



Clarkson™

# COURSE CATALOG

2023-2024

Prepared by the Registrar's Office July 2023

**Business - School of Business - Subject: Accounting**

AC 1(2 - 4) Course ID:007962 2015-06-30

**Accounting Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

AC 2(2 - 4) Course ID:007963 2015-06-30

**Accounting Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

AC 202(3) Course ID:007317 2022-02-10

**Financial Accounting**

In this course students will gain the fundamental knowledge of analyzing, recording, classifying, and summarizing accounting information into financial statements. These financial statements are important both inside and outside of the reporting entity, as they aid business managers, creditors, and investors in making many types of business decisions. This course will allow students to become proficient in preparing financial statements in accordance with Generally Accepted Accounting Principles by developing their ability to identify and interpret financial transactions, classify and record business transactions in a financial accounting system, and complete the accounting cycle.

Components: Lecture

Attributes: Offered Fall and Spring

AC 203(3) Course ID:012743 2022-02-10

**Managerial Accounting**

The purpose of this course is to provide future managers with an introduction to and an appreciation of the vast array of tools and techniques that comprise managerial accounting. Managerial accounting information is used widely in an organization, from pricing products to allocating company resources. This course develops your understanding of procedures, methods, and information gathering techniques that managers and other business professionals use to analyze financial data in order to make managerial decisions and budget/forecast results of operations.

Components: Lecture

Attributes: Offered Fall and Spring

Requirement Group: Prerequisite: AC202

AC 205(3) Course ID:007318 2016-01-04

**Introduction to Financial and Managerial Accounting**

[Cross-listed with EM 205] An introductory survey of accounting information to guide and improve decision making. Many course topics involve cost planning and control techniques used to evaluate and improve the financial performance of organizations and/or products.

Components: Lecture

Course Equivalents: EM 205

Attributes: Offered Each Term

AC 305(3) Course ID:007321 2016-11-04

**Cost Accounting**

Cost accounting information is used for both internal and external reporting purposes and plays a vital role within an organization as a basis for making sound business decisions. This course is an extension of Managerial Accounting with its primary objective to develop an in-depth understanding of cost accounting tools and techniques at an advanced cost accounting level. More specifically, students will learn fundamental cost analysis principles, generalizations and theories and gain in-depth factual knowledge of various product costing management systems (terminology, classifications, methods & trends), and learn various cost allocation methods. Overall, students are introduced to various methods to assist in decision-making, both operational and strategic within the organization developing their skills, competencies, and points of view needed by accounting professions.

Components: Lecture

Attributes: Offered Spring Term

Requirement Group: Prerequisites: AC203 or EM205 or AC205

**Business - School of Business - Subject: Accounting**

AC 311(3) Course ID:011275 2016-09-09

**Intermediate Financial Accounting I**

First course in a two-course sequence in financial reporting at the professional level. Seeks to develop student's' understanding of the environment in which financial reporting choices are made and how they impact financial statement information. The course integrates the perspectives of accounting, corporate finance, and economics to help understand how business transactions get reported and their decision implications. Examines the principles and practices of external financial reporting, with particular emphasis on balance sheet valuation and income determination. Reviews basic accounting concepts and the essentials of the accounting process. Covers the measurement and disclosure problems associated with such topics as cash, receivables, inventories, long-lived assets, and intangibles.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: AC203

AC 312(3) Course ID:010178 2016-01-04

**Intermediate Financial Accounting II**

Continues the two-course sequence begun in AC 311 by exploring additional coverage of generally accepted accounting principles such as current liabilities, long-term debt, stockholders' equity, earnings per share, accounting for income taxes, accounting changes, and the Statement of Cash Flows. Pro forma 'as if' disclosures, earnings, and financial statements are introduced as well as present value techniques to accounting valuations.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: AC 311

AC 407(3) Course ID:007323 2015-06-10

**Taxation of Business Entities**

Emphasis is placed on federal income tax responsibilities of individual taxpayers and small businesses. Topics covered include tax planning, compliance, sales taxes, and payroll taxes.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: Must have junior or senior standing.

AC 421(3) Course ID:007325 2016-09-09

**Accounting Information Systems**

The course covers the design and installation of accounting systems that provide relevant and reliable information. Special emphasis is given to potential risks of errors or irregularities and the need for systems control. Projects may include analysis, design and implementation of an accounting system.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: AC305 or AC203.

AC 431(3) Course ID:007326 2016-11-08

**Advanced Accounting: Investment and Ownership Interests**

This course examines the theory and practice of accounting for business combinations, consolidated financial statements, partnerships, foreign currency transactions, and foreign inter-company investments. Additional topics may also be covered. Current issues in these areas will also be discussed.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: AC311

AC 436(3) Course ID:007327 2016-11-08

**Auditing**

A study of the independent auditor's examination of his or her clients' recording of events, periodic adjustments and formal statements. Topics will include the auditor's opinion, sampling as used in auditing, auditing and the computer.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: AC311, senior standing and at least a C average in all previous accounting courses taken

**Business - School of Business - Subject: Accounting****AC 487(1 - 3)** Course ID:007328 2017-01-13**Special Project in Accounting**

An investigation of a problem or in-depth topic undertaken by the student under the guidance of a faculty member. Prerequisites: junior standing, grade of at least C in all Clarkson accounting courses, and consent of the instructor.

**Components:** Research**Attributes:** Given When Needed**AC 490(1 - 3)** Course ID:007329 2016-04-04 **Instructor Consent Required****Internship in Accounting**

An unpaid internship that is related to the student's professional goals.

**Components:** Independent Study**Attributes:** Given When Needed**AC 603(2)** Course ID:007332 2015-06-30**Management Accounting**

[Cross-listed with AC 604] The purpose of this module is to build on the students' knowledge of basic accounting concepts, to enhance their ability to properly evaluate and use accounting data for internal planning, control and decision making. Topics include financial statement analysis; management control; agency costs and organizational behavior; goals and strategies; information economics; responsibility center, profit center and investment center accounting; divisional control and transfer pricing; multinational corporations and foreign currency translation. Consideration is also given to usefulness of information contained in general purpose financial statements.

**Components:** Discussion, Lecture**Course Equivalents:** AC 604, AC 604**Attributes:** Offered Fall Term**Requirement Group:** Restriction: Admission to the MBA program required

**Business - CRC Business - Subject: Accounting**

AC 604(3) Course ID:007333 2018-11-29

**Financial and Managerial Accounting for Decision Making**

[Cross-listed with AC 603] This course covers Financial and Managerial Accounting concepts for MBA students. The financial accounting portion; covers the fundamentals of the accounting cycle and the evaluation of the major financial statements for external reporting purpose. Furthermore, develop the ability to analyze the financial statements. The managerial cost accounting portion will cover job costing, process costing, cost-volume-profit analysis, budgeting and pro-forma financial statement development, flexible budgets and standard costing systems, cost allocation and responsibility accounting, and tools for short-term business decisions. The overall objective of the course is to develop students' ability to construct accounting reports, understand accounting reports and make decisions from such accounting information.

**Components:** Lecture**Same As Offering:** AC 604**Course Equivalents:** AC 603**Attributes:** Offered Summer Term

AC 604(3) Course ID:007333 2018-11-29

**Financial and Managerial Accounting for Decision Making**

[Cross-listed with AC 603] This course covers Financial and Managerial Accounting concepts for MBA students. The financial accounting portion; covers the fundamentals of the accounting cycle and the evaluation of the major financial statements for external reporting purpose. Furthermore, develop the ability to analyze the financial statements. The managerial cost accounting portion will cover job costing, process costing, cost-volume-profit analysis, budgeting and pro-forma financial statement development, flexible budgets and standard costing systems, cost allocation and responsibility accounting, and tools for short-term business decisions. The overall objective of the course is to develop students' ability to construct accounting reports, understand accounting reports and make decisions from such accounting information.

**Components:** Lecture**Same As Offering:** AC 604**Course Equivalents:** AC 603**Attributes:** Offered Summer Term

AC 610(3) Course ID:012541 2017-07-14

**Fraud and Forensic Accounting**

[Formerly MBA 610] This MBA course is designed as a seminar. The primary goal of this course is to assist students in recognizing fraud, which will aid in the prevention and detection of fraud. This course will focus on the professional responsibility of accountants to act ethically. The course materials will discuss what a fraud is, how frauds can be committed, how frauds can be uncovered, and what accountants and business executives can do to prevent frauds from occurring in their organizations. We will use a variety of materials that were provided by the Association of Certified Fraud Examiners. In addition, students will analyze fraud case studies.

**Components:** Lecture**Attributes:** Offered Spring Term

AC 613(3) Course ID:012544 2016-07-25

**Advanced Auditing and Research**

[Formerly MBA 613] This course is an advanced case and research-oriented study of topics in Auditing. Through a series of cases and related research, students will engage in the practice of auditing using real-world situations as the foundation for technical and theoretical discussions of issues facing the contemporary auditor. Cases will be chosen to reflect current and emerging topics in the practice of public accounting, financial auditing, fraud investigation, and forensic accounting. Auditing communications tools and software-based audit techniques will also be emphasized.

**Components:** Lecture**Attributes:** Offered Fall Term

**Business - School of Business - Subject: Accounting****AC 620(3)** Course ID:013020 2019-11-01**Accounting Analytics**

Understanding how to use data to formulate and solve business problems provides an opportunity for the accounting professional to become a forward-thinking strategic partner in the organization. This course is designed to prepare students with the necessary tools and skills needed to perform data analytics successfully. Based on case studies, students are required to think through the steps needed to provide data-driven insights and recommendations. Labs provide multiple datasets and tutorials. Students will conduct data analysis using Excel and Access (including SQL). The course will develop a student's data analytics mindset (critical thinking skills), that is the development of students' ability to ask questions that can be answered using data.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: IA 530 or equivalent.**AC 623(3)** Course ID:007337 2021-11-18**Financial Statement Analysis**

This course helps students utilize the information contained in financial statements to make decisions. It specifically discusses (1) institutional forces underlying the provision of financial statement data, (2) properties of numbers derived from financial statements, (3) key aspects of decisions using financial statement information and the environment in which they are made, (4) design of information appropriate to these decisions. The objective is to allow the student to employ these factors to exploit fully the richness of the information contained in financial statements, while appreciating its limits.

**Components:** Lecture**Attributes:** Given When Needed**AC 630(2)** Course ID:009698 2016-08-27**Cost Management**

A graduate level course covering basic concepts and techniques of cost management. Topics include basic cost management concepts, cost-volume-profit analysis, strategy and the master budget, the role of costs in pricing decisions, job and activity based costing (ABC) costing systems, relevant costs for decision making, operational and management control systems, target costing, value engineering, theory of constraints, the Balanced Scorecard, and the management and control of quality. Explores the analysis and presentation of information from a behavioral as well as a quantitative perspective. Introduces basic financial and sustainability concepts and reporting issues.

**Components:** Lecture**AC 636(3)** Course ID:007339 2017-03-17**Auditing**

An examination of auditing standards and procedures currently followed by independent public accountants. Ethics, audit evidence and reporting standards are also considered.

**Components:** Lecture**Same As Offering:** AC 636**Attributes:** Given When Needed**Requirement Group:** Prerequisites: AC 603 and AC 623 or the equivalent of these courses.

**Business - CRC Business - Subject: Accounting****AC 636(3)****Course ID:007339****2017-03-17****Auditing**

An examination of auditing standards and procedures currently followed by independent public accountants. Ethics, audit evidence and reporting standards are also considered.

**Components:** Lecture**Same As Offering:** AC 636**Attributes:** Given When Needed

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**Business - School of Business - Subject: Accounting****AC 648(3)** Course ID:007341 2015-06-30**Seminar in Accounting Information Systems & Auditing**

A graduate level introduction to accounting information systems. Coverage includes the basic systems methodology and terminology necessary to prepare students for any of the professional accounting examinations. Emphasis is on the design, internal control mechanisms, documentation and audit problems associated with specific accounting subsystems, i.e. payroll, general ledger, inventory-production or procurement-receivables. The course introduces students to three typical aspects of information technology (IT) systems and audits: audits of computerized information systems, the computer facility, and the process of developing and implementing accounting information systems. A major course segment involves a detailed study, including hands-on experience using commercial software of at least one specific subsystem.

**Components:** Seminar**Attributes:** Offered Spring Term**AC 650(3)** Course ID:011322 2015-07-08**Accounting Research & Theory**

Introduces graduate students to accounting research and theory. Focuses on how research can help address management, uniformity and disclosure issues that regularly arise in business. Investigates ethical perspectives and emerging issues. Evaluates policy formulation of accounting standards and their impact on financial reporting. Students research, analyze, develop and present proposed solutions to accounting and related business cases encountered in practice.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: AC404 or equivalent**AC 687(1 - 3)** Course ID:007342 2021-07-26**Instructor Consent Required****Special Projects in Accounting**

An investigation of a problem undertaken by the student which is acceptable to and under the guidance of the faculty member and chairperson. The course provides an opportunity for the student to investigate and analyze a problem area of accounting in depth on an independent study basis.

Requirement: Instructor and Program Chair permission

**Components:** Independent Study**Same As Offering:** AC 687**Attributes:** Given When Needed

**Business - Economics & Financial Studies - Subject: Accounting**

AC 687(1 - 3) Course ID:007342 2021-07-26 Instructor Consent Required

**Special Projects in Accounting**

An investigation of a problem undertaken by the student which is acceptable to and under the guidance of the faculty member and chairperson. The course provides an opportunity for the student to investigate and analyze a problem area of accounting in depth on an independent study basis.

Requirement: Instructor and Program Chair permission

**Components:** Independent Study

**Same As Offering:** AC 687

**Attributes:** Given When Needed

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**Engineering - Mechanical & Aerospace Eng - Subject: Aeronautical Engineering****AE 1(2 - 4)** Course ID:007964 2015-01-13**Mechanical and Aeronautical Engineering Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study**Attributes:** Transfer Credit Only**AE 2(2 - 4)** Course ID:007965 2015-01-13**Mechanical and Aeronautical Engineering Elective**A college level course for which there is no comparable Clarkson course. Used for transfer credit only.  
This course may be used as a Professional Elective.**Components:** Independent Study**Attributes:** Transfer Credit Only**AE 201(1)** Course ID:010193 2022-03-18**Measurement & Instrumentation**

[Cross-listed with ME 201] This course provides an introduction to measurement and instrumentation in mechanical and aerospace engineering. Fundamental components of mechanical measurement systems are studied through laboratory experiments. Tests include electromechanical instruments, circuits, actuators, controls, and data acquisition systems. First order uncertainty analysis is performed and empirical results are compared with engineering principles from material science, statics, strength of materials, rigid body dynamics and electrical science.

**Components:** Lecture**Course Equivalents:** ME 201**Attributes:** Two communication units, Offered Spring Term**Requirement Group:** Corequisites: ES220, ES222, ES223**AE 212(3)** Course ID:007347 2021-11-04**Introduction to Engineering Design**

This course lays the foundation for the design curriculum of the MAE Department. Students are introduced to how to solve complex, open-ended engineering problems. Core topics covered are: the design process; engineering ethics and professional responsibilities; design for safety; mathematical and computer modeling; and written, oral and graphical communication. These topics are presented within the framework of at least two open-ended design projects which students must propose and accomplish through the completion of the preliminary design phase including a design report and presentation slides for each project.

**Components:** Lecture**Course Equivalents:** CE 212, ME 212**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: ES100. Co-Requisite: ES220.**AE 301(1)** Course ID:010195 2022-04-13**Experimental Methods**

This is a hands-on experimental methods course with applications in aerospace engineering. Experiments involve flow visualization, airfoil wing pressure, air duct friction, aircraft structural stress and strain, lift and drag force, air velocity, wing vibration and wind tunnel testing. Course topics include workplace safety, test procedures, calibration, measurement uncertainty, error propagation, design of experiments, data acquisition, sampling, data analysis, and technical report writing.

**Components:** Lecture**Course Equivalents:** ME 301**Attributes:** Two communication units, Offered Fall Term**Requirement Group:** Prerequisite: AE201 or ME201**AE 342(3)** Course ID:012886 2021-10-13**Introduction to Numerical Methods with Application**

The goal of this course is to introduce the techniques needed for the numerical solution of ordinary and partial differential equations. These techniques will include the formulation of physical problems for numerical simulations, discretization and solution methods, and use of commercial software for solving engineering problems governed by differential equations. Specific topics covered are numerical differentiation, integration, interpolation, and associated errors, the solution of systems of non-linear algebraic equations, and the solution of initial and boundary value problems using finite difference and finite element methods.

**Components:** Laboratory, Lecture**Course Equivalents:** ME 342**Attributes:** Offered Fall and Spring**Requirement Group:** Prerequisites: ES 100, or HP102 and HP103, or EM120 and EM121, or CS141, and MA 232 Corequisites: ES

**Engineering - Mechanical & Aerospace Eng - Subject: Aeronautical Engineering**

**AE 350(3)** Course ID:007348 2023-05-23

**Aerospace Structures I**

[Cross-listed with ME 350] Properties of wing sections. Beam-column moments; torsion of thin-walled and skin-stringer multiple-cell sections; non-symmetrical bending of skin-stringer wing sections; flexural shear in open and closed thin-walled and skin-stringer sections; modified beam theory for wing design; deflection by energy method; buckling of columns and thin panels.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: ES 222 and ES223

**AE 351(3)** Course ID:007365 2023-05-30

**Aerospace Structures II**

Properties of fuselage sections; modified beam theory for fuselage design; linear elastic plate theory and analyses; linear elastic shell theory and analyses; numerical techniques for complex structures; failure modes of plates and shells; introduction to composite materials; design techniques for plates and shells

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: AE350.

**AE 365(3)** Course ID:007349 2017-02-24 Instructor Consent Required

**Independent Projects I**

[Cross-listed with ME 365] An opportunity for the student to become involved singly, or with a group, working on a special project under the guidance of a faculty member. Topics are often suggested by the faculty but suggestions from the students are encouraged. By permission of adviser only.

**Components:** Independent Study

**Course Equivalents:** ME 365

**Attributes:** Offered Each Term

**AE 366(3)** Course ID:007350 2017-02-24 Instructor Consent Required

**Independent Projects II**

[Cross-listed with ME 366] Continuation of AE 365.

**Components:** Independent Study

**Course Equivalents:** ME 366

**Attributes:** Offered Each Term

**AE 401(1)** Course ID:010197 2022-01-26

**Test Engineering**

[Cross-listed with ME 401] This is a test engineering course focused on measurement, test and experiment design in mechanical and aerospace engineering. The course primarily involves a semester-long team-based experimental project including a proposal, test plan, risk assessment, measurement equipment selection, procedure writing, test execution, data acquisition, analysis, and technical paper writing.

**Components:** Lecture

**Course Equivalents:** ME 401

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: AE/ME301

**AE 425(3)** Course ID:007353 2022-03-18

**Aerodynamics**

Topics covered include: Wing aerodynamics, thin airfoil theory, source panel methods, and supersonic and subsonic finite wing theories. Boundary layer theory and flow separation will also be discussed.

**Components:** Lecture

**Course Equivalents:** ME 326

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: ES330, ES340 and MA231

**Engineering - Mechanical & Aerospace Eng - Subject: Aeronautical Engineering**

**AE 427(3)** Course ID:007354 2016-09-13

**Design of Propulsion Systems**

[Cross-listed with ME 427] The course covers the preliminary design of various propulsion devices of historical and modern significance including propellers, ramjets, turbojets and its variations and rockets and its variations and supersonic nozzles. These systems will be designed in the context of aircraft, watercraft and land vehicle applications. Detailed design on components such as turbine blades, diffusers, compressor stages, combustors, fans and two-dimensional supersonic nozzle shapes will be addressed. Many lessons will include examination of actual component hardware. Instruction on design methodology is combined with fluid and thermodynamic analysis techniques to form computational schemes for testing design variations. Design decisions will be based on matching application performances, optimizing, meeting application constraints and iterative selection. A series of engineering homework assignments and design projects will be used to learn about each system. Most work will be individual with one or two projects requiring teamwork.

**Components:** Lecture

**Attributes:** Two communication units, Offered Spring Term

**Requirement Group:** Prerequisites: ME326 or ME431 or AE431, and ES340.

**AE 429(3)** Course ID:007356 2015-01-20

**Aircraft Performance and Flight Mechanics**

Fundamentals of propeller and jet aircraft performance. Steady and accelerated flight. Equations of motion. Level flight. Gliding, climbing, driftdown. Takeoff and landing. FAR requirements. Range and endurance. Payload-range diagrams. Maneuvering. V-n diagram. Turning and pull-ups. Stall and spin behavior. Energy methods.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Corequisites: AE425.

**AE 430(3)** Course ID:007357 2017-02-24

**Stability and Control of Aerospace Vehicles**

[Cross-listed with ME 430] An introduction to atmosphere flight vehicle dynamics. Static stability and control. Equations of motion. Dynamic stability and control. Classical control theory. Transfer functions and block diagrams. Routh's criterion, Root locus techniques, Bode plots. Modern control theory. State space techniques. Observability, and controllability. Flying qualities, ratings and regulations. Application to aircraft autopilot design.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: AE455/ME455 or AE324/ME324, MA231, and MA232.

**AE 431(3)** Course ID:007358 2019-06-07

**Gas Dynamics**

The fundamental theories of modern compressible flow and their applications to aerodynamics are introduced. Topics include steady and unsteady supersonic flows, transonic flows, high-temperature gas dynamics, numerical methods and nozzle design.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: ES330, ES340 and MA 232 or equivalent.

**AE 443(3)** Course ID:007359 2017-02-24

**Optimal Engineering**

[Cross-listed with ME 443] An introduction to the optimal design of mechanical systems. This course involves the application of mathematical optimization techniques, including linear and nonlinear methods, to the design of devices and systems of interest to mechanical engineers. Emphasis is placed on the formulation of problems which can be solved by these techniques. Use is made of currently available optimal design computer programs.

**Components:** Lecture

**Course Equivalents:** ME 443

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: AE/ME350 or ME341.

**Engineering - Mechanical & Aerospace Eng - Subject: Aeronautical Engineering****AE 450(3)** Course ID:007360 2017-01-13**Aircraft Design I**

An introduction to basic methodology and decisions surrounding aircraft design leading to the conceptual and preliminary design of an aircraft. Topics include preliminary sizing, requirements and constraints, mission definition, layout, stability and performance estimation, structural issues, economics, trade studies, and ethical implications of the design and decision process.

**Components:** Research**Attributes:** One communication unit, Offered Fall Term**Requirement Group:** Prerequisites: AE212, AE425, AE429, AE458 Corequisites: AE430, AE431**Req. Designation:** Technology**AE 451(3)** Course ID:007361 2022-11-10**Aircraft Design II**

Continuation of concepts introduced in Aircraft Design I on the basic methodology and decisions surrounding aircraft design with a focus on the specific design of an aircraft in the context of a company type of environment. The course is supplemented by lectures on various topics including conceptual design issues, detailed system considerations, trade studies, propulsion integration, structural issues, CFD methods, testing considerations, cost, and manufacturing.

**Components:** Laboratory, Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: AE450 Corequisites: AE427**Req. Designation:** Technology**AE 455(3)** Course ID:007363 2017-02-24**Mechanical Vibrations and Control**

[Cross-listed with ME 455] Fundamentals, free vibration, harmonically excited vibration, transient vibration, multi-degree freedom systems, vibration measurements, introduction to control theory, linear feedback control, vibration control, adaptive and optimal control, numerical methods.

**Components:** Lecture**Course Equivalents:** ME 455**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: ES223**Req. Designation:** Technology**AE 457(3)** Course ID:007364 2023-03-03**Composite Mechanics and Design**

Nature of composite materials. Classification and characteristics of composite materials, mechanical behavior of composite materials. Macromechanical and micromechanical elastic behavior of unidirectional lamina. Constitutive and transformation relations. Strength of unidirectional lamina. Composite failure theory. Mechanics of multidirectional structural laminates. Lamination theory. Strength and failure analysis of multidirectional laminates. Effect of temperature and moisture.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: ES222 and ES260**Req. Designation:** Technology**AE 459(3)** Course ID:013129 2023-03-03**Space Robotics**

This course establishes principles underpinning space robotics with a thorough and modern approach; chapters build from general physical foundations through an extensive treatment of control systems, perception challenges, and conservation principles in dynamics. After introducing the principles and governing dynamic equations of space robotic systems, the latter part of the course focuses on real-life applications related to space systems including space mechanics and the dynamics of space vehicles. It introduces supervised and unsupervised machine learning (ML) algorithms including implementations of ML techniques for perception challenges that can be applied to a wide range of space vehicles and robotic systems. Applications of dynamics and control theory to real spacecraft systems are also covered. After completing this course, the students will be able to apply basic robotic and machine learning techniques in space robotic systems.

**Components:** Lecture**Course Equivalents:** ME 559**Attributes:** Given When Needed**Req. Designation:** Technology

**Engineering - Mechanical & Aerospace Eng - Subject: Aeronautical Engineering****AE 460(3)** Course ID:012922 2023-04-03**Introduction to Spacecraft Systems Engineering**

One-semester elective course offered to Juniors and Seniors in the ME or AE programs. Introduces the major engineering subsystems and disciplines required to design and operate a space satellite e.g. configuration and structure, electrical power subsystem, attitude control subsystem etc. Also basic orbital mechanics, launch vehicles, space environment including ionizing radiation and Sun-Earth-spacecraft geometries, ground operations; overall mission and spacecraft system engineering.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: ME212 or AE212**Req. Designation:** Technology**AE 465(3)** Course ID:007366 2017-02-24 **Instructor Consent Required****Advanced Independent Projects I**

[Cross-listed with ME 465] An opportunity for the advanced student to undertake an independent investigation in a mechanical engineering field of his or her own choice. Assistance will be given only when the student requests it. The project may be a comprehensive literature investigation, involve laboratory experiments, or involve analytical work by permission of adviser only.

**Components:** Independent Study**Course Equivalents:** ME 465**Attributes:** Offered Spring Term**Req. Designation:** Technology**AE 466(3)** Course ID:007367 2022-11-10**Aircraft Accidents: Causes and Consequences**

This course explores key accidents in aerospace history from technical, professional, and organizational perspectives. Students will complete hands-on analyses that apply content from the aeronautical engineering program. Topics include aviation regulations, professional ethics, human factors, and systems considerations.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: AE 458, AE 425, AE 429, AE 430, AE 450 Corequisite: AE 427**Req. Designation:** Technology**AE 470(3)** Course ID:007869 2022-11-10**Orbital Mechanics**

[Cross-Listed ME570] This course provides an overview of the fundamentals of orbital mechanics. Beginning from kinematics and rigid body dynamics, students are introduced to topics in orbital and attitude dynamics and control. In orbital dynamics and control, core topics covered include: the two-body problem, orbital motion, Kepler's Laws, orbital elements, orbital perturbations, orbital maneuvers, interplanetary trajectories, and the restricted three-body problem. In attitude dynamics and control, core topics covered include: attitude stabilization, torques on a spacecraft, torque-free motion, spin and dual-spin stabilization, gravity-gradient stabilization, and active attitude control.

**Components:** Lecture**Course Equivalents:** ME 570**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: ES 223, AE/ME 324, and MA 232**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: American Studies****AMST 1(2 - 4)** Course ID:011750 2015-01-13**American Studies Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study**Attributes:** Transfer Credit Only**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Anthropology**

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ANTH 1(2 - 4) Course ID:010821 2015-01-13

**Anthropology Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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ANTH 2(2 - 4) Course ID:010817 2015-01-13

**Anthropology Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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ANTH 201(3) Course ID:011800 2015-03-05

**Introduction to Cultural Anthropology**

Using case studies examining a number of different cultures, the course gives students the opportunity to explore the similarities and differences of cultures around the world by showing them the varieties of ways in which humans organize their lives and understand their worlds. The course also introduces students to the concepts and methods that anthropologists use to describe and understand those similarities and differences, providing them with the tools to better understand the complexity and the diversity of the human condition. The course gives students an introduction to the basic theoretical concepts and methods used in social analysis and it provides them the opportunity to see the use of those tools in a variety of specific, ethnographic cases drawn from a range of societies and cultures.

Components: Lecture

Attributes: Contemporary and Global Issues, Cultures and Societies, University Course, Given When Needed

Req. Designation: Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: Anthropology**

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**ANTH 220(3)** Course ID:011410 2019-09-11**Understanding the Americas**

When does America begin? With Columbus, with the arrival of the Mayflower, or with the arrival of hunters coming from Asia through the Bering Strait? The Americas are continents with a complex history before European arrival, and a complex history since then, in which commonalities and experiences between the peoples of the Americas are often overlooked. In contrast to the European Union, countries in the Americas are enforcing their borders to stem the huge population flows from desperate regions into more prosperous regions. In this course, we will be looking at the origins and experiences that tie the peoples of the Americas together as well as tear them apart. We will be reading an eclectic mix of fiction and nonfiction.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Science, Technology and Society, University Course**Req. Designation:** Technology

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**ANTH 225(3)** Course ID:011411 2015-03-03**Global Perspectives on Sexuality**

Sexuality is often thought of as one of the most private aspects of life. Yet, it is also the subject of politics, commerce and public imagination at the state and global level. Exploring such topics as Human Trafficking, HIV/AIDS, Cybersex, and the emergence of new sexual identities, this course examines sexuality in a global context.

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Science, Technology and Society, University Course, Offered Even Springs**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Anthropology****ANTH 230(3) Course ID:008523 2017-10-23****Introduction to Race and Ethnicity**

[Formerly LC315/Cross-Listed with SOC230] Variations in phenotype--skin color--have always existed, but has 'race'? What are the bases of racial identity in the contemporary United States? How have they changed? How are 'race' and 'ethnicity' related? In this course we will address broader questions about race by focusing on contemporary racial and ethnic divisions and by examining the history of these concepts in the Western Hemisphere.

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology

**Liberal Arts - Humanities & Social Sciences - Subject: Anthropology****ANTH 235(3)****Course ID:011261****2022-02-11****Europe Through Film and Fiction**

This introductory Anthropology course introduces students to the diversity of European cultures through film and fiction, and through various themes, including love across cultures, post Cold War transitions, the expansion of the European Union, the growing integration between European states, cultural conflicts, and the rise of anti-immigrant movements and politics in wide swaths of Europe.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Anthropology****ANTH 238(3) Course ID:010807 2018-09-17****Men and Masculinities**

[Formerly LC393] Over the last few decades, manhood has come under attack. Instead of warrior heroes like John Wayne and James Bond, TV shows today feature a good number of losers like Homer Simpson and Frazier and numerous men's movements have emerged centered on such issues as 'male bonding' and atonement. At the same time, other aspects of popular culture bombard us with an image of men as muscle-packed, mean, lean fighting machines or as exploitative pimps. While the average size of men's muscles seemed to have increased dramatically, what has happened to men's sense of self, how they see each other, and how they see women? Is this all the result of feminists attacking men as being domineering, oppressive chauvinists? Or is this a period of sorely needed male self-reflection? In this discussion-based course we take a critical look at the role of manhood in our society and elsewhere, by looking at how it is represented in popular culture, and lived in such institutions as sports, schools and college, military, prisons, marriage, politics or work, and

**Components:** Lecture**Attributes:** Cultures and Societies, Given When Needed**Req. Designation:** Technology**ANTH 240(3) Course ID:012844 2017-10-11****The Diversity of the U.S. in Ethnographic Perspective**

The United States is often referred to as a 'melting pot' of cultures. This metaphor is said to represent the ways in which people of diverse racial and ethnic backgrounds make up the American nation. As components of diversity in the U.S., race and ethnicity are understood in varied ways. Racial and ethnic conflict, clashes, disparities, and inequalities sometimes manifest themselves across professions, housing, access to opportunities, and livelihoods in general. But a closer look can unveil the remarkably creative ways in which different groups of people establish meaningful connections to bridge differences, allowing productive syntheses to emerge in social, cultural, political, religious, and economic realms. This course offers a window into some of these clashes and collaborations through engaging readings and audiovisual materials putting U.S. diversity into context. Anthropologists and other social scientists usually call such a window an ethnographic one. In other words, the course will help you put diversity into perspective by bringing you

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Cultures and Societies, University Course, Given When Needed**Req. Designation:** Technology**ANTH 255(3) Course ID:012887 2019-09-30****Culture and the Environment**

[Cross-listed with ANTH555] As our world faces ever-more urgent challenges related to climate change and environmental instability, the very categories of "nature," "environment," and "climate" deserve critical and innovative thought. Central to this rethinking is a consideration of the cultural, political, and economic aspects of these terms, thereby creating space for careful critiques and alternative engagements. Anthropologists have long been active in examining cultural beliefs and practices related to environments. Today, these perspectives are changing to reflect a better understanding of human relationships with non-human actors and processes. This class provides an introduction to Environmental Anthropology, with particular attention to the power and politics of knowledge production about environments and climates. It begins with a historical look at the sub-discipline, followed by a discussion of more recent theoretical and methodological approaches to rethinking how we study and engage with the environment.

**Components:** Lecture**Course Equivalents:** ANTH 555**Attributes:** Contemporary and Global Issues, Cultures and Societies, University Course, Offered Fall and Spring**Req. Designation:** Technology**ANTH 285(3) Course ID:010809 2019-09-11****Food and Society or What to Think About What You Eat**

[Cross-listed with SOC 285] [Formerly LC 397, ANTH 385] Food is central to how we understand ourselves and our world. This class examines the cultural politics of food, exploring the social, political, and economic implications of global food production and consumption. We will examine the nature and history of contemporary food networks and the impacts of these patterns on our society, economy, health, and environment. In so doing, we will use food as a lens through which to understand larger relationships and processes, from social inequality to climate change.

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Science, Technology and Society, University Course, Offered Fall Term**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Anthropology****ANTH 311(3)****Course ID:012843****2020-01-15****Ethnography**

[Cross-listed with ANTH511] Ethnographic methods, the key research methodology of cultural anthropologists, are now used in a wide variety of disciplines, such as education, to health, environment, business, to name just a few. An exploration of anthropological research and writing through the analytical and practical study of "fieldwork" and "ethnography", this course examines a variety of anthropological research methods and genres of representation, and teaches students how to conduct an ethnographic fieldwork project of their own. This course is in large part a workshop in which students will learn and mobilize various ethnographic methods and techniques, identify a research project and conduct ethnographic fieldwork. The culminating experience of the course is the writing of a 10-15 pages mini ethnography, based on the fieldnotes that students are writing.

**Components:** Lecture**Course Equivalents:** ANTH 511**Attributes:** One communication unit, Individual and Group Behavior, Given When Needed**Req. Designation:** Technology**ANTH 320(3)****Course ID:010455****2020-09-22****Racial Inequality in the United States**

[Formerly LC356] What is the status of racial equality today, four decades after the civil rights struggle? Have we ceased to judge people 'by the color of their skin,' have we achieved a society where all members share 'equal opportunities' to succeed? Has the 'appreciation of cultural diversity' in America abolished notions of white superiority and practices of white privilege? Or have we returned, albeit in a more invisible form, to the hypocrisy of the 1896 Apartheid doctrine of 'separate but equal'? Or, is racism permanent and racial inequality a critical element in the fabric of American society? This course attempts to arrive at an understanding of how systems of racial inequality are maintained in a seemingly democratic system that allegedly upholds the civil rights of all its citizens. We will first assess the extent of racial inequality in the contemporary US and then review current theories that explain the persistence of inequality. Facing the paradox of explaining the social reality of race while asserting its biological

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Individual and Group Behavior, University Course, Offered Spring Term**Req. Designation:** Technology**ANTH 325(3)****Course ID:011484****2022-02-11****Sex and Commerce**

This course, designed for upper division students who have been taking courses on sexuality and/or gender, examines in depth the commercial aspects of sex. From looking at the concept of marriage as an economic transaction, to the ways in which sex is sold or is used as a vehicle to sell, this course provides an in depth discussion of the question of pornography, sex-trafficking, and prostitution. It raises fundamental questions about sexuality, love, and gender.

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology**ANTH 332(3)****Course ID:010202****2020-09-22****Cities and Social Justice**

[Formerly LP310] Understanding Cities: New York, Los Angeles, Berlin. For many Americans, cities have become synonymous with violence, poverty and decay, homelessness and racial tension, as well as excessive consumerism. But they are also places of intense cultural activities. In any case, cities are where most jobs are concentrated and where most of us will eventually live. Understanding how cities work and the problems they face is therefore critical for all of us. Using a comparative and international perspective, this course explores such issues as cities' management of natural and vital resources (f.ex. water or electricity), the built environment and its relationship to social identities and social engineering, global networks of cities in terms of labor markets, capital, and commodities, and their effects on urban lives, cities as sustainable environments, and last but not least, the cities as sites of social and racial in/justice. Students are to conduct team-based research projects that tackle real-life problems in one of the three cities or Potsdam

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Anthropology**

ANTH 360(3)	Course ID:013123	2021-09-14
<b>The Ethics of Eating</b>		
Walking through the grocery store, we're confronted by a range of ethical claims--from Fair Trade to Cage-Free, food companies ask us to demonstrate who we are and what we value. In this class, students learn about how eating is positioned as an (un)ethical act. Focusing on the methods and approaches of cultural anthropology, students explore food and eating in a variety of cultural contexts, with particular attention to the inequalities embedded in food systems. The course culminates with a research paper in which students themselves detail their own understanding of what it means to eat ethically.		
<b>Components:</b> Lecture <b>Attributes:</b> One communication unit, Contemporary and Global Issues, Cultures and Societies, Offered Even Springs <b>Req. Designation:</b> Technology		

ANTH 490(1 - 10)	Course ID:010753	2022-08-19	Department Consent Required
<b>Independent Study</b>			
Designed primarily for an advanced student who wishes to pursue special interests in anthropology for one or more semesters, this series allows students to design and conduct independent study projects under faculty guidance.			
Prerequisite: consent of the instructor.			
<b>Components:</b> Independent Study <b>Attributes:</b> Offered Each Term <b>Req. Designation:</b> Technology			

ANTH 499(0)	Course ID:010900	2010-06-03
<b>Minor Portfolio</b>		
In this course, students complete their Liberal Arts Minor Portfolios under the direction of their minor advisor. The course is graded on a Pass-No Credit Basis.		
<b>Components:</b> Independent Study <b>Req. Designation:</b> Technology		

ANTH 511(3)	Course ID:013025	2020-01-15
<b>Ethnography</b>		
[Cross-listed with ANTH311] This course will cover the same subject area and topics as ANTH311. Additional materials at the graduate level will be expected of those who register under this catalog number. (The attached syllabus includes the additional requirements for graduate students.)		
<b>Components:</b> Lecture <b>Course Equivalents:</b> ANTH 311 <b>Attributes:</b> Given When Needed <b>Req. Designation:</b> Technology		

ANTH 555(3)	Course ID:012969	2019-09-30
<b>Culture and the Environment</b>		
[Cross-listed with ANTH255] This course will cover the same subject area and topics as ANTH 255. Additional materials at the graduate level will be expected of those who register under this catalog number. (The attached syllabus includes the additional requirements for graduate students.)		
<b>Components:</b> Lecture <b>Course Equivalents:</b> ANTH 255 <b>Attributes:</b> Given When Needed <b>Req. Designation:</b> Technology		

ANTH 585(3)	Course ID:011824	2019-11-06	Instructor Consent Required
<b>Food and Society or What to Think About What You Eat</b>			
This course will cover the same subject area and topics as ANTH 285. Additional materials at the graduate level will be expected of those who register under this catalog number.			
<b>Components:</b> Lecture <b>Attributes:</b> Given When Needed <b>Req. Designation:</b> Technology			

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Anthropology****ANTH 586(3) Course ID:011859 2015-03-05****Food and Society or What to Think About What You Eat**

[Cross-listed with EV 586, SOC 586] Patterns of food production and consumption have dramatic impact on individuals, societies, and the environment. In this class we will examine aspects of food consumption and production in the United States. We will examine the nature and history of contemporary patterns of consumption and production and the impacts of these patterns and changes on our health and our environment. Topics to be discussed include the role of food in American society, the transformation of eating habits over the 20th century--including the rise of processed and fast food and also ethnic and organic food and vegetarian alternatives--the nature and impact of industrial agriculture and of genetically modified organisms, and the political economy of food. Graduate students will have additional course work.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: Visual and Performing Arts**

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ARTS 1(2 - 4) Course ID:011787 2015-01-13

**Art Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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ARTS 2(2 - 4) Course ID:011565 2015-01-13

**Art Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Knowledge Area requirement.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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ARTS 100(3) Course ID:011436 2015-01-13

**Introduction to Art**

Credit for this course is awarded only in the following cases: 1) receipt of a 4 or 5 on the AP Art History Exam, 2) receipt of a score of 5 through 7 on the International Baccalaureate Visual Arts Higher-Level Examination, or 3) satisfactory completion of a college-level introductory art appreciation or art history course.

Components: Independent Study

Attributes: Imaginative Arts, Transfer Credit Only

Req. Designation: Technology

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ARTS 101(3) Course ID:011437 2015-01-13

**Introduction to Music Theory**

Credit for this course is awarded only in the following cases: 1) receipt of a 4 or 5 on the AP Music Theory Exam or 2) satisfactory completion of a college-level introductory music theory course.

Components: Independent Study

Attributes: Imaginative Arts, Transfer Credit Only

Req. Designation: Technology

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**Other - Air, Space, and Cyberspace - Subject: Air, Space, & Cyberspace Studi****AS 101(1)** Course ID:008038 2019-06-13**Air Force Heritage and Values I**

This is a survey course focusing on the organizational structure and missions of Air Force organizations, military customs and courtesies, officership and core values, and an introduction to written and oral communication skills. AFROTC cadets must take AS 103 Leadership Laboratory in conjunction with this course.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**AS 102(1)** Course ID:008039 2019-06-13**Air Force Heritage and Values II**

This is a continuation of the overview of the organizational structure and missions of Air Force organizations, military customs and courtesies, officership, and core values to include further emphasis on basic communications principles. AFROTC cadets must take AS 104 Leadership Laboratory in conjunction with this course.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**AS 103(0)** Course ID:008040 2015-02-12**Leadership Laboratory**

Leadership Laboratory is the application of personal leadership skills, demonstration of command, effective communication, individual leadership instruction, physical fitness training, and knowledge of US Air Force customs and courtesies.

**Components:** Laboratory**Attributes:** Offered Fall Term**Requirement Group:** Corequisites: AS101.**Req. Designation:** Technology**AS 104(0)** Course ID:008041 2015-01-20**Leadership Laboratory**

Leadership Laboratory is the application of personal leadership skills, demonstration of command, effective communication, individual leadership instruction, physical fitness training, and knowledge of US Air Force customs and courtesies.

**Components:** Laboratory**Attributes:** Offered Spring Term**Requirement Group:** Corequisites: AS102.**Req. Designation:** Technology**AS 201(1)** Course ID:008042 2021-06-01**Team and Leadership Fundamentals I**

Team and Leadership Fundamentals is a survey course designed to provide a fundamental understanding of both leadership and team building. Communication skills are emphasized throughout the course. AFROTC cadets must take AS 203 Leadership Laboratory in conjunction with this course.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**AS 202(1)** Course ID:008043 2021-06-01**Team and Leadership Fundamentals II**

This is a continuation of the AS 201 survey course designed to provide a fundamental understanding of both leadership and team building. Communication skills are emphasized throughout the course. AFROTC cadets must take AS 204 Leadership Laboratory in conjunction with this course.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: AS201 or consent of the instructor.**Req. Designation:** Technology**AS 203(0)** Course ID:008044 2015-02-12**Leadership Laboratory**

Leadership Laboratory is the application of personal leadership skills, demonstration of command, effective communication, individual leadership instruction, physical fitness training, and knowledge of US Air Force customs and courtesies.

**Components:** Laboratory**Attributes:** Offered Fall Term**Requirement Group:** Corequisites: AS201.**Req. Designation:** Technology

**Other - Air, Space, and Cyberspace - Subject: Air, Space, & Cyberspace Studi**

AS 204(0) Course ID:008045 2015-01-20

**Leadership Laboratory**

Leadership Laboratory is the application of personal leadership skills, demonstration of command, effective communication, individual leadership instruction, physical fitness training, and knowledge of US Air Force customs and courtesies.

**Components:** Laboratory

**Attributes:** Offered Spring Term

**Requirement Group:** Corequisites: AS202.

**Req. Designation:** Technology

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AS 301(3) Course ID:008046 2023-06-01

**Leading People and Effective Communication I**

This course is a study of leadership and quality management fundamentals, professional knowledge, leadership ethics, and communication skills required of an Air Force junior officer. Case studies are used to examine Air Force leadership and management situations as a means of demonstrating and exercising practical application of the concepts. AFROTC cadets must take AS 303 Leadership Laboratory in conjunction with this course.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: AS202 or consent of the instructor.

**Req. Designation:** Technology

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AS 302(3) Course ID:008047 2019-06-13

**Leading People and Effective Communication II**

This is a continuation of the study of leadership and quality management fundamentals, professional knowledge, leadership ethics, and communication skills. AFROTC cadets must take AS 304 Leadership Laboratory in conjunction with this course.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: AS301 or consent of the instructor.

**Req. Designation:** Technology

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AS 303(0) Course ID:008048 2015-02-12

**Leadership Laboratory**

Leadership Laboratory is the application of personal leadership skills, demonstration of command, effective communication, individual leadership instruction, physical fitness training, and knowledge of US Air Force customs and courtesies. This course provides advanced leadership experiences in officership activities, giving students the opportunity to apply leadership and management principles learned in AS 301.

**Components:** Laboratory

**Attributes:** Offered Fall Term

**Requirement Group:** Corequisites: AS301.

**Req. Designation:** Technology

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AS 304(0) Course ID:008049 2015-01-20

**Leadership Laboratory**

Leadership Laboratory is the application of personal leadership skills, demonstration of command, effective communication, individual leadership instruction, physical fitness training, and knowledge of US Air Force customs and courtesies. This course provides advanced leadership experiences in officership activities, giving students the opportunity to apply leadership and management principles learned in AS 301 and AS 302.

**Components:** Laboratory

**Attributes:** Offered Spring Term

**Requirement Group:** Corequisites: AS302.

**Req. Designation:** Technology

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AS 401(3) Course ID:008050 2019-06-13

**National Security, Leadership Responsibilities, and Commissioning Preparation I**

This course covers the Armed Forces as an integral element of contemporary society with specific emphasis on the military profession, civil-military interaction, and the formulation, organization, and implementation of US national security policy. In addition, students study leadership and management, ethical decision making, and communication skills. AFROTC cadets must take AS 403 Leadership Laboratory in conjunction with this course.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: AS302 or consent of the instructor.

**Req. Designation:** Technology

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**Other - Air, Space, and Cyberspace - Subject: Air, Space, & Cyberspace Studies****AS 402(3) Course ID:008051 2019-06-13****National Security, Leadership Responsibilities, and Commissioning Preparation II**

This is a continuation of the study of the military profession, civil-military interaction, and US national security policy. Midway through the course, the focus shifts to orient junior officers toward their first duty assignment in the Air Force. AFROTC cadets must take AS 404 Leadership Laboratory in conjunction with this course.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: AS401 or consent of the instructor.**Req. Designation:** Technology**AS 403(0) Course ID:008052 2015-02-12****Leadership Laboratory**

Leadership Laboratory is the application of personal leadership skills, demonstration of command, effective communication, individual leadership instruction, physical fitness training, and knowledge of US Air Force customs and courtesies. This course provides advanced leadership experiences in officership activities, giving students the opportunity to apply leadership and management principles learned throughout their AFROTC experience.

**Components:** Laboratory**Attributes:** Offered Fall Term**Requirement Group:** Corequisites: AS401.**Req. Designation:** Technology**AS 404(0) Course ID:008053 2015-01-20****Leadership Laboratory**

Leadership Laboratory is the application of personal leadership skills, demonstration of command, effective communication, individual leadership instruction, physical fitness training, and knowledge of US Air Force customs and courtesies. This course provides advanced leadership experiences in officership activities, giving students the opportunity to apply leadership and management principles learned throughout their AFROTC experience.

**Components:** Laboratory**Attributes:** Offered Spring Term**Requirement Group:** Corequisites: AS402.**Req. Designation:** Technology

**Business - School of Business - Subject: KEDGE Business School**

BEM 1OPS(2.5) Course ID:012728 2016-01-02

**Inventory Management**

Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture  
Req. Designation: Technology

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BEM 1OTH(2.5) Course ID:012724 2016-01-02

**Contemporary International Politics**

Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture  
Req. Designation: Technology

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BEM 3OPS(2.5) Course ID:012733 2016-01-02

**Operational Logistics Management**

Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture  
Req. Designation: Technology

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BEM 4ECO(2.5) Course ID:012726 2016-01-02

**Derivatives**

Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture  
Req. Designation: Technology

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BEM 5MGT(2.5) Course ID:012729 2016-01-02

**Management and Language**

Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture  
Req. Designation: Technology

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BEM 9FIN(2.5) Course ID:012727 2016-01-02

**Equity Investments**

Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture  
Req. Designation: Technology

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BEM 10MGT(2.5) Course ID:012735 2016-01-02

**Strategic Design Management**

Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture  
Req. Designation: Technology

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BEM 14STR(2.5) Course ID:012723 2016-01-02

**Applied Sustainable Value Analysis in the Automobile Industry**

Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture  
Req. Designation: Technology

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BEM 18MGT(2.5) Course ID:012725 2016-01-02

**Creating and Sustaining a Successful Enterprise**

Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture  
Req. Designation: Technology

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**Business - School of Business - Subject: KEDGE Business School****BEM 26MKT(2.5)** Course ID:012734 2016-01-02**Customer Relationship Management, Implementation and Application**Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture

Req. Designation: Technology

**BEM 28FIN(2.5)** Course ID:012732 2016-01-02**World Financial Markets and Institutions**Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture

Req. Designation: Technology

**BEM 32MKT(2.5)** Course ID:012730 2016-01-02**Marketing Strategy and Planning**Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Laboratory

Req. Designation: Technology

**BEM 49MGT(2.5)** Course ID:012731 2016-01-02**Strategic Business Relationships**Course offered through Clarkson's MBA Exchange Program at Kedge Business School. Please contact Kedge Business School for a course description. <http://www.kedgebs.com/en>.

Components: Lecture

Req. Designation: Technology

**School of Arts and Sciences - CRC Bioethics Program - Subject: Bioethics**

**BIE 400(3)** Course ID:012903 2018-10-23

**Responsible Conduct of Research**

This course is designed to provide students with an introduction to the ethics of scientific research, including research involving human participants and animal subjects. The course will start with a discussion of responsible conduct of research (also known as research integrity and commonly referred to by the acronym RCR). As close to ninety percent of the work that research ethicists do focuses on the education, promotion and adjudication of RCR issues, these issues are applicable to all aspects of the research endeavor and all fields of scientific study. Understanding these issues and being able to apply the basic principles to critically analyze cases is thus an essential starting point for anyone interested in research and research ethics. The course will also delve briefly into some of the basic ethical, legal, and social issues surrounding research using animal subjects or human volunteers.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**BIE 410(3)** Course ID:012949 2019-07-31 **Instructor Consent Required**

**Biomedical Ethics**

This online course covers seminal developments and areas of inquiry within biomedical ethics, starting with a look at the history of medicine and ethics followed by a tracing of the foundational arguments related to areas of inquiry central to biomedical ethics. This course will be taught simultaneously with the Master's level course of the same name (BIE 510: Biomedical Ethics), with undergraduate students receiving additional training in critical thinking and moral reasoning.

Requirement: Approval of Bioethics Department Chair or Instructor.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**BIE 500(3)** Course ID:012162 2022-06-07

**Proseminar in Health and Human Values**

An intensive week long introduction to historical and current topics in bioethics, taught seminar style with a clinical visit to Icahn School of Medicine at Mount Sinai in New York City. This overview of bioethics involves special seminars, case discussions and ethics rounds. There will also be training in the computer skills (demonstrations, workshops) essential to mastering distance learning.

**Components:** Seminar

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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**BIE 510(3)** Course ID:012163 2020-08-18

**Biomedical Ethics**

An advanced introduction to bioethics and clinical ethics focusing on such formalizations of medical morality as the Hippocratic Oath, the AMA codes, the Belmont Report and Beauchamp and Childress Principles, and the idea of casuistry. Major cases in bioethics will also be reviewed and the evolution of the core concepts and infrastructure of medical ethics and bioethics will be examined.

**Components:** Lecture

**Same As Offering:** BIE 510

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**BIE 510(3)** Course ID:012163 2020-08-18

**Biomedical Ethics**

An advanced introduction to bioethics and clinical ethics focusing on such formalizations of medical morality as the Hippocratic Oath, the AMA codes, the Belmont Report and Beauchamp and Childress Principles, and the idea of casuistry. Major cases in bioethics will also be reviewed and the evolution of the core concepts and infrastructure of medical ethics and bioethics will be examined.

**Components:** Lecture

**Same As Offering:** BIE 510

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**School of Arts and Sciences - CRC Bioethics Program - Subject: Bioethics**

**BIE 520(3)** Course ID:012164 2016-07-01

**Healthcare Policy**

This course provides an understanding of the public policy-making process and the political and regulatory environment in which healthcare organizations function. It also provides an understanding of managerial processes, politics, and structure of the healthcare organizations where ethical policies and practices are implemented and carried out on an ongoing basis. Policies for consideration include resource allocation, end-of-life decision-making, accountability and performance measurement, and conflict of interest.

**Components:** Lecture

**Attributes:** Offered Winter Term

**Req. Designation:** Technology

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**BIE 525(3)** Course ID:012166 2016-07-01

**Public Health Ethics**

In this course, students learn about ethics and public health and the ways in which these two fields interconnect. The course focuses on ethical theory and the discipline and history of public health, using case studies to illustrate the application of ethical theory to public health practice.

**Components:** Lecture

**Attributes:** Offered Winter Term

**Req. Designation:** Technology

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**BIE 530(3)** Course ID:012167 2016-07-25

**Bioethics and the Law**

This course provides an introduction to the major legal issues and concepts arising in the field of bioethics. Emphasis will be placed on (1) mastery of key legal concepts and rules that pertain to bioethics (i.e., what the law is) and (2) demonstration of ability to critically analyze the law from a normative bioethical perspective (i.e., argue for what the law ought to be).

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**BIE 533(1.5)** Course ID:012168 2016-07-01

**Neuroethics**

The course will familiarize students with the most pertinent issues in Neuroethics, but will emphasize those issues which have some immediate application in clinical settings, such as criteria for brain death, the ethics of enhancement and justification of memory manipulation. The overall objective of the course is to demonstrate continuity between neuroethics and other areas of bioethics, and to identify the application of major ethical principles to this new branch of ethics.

**Components:** Lecture

**Attributes:** Offered Even Springs

**Req. Designation:** Technology

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**BIE 535(3)** Course ID:012169 2022-06-07

**Medicine and Social Justice**

This course examines issues of social justice in medicine, beginning with a review of classical (Aristotle) and contemporary (Rawls) works on political philosophy, ethics and justice. Students will also read some of the theoretical work of authors who focus their attention on justice in medicine (including Daniels and Menzel). Building on these philosophic underpinnings, students will then explore the issues that lie at the heart of justice in medicine: the right to health and healthcare, aggregation and utility, personal responsibility, prioritarianism, and the allocation of medical resources.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**BIE 545(3)** Course ID:012171 2016-07-01

**Reproductive Ethics**

The course examines the philosophical, ethical, and legal problems arising from assisted reproductive technologies. We begin with the notion of procreative liberty. Procreative liberty is conceived as the right to make one's own reproductive decisions, whether to have or to avoid having offspring. We will not be discussing the right to avoid reproduction by contraception or abortion, as these topics would require a longer course, or even a course of its own. Instead, this course focuses on the right to reproduce: its nature, scope, and limits.

**Components:** Lecture

**Attributes:** Offered Even Summers

**Req. Designation:** Technology

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**School of Arts and Sciences - CRC Bioethics Program - Subject: Bioethics****BIE 555(3)****Research Ethics**

This course is designed to teach students about the ethics of scientific research, particularly research involving human participants. Upon completion of the course, students should be able to: (a) discuss in depth the principles of bioethics and how these principles should be applied to the ethical design and conduct of research involving human participants or animal subjects; (b) identify, define, and analyze ethical issues in the context of novel and potentially problematic areas of scientific research; (c) identify, through case studies, ethical issues that arise in different contexts and begin to reason through an appropriate course of action. In addition, students will be taught basic practical skills in research, writing and reviewing articles, and providing training and education in bioethics.

**Components:** Lecture**Same As Offering:** BIE 555**Attributes:** Offered Fall Term**Req. Designation:** Technology**BIE 555(3)****Research Ethics**

This course is designed to teach students about the ethics of scientific research, particularly research involving human participants. Upon completion of the course, students should be able to: (a) discuss in depth the principles of bioethics and how these principles should be applied to the ethical design and conduct of research involving human participants or animal subjects; (b) identify, define, and analyze ethical issues in the context of novel and potentially problematic areas of scientific research; (c) identify, through case studies, ethical issues that arise in different contexts and begin to reason through an appropriate course of action. In addition, students will be taught basic practical skills in research, writing and reviewing articles, and providing training and education in bioethics.

**Components:** Lecture**Same As Offering:** BIE 555**Attributes:** Offered Fall Term**Req. Designation:** Technology**BIE 563(1.5)****Pediatric Ethics**

This course cover standards for surrogate decision making for children; ethical issues with respect to very premature neonates; withholding and withdrawing life sustaining care; genetic testing and screening; and adolescent confidentiality, truth-telling, and decision making. This course will include guest participation by members of the Icahn School of Medicine faculty, including experts in neonatology, adolescent health, genetics, and pediatric oncology.

**Components:** Lecture**Attributes:** Offered Even Springs**Req. Designation:** Technology**BIE 569(1.5)****Statistical Methods in Healthcare**

The purpose of this course is to cover statistical topics applicable to healthcare settings, not typically covered in an introductory statistics course. These topics include a review of descriptive and inferential statistics, study designs commonly applied in healthcare, measures of disease frequency and health risk, and power analysis.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**BIE 570(3)****Bioethics Policy: Foundations**

This course will address prospective rules designed to govern populations, as opposed to the individual patient-provider encounter or ethics review of scientific research protocols. Often, bioethics policies have the force of law (e.g., statute, agency regulation, court precedent); at other times, they are voluntarily adopted by institutions or groups (e.g., hospitals, insurers, IRBs, research funders, the AMA). In this course, we will focus on the moral philosophical and behavioral foundations of contemporary bioethics policy, drawing on concepts from philosophy, economics, and psychology that are increasingly used in domestic and international policymaking.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

**School of Arts and Sciences - CRC Bioethics Program - Subject: Bioethics****BIE 573(1.5)** Course ID:012182 2022-06-07**Interpersonal Skills and Communication**

This course will provide students with the opportunity to learn the basic components of communication, including active listening, effective vocal style, optimal elicitation of information and the ability to create partnerships with patients, research subjects, families, clinicians and researchers. Using a variety of formats and media, students will develop and practice the interpersonal skills necessary to communicate with clinical ethicists, research ethicists, policymakers and in our daily human interactions.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**BIE 574(1.5)** Course ID:012772 2022-06-07**Contemporary Issues in Bioethics**

This course is designed to expose students to contemporary and breaking issues in bioethics. Topics covered will vary from year to year, as they will be drawn from acute issues spurring widespread discussion and assessment by the bioethics community.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**BIE 575(3)** Course ID:012183 2016-07-01**Bioethical Issues at the End of Life**

This course examines some of the philosophical, ethical and policy programs arising at the end of life. It begins with a discussion of death itself, including what it means to say that someone is dead and the criteria for determining that death has occurred. Additional topics covered include advance directives, assisted death and whether or not people have a 'right to die.'

**Components:** Lecture**Attributes:** Offered Even Summers**Req. Designation:** Technology**BIE 576(1 - 3)** Course ID:012774 2022-06-07**Independent Study in Bioethics**

This course will be used for one to three credits of independent study when needed.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology**BIE 577(1.5)** Course ID:012997 2023-05-24**Managerial Epidemiology**

[Cross listed with HC680] This course focuses on applying epidemiological concepts and methods in healthcare management. Epidemiology focuses on the distribution and determinants of health outcomes in populations. Topics covered include: formulating an epidemiological problem, measures of disease frequency and health risk, study designs, data sources, public health history and ethics, population health, and social determinants of health.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**BIE 578(1.5)** Course ID:013035 2020-03-20**Special Topics in Bioethics**

Advanced topics in specialized aspects of bioethics.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**BIE 580(3)** Course ID:012184 2022-06-07**Research Ethics II**

This course teaches students about the ethics and policies governing scientific research, particularly research involving human participants or animal subjects. This course builds upon the knowledge and themes introduced in BIE 555 (Research Ethics I). Research Ethics II covers these topics in greater depth and explores the key US and international laws and policies that regulate the design, conduct, and oversight of trials involving human participants or animal subjects. In addition, students examine in-depth specific areas or types of biomedical research that are potentially controversial or ethically problematic.

**Components:** Lecture**Attributes:** Offered Winter Term**Requirement Group:** Prerequisites: BIE555**Req. Designation:** Technology

**School of Arts and Sciences - CRC Bioethics Program - Subject: Bioethics****BIE 590(3)** Course ID:012185 2022-06-07**Clinical Ethics**

This course deals with the practical applications of clinical ethics, including clinical ethics consulting and its recording and documentation, the work of ethics committees and IRBs, and other practical aspects of clinical ethics.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**BIE 610(3)** Course ID:012187 2022-06-07**Online Practicum in Clinical Ethics**

[Formerly BIE 610C] This course is designed to help students develop many of the competencies required to perform clinical ethics consultation (CEC) at a basic level. Upon completion of the course, students should be able to: (a) assess their own strengths and weaknesses with respect to CEC competencies; (b) apply a systematic method to analyze and document CEC cases; (c) practice techniques to help avoid common CEC quality gaps; and (d) recognize complex cases for which advanced-level CEC competencies are required. While the course emphasizes process skills for CEC, students will also gain experience that will augment their clinical ethics content knowledge, emotional intelligence, and critical thinking.

**Components:** Practicum**Requirement Group:** Prerequisites: BIE590**Req. Designation:** Technology**BIE 611(3)** Course ID:012189 2022-06-07**Online Practicum in Research Ethics**

[Formerly BIE 610R] A supervised practical experience in research ethics designed to teach specific skills. Exposes students to the process of ethical review of research involving human volunteers or animal subjects, and helps students develop some of the basic skills that a working research ethics professional needs. Through online discussion and participatory exercises, students gain a practical understanding of: (a) research ethics committee structure and function, (b) applicable state and federal regulations regarding the conduct of research involving human volunteers or animal subjects, and (c) relevant organizational and management skills needed to lead a research ethics committee. In addition, students learn practical skills in qualitative and quantitative research, report and grant writing, and bioethical training and education.

**Components:** Practicum**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: BIE580**Req. Designation:** Technology**BIE 612(3)** Course ID:012188 2022-06-07**Online Practicum in Policy**

[Formerly BIE 610P] This course is designed as an opportunity for students to develop and refine the skills of policy analysis that they have learned in prior courses – in particular, in the prerequisites to this course – and to apply them to a range of current issues in bioethics policy. The course covers a broad range of policy issues in the biosciences, including both public and institutional bioethics policies.

**Components:** Practicum**Attributes:** Offered Spring Term**Req. Designation:** Technology**BIE 620(3)** Course ID:012191 2016-07-25**On-Site Practicum in Clinical Ethics**

[Formerly BIE 620C] A supervised practical experience in clinical ethics designed to teach skills in clinical ethics consultation.

**Components:** Practicum**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: BIE 590 Corequisites: BIE610**Req. Designation:** Technology**BIE 621(3)** Course ID:012192 2016-07-25**On-Site Practicum in Research Ethics**

[Formerly BIE 620R] A supervised practical experience. Helps students develop and refine the practical skills introduced in BIE 611 (Online Research Ethics Practicum) through hands-on experience. These skills include: teaching and education, review and oversight of institutional research projects involving human volunteers or animal subjects, and sound management of the research endeavor, including organizational management and policy analysis, arbitration, and mediation.

**Components:** Practicum**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: BIE580 Corequisites: BIE611**Req. Designation:** Technology

**School of Arts and Sciences - CRC Bioethics Program - Subject: Bioethics**

**BIE 630(3)** Course ID:012194 2017-02-17

**Masters Project I**

The Master's project in bioethics involves three terms of independent research (under the direction of a faculty supervisor) culminating in a written document that addresses some aspect of clinical ethics, research ethics, or bioethics policy.

**Components:** Independent Study  
**Attributes:** Offered Fall Term  
**Req. Designation:** Technology

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**BIE 635(3)** Course ID:012793 2017-02-17

**Master's Project II**

The Master's project in bioethics involves three terms of independent research (under the direction of a faculty supervisor) culminating in a written document that addresses some aspect of clinical ethics, research ethics, or bioethics policy.

**Components:** Independent Study  
**Attributes:** Offered Winter Term  
**Requirement Group:** BIE 635 Prerequisites: BIE630  
**Req. Designation:** Technology

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**BIE 640(3)** Course ID:012195 2017-02-17

**Masters Project III**

The Master's project in bioethics involves three terms of independent research (under the direction of a faculty supervisor) culminating in a written document that addresses some aspect of clinical ethics, research ethics, or bioethics policy.

**Components:** Independent Study  
**Attributes:** Offered Spring Term  
**Requirement Group:** BIE 640 Prerequisites: BIE630 and BIE635  
**Req. Designation:** Technology

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**BIE 650(3)** Course ID:012196 2016-07-25

**Capstone**

Capstone practicum in which students demonstrate their mastery of clinical ethics, research ethics or bioethics policy. Each student presents their Masters Project.

**Components:** Lecture  
**Attributes:** Offered Spring Term  
**Req. Designation:** Technology

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**BIE 670(3)** Course ID:012810 2017-03-26

**Proseminar in Biomedical Ethics (Spanish)**

Onsite introduction to biomedical ethics, methodology and history, as well as the responsible conduct of research. Designed to orient trainees, to serve as a springboard for the Caribbean Research Ethics Education Initiative, and to introduce trainees to the subsequent online courses and the faculty that teach them.

**Components:** Lecture  
**Attributes:** Offered Summer Term  
**Req. Designation:** Technology

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**BIE 671(3)** Course ID:012802 2017-03-26

**Responsible Conduct of Research (Spanish)**

This online course provides trainees with an introduction to the ethics of scientific research, starting with a discussion of responsible conduct of research (commonly referred to by the acronym RCR).

**Components:** Lecture  
**Attributes:** Offered Fall Term  
**Req. Designation:** Technology

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**BIE 672(3)** Course ID:012803 2017-03-26

**Human Subjects Research (Spanish)**

This online course builds upon some of the themes that were first introduced in Responsible Conduct of Research and provides trainees with additional experience in the design, conduct and oversight of trials involving human participants.

**Components:** Lecture  
**Attributes:** Offered Winter Term  
**Req. Designation:** Technology

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**School of Arts and Sciences - CRC Bioethics Program - Subject: Bioethics****BIE 673(3)** Course ID:012804 2017-06-23**Bioethics Policy and Pedagogy (Spanish)**

The purpose of this online course is to provide students with basic skills in bioethics policy making and pedagogy. The first half of this course provides trainees with an understanding of the public policy making process and the political and regulatory environment in which researchers and research ethics committees function. The second half of the course is designed to give trainees practical experience in teaching bioethics and research ethics to adult learners, covering such topics as theories of active learning, knowledge taxonomies, course planning and development, assessment and grading, and observation and feedback.

**Components:** Lecture**Attributes:** Offered Summer Term**Req. Designation:** Technology**BIE 674(3)** Course ID:012805 2017-03-27**Online Practicum and Project (Spanish)**

During this online course, trainees will carry out individual projects in their home countries and institutions, building off the knowledge and skills learned in Bioethics Policy and Pedagogy.

**Components:** Lecture**Attributes:** Offered Summer Term**Req. Designation:** Technology**BIE 675(3)** Course ID:012736 2017-03-26**Capstone (Spanish)**

The purpose of this onsite course is to assess how well students have learned the knowledge and the practical skills necessary for functioning as policymakers and research ethics educators in their home countries, and in promoting institutional change.

**Components:** Lecture**Attributes:** Offered Summer Term**Req. Designation:** Technology**BIE 683(3)** Course ID:012807 2017-04-17**Bioethics Policy and Pedagogy (English)**

The purpose of this online course is to provide students with basic skills in bioethics policy making and pedagogy. The first half of this course provides trainees with an understanding of the public policy making process and the political and regulatory environment in which researchers and research ethics committees function. The second half of the course is designed to give trainees practical experience in teaching bioethics and research ethics to adult learners, covering such topics as theories of active learning, knowledge taxonomies, course planning and development, assessment and grading, and observation and feedback.

**Components:** Laboratory**Attributes:** Offered Winter Term**Req. Designation:** Technology**BIE 684(3)** Course ID:012808 2017-03-27**Online Practicum and Project (English)**

During this online course, trainees will carry out individual projects in their home countries and institutions, building off the knowledge and skills learned in Bioethics Policy and Pedagogy.

**Components:** Laboratory**Attributes:** Offered Spring Term**Req. Designation:** Technology**BIE 685(3)** Course ID:012809 2017-03-27**Capstone (English)**

The purpose of this onsite course is to assess how well students have learned the knowledge and the practical skills necessary for functioning as policymakers and research ethics educators in their home countries, and in promoting institutional change.

**Components:** Independent Study**Attributes:** Offered Spring Term**Req. Designation:** Technology**BIE 693(3)** Course ID:012211 2016-12-30**International Rsrch Ethics I**

In this online course, fellows will be able to identify and explain the prominent ethical, social and legal issues in research ethics and apply ethical and professional principles to those issues.

**Components:** Lecture**Attributes:** Offered Winter Term**Req. Designation:** Technology

**School of Arts and Sciences - CRC Bioethics Program - Subject: Bioethics****BIE 694(3)****Course ID:012212****2017-03-01****International Research Ethics II**

In this online course, a continuation of Research Ethics I, fellows will master the knowledge base that will allow them to function as ethicists on research ethics committees. They will understand the legal and ethical complexities of contemporary research issues occurring in their home countries and how the local prevailing approaches and standards compare and contrast to international ones.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: Educational Biology**

BIO 580(3) Course ID:012225 2021-10-08

**MAT Project in Biology (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar

**Attributes:** Offered Spring Term

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Business of Energy**


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**BOE 606(0)** Course ID:013006 2020-01-02

**MS-BOE Graduate Project - Studies**

This non-credit Seminar project provides a capstone experience for Business of Energy MS students. The purpose is to further develop the student's communication, critical thinking, and interaction skills via a capstone experience on a Business of Energy topic that holds a special interest to the student. The candidate and faculty advisor agree on project scope and evaluation process. The candidate performs required analytical and/or experimental studies to complete a Graduate Project Paper and Presentation.

**Components:** Seminar

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**BOE 610(3)** Course ID:012232 2018-11-06

**Fundamentals of the Business of Energy**

An initial umbrella course designed to acquaint the student with the complexities of the present-day power system and how we arrived at this point. It will include a brief history of the industry evolution and will encompass various fuels, types of generation, regulatory authorities, power transmission, distribution, control & dispatch, planning, power markets and revenue flows.

**Components:** Lecture

**Same As Offering:** BOE 610

**Req. Designation:** Technology

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**BOE 610(3)** Course ID:012232 2018-11-06

**Fundamentals of the Business of Energy**

An initial umbrella course designed to acquaint the student with the complexities of the present-day power system and how we arrived at this point. It will include a brief history of the industry evolution and will encompass various fuels, types of generation, regulatory authorities, power transmission, distribution, control & dispatch, planning, power markets and revenue flows.

**Components:** Lecture

**Same As Offering:** BOE 610

**Req. Designation:** Technology

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**BOE 611(3)** Course ID:012233 2018-08-06

**Planning and Operations of Power Systems**

Operations and planning of power systems will introduce and discuss the decision process regarding generation types, fuels and transmission. Comparisons will be introduced establishing the difference between traditional vertically integrated utilities and unbundled resource suppliers. The principles of electric power systems will be studied along with the impact of deregulation.

**Components:** Lecture

**Same As Offering:** BOE 611

**Req. Designation:** Technology

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**BOE 611(3)** Course ID:012233 2018-08-06

**Planning and Operations of Power Systems**

Operations and planning of power systems will introduce and discuss the decision process regarding generation types, fuels and transmission. Comparisons will be introduced establishing the difference between traditional vertically integrated utilities and unbundled resource suppliers. The principles of electric power systems will be studied along with the impact of deregulation.

**Components:** Lecture

**Same As Offering:** BOE 611

**Req. Designation:** Technology

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**BOE 612(3)** Course ID:012234 2016-07-01

**Power Markets**

This course will deal with the intricacies of the workings of the power markets (including gas). It will introduce and discuss the evolution from regulated pricing to market pricing. It will introduce and discuss market-based products necessary for reliable operation; hedging principles; and out-of-market products necessary for a fair and reliable market.

**Components:** Lecture

**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Business of Energy****BOE 613(3)****Course ID:012235****2020-09-23****Regulation & Restructuring**

This course will explore the history of legislation, regulation and regulatory authorities in the development of the power industry and its impact on the economy and consumers. The evolution of the relationships between regulators and the regulated; the restructuring of the natural gas and electric industry over the last three decades; and the current regulatory status of both the infrastructure and power markets will also be studied.

**Components:** Lecture**Same As Offering:** BOE 613**Req. Designation:** Technology**BOE 613(3)****Course ID:012235****2020-09-23****Regulation & Restructuring**

This course will explore the history of legislation, regulation and regulatory authorities in the development of the power industry and its impact on the economy and consumers. The evolution of the relationships between regulators and the regulated; the restructuring of the natural gas and electric industry over the last three decades; and the current regulatory status of both the infrastructure and power markets will also be studied.

**Components:** Lecture**Same As Offering:** BOE 613**Req. Designation:** Technology**BOE 614(3)****Course ID:012236****2016-08-27****Electric Power Industry Economics and Finance**

This course will evaluate the weaving thread of economics and finance as an integral part of operations and strategic planning in the complex energy industry. It will investigate supplier economics and finance under regulation and deregulation environments. It will evaluate market transactions, payment paths, settlements, capital requirements, financial instruments, and procedures that are identified with the industry. It will review economic issues confronting power transmission owners/providers under regulated models and merchant function models. The course will identify and encourage a knowledge-based review of new technologies and green energy as they relate to financial and economic decision making. Energy policies, metering technology, micro-grids, government influences, fuels and storage will all be explored as they relate to various present and future economic and financial models.

**Components:** Lecture**Same As Offering:** BOE 614**Req. Designation:** Technology

**Business - CRC Engineering Programs - Subject: Business of Energy**

BOE 614(3) Course ID:012236 2016-08-27

**Electric Power Industry Economics and Finance**

This course will evaluate the weaving thread of economics and finance as an integral part of operations and strategic planning in the complex energy industry. It will investigate supplier economics and finance under regulation and deregulation environments. It will evaluate market transactions, payment paths, settlements, capital requirements, financial instruments, and procedures that are identified with the industry. It will review economic issues confronting power transmission owners/providers under regulated models and merchant function models. The course will identify and encourage a knowledge-based review of new technologies and green energy as they relate to financial and economic decision making. Energy policies, metering technology, micro-grids, government influences, fuels and storage will all be explored as they relate to various present and future economic and financial models.

**Components:** Lecture**Same As Offering:** BOE 614**Req. Designation:** Technology

**Engineering - CRC Engineering Programs - Subject: Business of Energy****BOE 615(3)** Course ID:012237 2016-07-01**Challenges to Upgrading Aging Infrastructure**

This course will examine and evaluate the changing energy horizon as the industry embraces expanding technology, renewable energy, smart grid technology, etc.; to be exercised upon an aging infrastructure. The student will see the critical need for system knowledge and planning to continue to meet the needs and reliability of a sophisticated complex industry struggling to meet the needs of its customers and economic growth.

**Components:** Lecture**Req. Designation:** Technology**BOE 616(0)** Course ID:012854 2020-01-02**MS-BOE Graduate Project - Defense**

This non-credit Seminar project provides a capstone experience for Business of Energy MS students. The candidate will deliver and defend results from studies documented in a Graduate Project Paper and Presentation. The candidate receives a pass/fail grade which appears on the official transcript.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology**BOE 623(3)** Course ID:012973 2019-10-18**Statistical Methods for Reliability and Life Data Analysis**

[Cross-listed with EE603 and ME578]

Reliability analysis is concerned with understanding the failure modes that affect an engineered product, estimating the expected life of the product under service conditions, and predicting the failure rate of the product

as a function of time in service. The primary response variable in reliability analysis is time to failure, which may

be measured in controlled laboratory experiments, or observed empirically from post-introduction studies of products "in the field". The analysis of data for which the primary variable of interest is time to failure requires

specialized statistical concepts and tools; this course will cover some of the most useful approaches.

**Components:** Lecture**Course Equivalents:** EE 603, EE 603, ME 578, ME 578**Attributes:** Offered Winter Term**Requirement Group:** Prerequisites: EE602, ME577, or CS506 or instructor consent.**Req. Designation:** Technology

**Health Sciences - School of Engineering - Subject: Biomedical/Rehabilitation Eng****BR 110(1)** Course ID:013214 2023-07-10**Introduction to Biomedical Research I**

This course will introduce students to the different research methods used in bioengineering. Students will discuss the advantages and disadvantages of each method, as well as ethical considerations involved in bioengineering research. Students will also work collaboratively to develop a research plan.

Prerequisite: Enrollment by permission of instructor

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

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**BR 111(1)** Course ID:013213 2023-07-10**Introduction to Biomedical Research II**

This course will teach students the skills they need to successfully complete a research project. Students will cover the basics of research design, data collection, and data analysis. We also discuss the importance of teamwork and project management.

Prerequisite: BR 110; Enrollment by permission of instructor.

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

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**Engineering - Electrical & Computer Eng - Subject: Biomedical/Rehabilitation Eng****BR 200(3) Course ID:011179 2015-11-16****Introduction to Biomedical & Rehabilitation Engineering, Science and Technology**

Introductory course focused on biomedical and rehabilitation engineering, science and technology (BEST). With remarkable progress in medical technology for saving lives and improving quality of life, this course will focus on advances in biomedical engineering and its application to rehabilitation technology. Using ten most significant technological innovations, a quantitative focus will consider fundamental scientific bases and engineering concepts for devices and technologies as well as the societal context of which these innovations arose. We will explore various factors that impact the technological solution including culture, medical ethics, regulatory issues, economics and marketing. Students will focus on one specific problem, apply design principles and develop a solution while considering the factors which impact the design.

**Components:** Lecture**Attributes:** Two communication units, Science, Technology and Society, Offered Each Term**Req. Designation:** Technology

**Health Sciences - School of Engineering - Subject: Biomedical/Rehabilitation Eng****BR 210(1)** Course ID:013215 2023-07-10**Introduction to Biomedical Research III**

This course will teach students the skills they need to successfully complete a research project and communicate their findings effectively. We will cover the basics of research design, data collection, and data analysis. We will also discuss the importance of clear and concise writing, as well as the use of visual aids to communicate research findings.

BR 111; Enrollment by permission of instructor

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**BR 211(1)** Course ID:013216 2023-07-10**Introduction to Biomedical Research IV**

This course will teach students the skills they need to communicate the results of their scientific research effectively. Students will cover the basics of clear and concise writing, as well as the use of visual aids to communicate their research findings. The class will identify the ethical and responsible communication of research , as well as how to communicate with different audiences, such as the general public, policy makers, and other scientists.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Biomedical/Rehabilitation Eng**

BR 400(3) Course ID:010598

2023-05-10

**Biomedical Engineering Fundamentals**

[Cross-listed with BY 440, ES 402, EE400] This interdisciplinary course will introduce students to basic principles of biomedical rehabilitation engineering. The course will present principles of disability and the diverse roles of engineering in medicine and rehabilitation. Students will use engineering methods to study anatomical and physiological systems including applications in rehabilitation engineering, bioinstrumentation, biosignal and image processing, biomechanics, and biomaterials.

**Components:** Lecture**Course Equivalents:** BY 440, BR 500, BY 540, ES 402**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: MA131/132, PH131/132, BR 200, MA 232 Corequisites: BY 471/473 or BY 472/474**Req. Designation:** Technology

BR 450(3) Course ID:011178

2015-11-16

**BEST Capstone Design I**

Biomedical Engineering, Science, and Technology (BEST) senior capstone design course. Students will be divided into multi-disciplinary teams charged with investigating a BEST-related open ended project. Students focus on one aspect of design/production/marketing appropriate for their background and be conversant on other area of the project, including design, human interface, regulatory, ethics, marketing and economics. Includes written reports and oral presentations

**Components:** Project Team**Attributes:** Offered Fall Term**Req. Designation:** Technology

BR 500(3) Course ID:010661

2014-11-24

**Biomedical Engineering Fundamentals**

[Cross-listed with BY 540] This interdisciplinary course will introduce students to the fundamental and quantitative basics of biomedical rehabilitation engineering. The course will present principles of disability and the diverse roles of engineering in medical and rehabilitation. Students will use engineering methods to study anatomical and physiological systems including applications in rehabilitation engineering, bioinstrumentation, biosignal, and image processing, biomechanics and biomaterials. Graduate students will be required to additionally write a comprehensive paper and present that paper in a short talk to the class. Prerequisites: MA131/132, PH131/132, junior or senior standing.

**Components:** Lecture**Course Equivalents:** BY 440, BR 400, BY 540, ES 402**Req. Designation:** Technology

**Engineering - School of Engineering - Subject: Biomedical/Rehabilitation Eng**

BR 520(3) Course ID:013196

2023-05-22

**BioEntrepreneurship and FDA Design**

This course provides students with a solid basis in bio-entrepreneurship methods and an introductory knowledge of FDA regulations, record-keeping requirements and best practices guidelines.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Business & Marketing Education****BUS 527(3)** Course ID:013004 2022-04-08**Current Topics in Business and Marketing I**

Students will investigate topics central to accounting, finance, and financial literacy for the preK-12 learner. Accounting and finance principles will be aligned to industry standards and New York state teaching and learning standards. The course is designed for MAT, Business and Marketing students.

**Components:** Seminar**Attributes:** Given When Needed**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology**BUS 562(3)** Course ID:013005 2021-10-08**Current Topics in Business and Marketing II**

Current topics in the fields of business and marketing will be explored with attention paid to fundamental concepts as well as future trends. This course is designed for MAT, Business and Marketing students.

**Components:** Seminar**Attributes:** Given When Needed**Req. Designation:** Technology**BUS 574(3)** Course ID:013070 2020-11-03**Work Based Learning - Program Organization**

This is the first of two courses that, when successfully completed, enable you to apply for an extension to your New York State Teacher Certification and allow you to place students in a variety of work based learning experiences including, internships, community based work experiences and cooperative work experiences.

**Components:** Field Studies**Attributes:** Given When Needed**Req. Designation:** Technology**BUS 575(3)** Course ID:013071 2020-11-03**Work Based Learning - Program Operation**

This is the second of two courses that, when successfully completed, enable you to apply for an extension to your New York State Teacher Certification and allow you to place students in a variety of work based learning experiences including, internships, community based work experiences and cooperative work experiences.

**Components:** Field Studies**Attributes:** Given When Needed**Req. Designation:** Technology**BUS 580(3)** Course ID:013069 2021-10-08**MAT Project in Business and Marketing**

The MAT project is a one term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification area. The course is intended to be custom-tailored to meet the specific needs of each individual intern. MAT projects are well grounded in research and theory, and include a strong and intensive applied aspect directly addressing the question: ""What would this look like in the classroom?""

**Components:** Seminar**Requirement Group:** Must be enrolled in the MAT program**Req. Designation:** Technology

**School of Arts and Sciences - Biology - Subject: Biology**

**BY 1(1 - 6)** Course ID:008054 2022-06-07

**Biology Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study  
 Attributes: Transfer Credit Only  
 Req. Designation: Technology

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**BY 2(1 - 6)** Course ID:008055 2022-06-07

**Biology Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Science Foundation Curriculum Requirement.

Components: Independent Study  
 Attributes: Transfer Credit Only  
 Req. Designation: Technology

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**BY 100(4)** Course ID:007379 2015-01-19

**Biology Elective with Laboratory Experience**

Credit for this course is awarded only on the basis of an incoming student's performance on the Biology Advanced Placement (AP) exam or in the International Baccalaureate (IB) Biology course. See the AP/IB policy for specifics. Biology, Biomolecular Science, and Environmental Science (EHS and ES&P) majors may not use credit for BY100 as one of their required Biology Electives.

Components: Lecture  
 Attributes: Transfer Credit Only  
 Req. Designation: Technology

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**BY 110(3)** Course ID:009554 2019-04-19

**Biology and Society**

Definition of science, the scientific method, overview and scope of modern biology, introduction to biomolecules and cell structure, Mendelian inheritance and genetics, human physiology, evolution, and ecology. Course topics are presented from the perspective of current issues in biotechnology, medicine, and human impact on the biosphere. This course is intended for students who are not majoring in the biological sciences and my not be taken by students with credit for BY100 or BY140.

Components: Lecture  
 Attributes: Offered Each Term  
 Requirement Group: Restriction: Students may not enroll in this course if they have credit for BY140 or BY160.  
 Req. Designation: Technology

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**BY 112(1)** Course ID:007383 2015-02-03

**Laboratory for Biology and Society**

Companion laboratory course to BY110 introducing students to the scientific method of laboratory and field experimentation used by contemporary biologists.

Components: Laboratory  
 Attributes: Offered Each Term  
 Requirement Group: Corequisite: BY110.  
 Req. Designation: Technology

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**BY 115(3)** Course ID:012764 2019-04-19

**Introduction to Environmental Sustainability**

This course will provide students with a basic understanding of environmental science and sustainability concepts. Students will gain an understanding of the impacts that humans have on atmosphere, lithosphere, and hydrosphere. The course will also focus on sustainability concepts that are particularly relevant to business practices and engineering. Specific case studies will also be used to increase understanding of how businesses are tailoring their practices to meet sustainability goals. The course will be lecture based, and active learning exercises will be implemented to enhance understanding of sustainability concepts. Students will be evaluated through homeworks, examinations, and a group project.

Components: Lecture  
 Attributes: Offered Spring Term  
 Requirement Group: Restriction: Students may not enroll in this course if they have credit for BY140 or BY160.  
 Req. Designation: Technology

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**School of Arts and Sciences - Biology - Subject: Biology****BY 120(3)** Course ID:009555 2015-11-16**Introduction to Biotechnology Sciences and their Applications**

Students in today's competitive market often need to possess multifaceted knowledge and skills. The interdisciplinary structure of BY120 encourages collaborations across schools and fields. The syllabus is designed to meet the needs and spark the interest of non-biology majors in biotechnology. By creating a stimulating, lecture-based, solid foundation in basic molecular biology and providing insight into the innovative discipline of biotechnology, students will be inspired and encouraged to apply their own academic backgrounds in a creative manner to drive innovations and applications in this field forward and to investigate possible employment niches for themselves. Aside from covering the fundamentals, the lectures will venture into bioinformatics, DNA amplification and sequencing technologies, genetic engineering and gene expression systems, large scale production, molecular diagnostics, personalized medicine, commercial products, gene therapy, stem cells, transgenic animals and plants, synthetic biology, patenting, as well as

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**BY 130(3)** Course ID:010309 2015-01-23**Contemporary Issues in Environmental Science**

This course examines how human activity impacts the environment. Topics include air and water pollution, environmental systems management, industrial ecology and environmental policy with emphasis on the multidimensional aspects of currently environmental issues. Case studies of chemical exposures, life cycle assessments, and integrated resources management will be used to discuss the process of environmental decision making.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**BY 140(3)** Course ID:010155 2015-09-18**Biology I - Inheritance, Evolution, and Diversity**

Introduction to the scientific method, mitotic and meiotic cell division, genetic inheritance, evolution of species, phylogenetics, systematics, paleobiology, survey of the tree of life, population biology, ecology and behavior.

**Components:** Discussion, Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**BY 142(2)** Course ID:010157 2015-02-12**Biology I Laboratory**

Companion laboratory course to BY140 providing practical exposure to the scientific method of hypothesis testing, presentation and statistical analysis of biological data, writing scientific reports and papers in the context of field and laboratory experimentation related to BY140.

**Components:** Laboratory**Attributes:** One communication unit, Offered Fall Term**Requirement Group:** Corequisite: BY140.**Req. Designation:** Technology**BY 160(3)** Course ID:010156 2015-09-18**Biology II - Cellular and Molecular Biology**

Introduction to biomolecules, organelles, and cytoarchitecture of cells, energy metabolism and photosynthesis, DNA replication, transcription of RNA, protein synthesis, gene regulation, development and differentiation with a view towards biotechnology.

**Components:** Discussion, Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**BY 162(2)** Course ID:010158 2015-01-20**Biology II Laboratory**

Companion laboratory course to BY160 providing a hands-on experience to put your knowledge to the test. Here you will be introduced to the scientific method and you will be describing, analyzing, and reporting your results the way a scientist would in a real laboratory setting. Experiments include chemical properties of the molecules of life, enzymatic analyses, microscopy and microdissections, photosynthesis and respiration, mitosis and meiosis, Drosophila genetics, molecular biology of nucleic acids and bacteriology. You will be presenting your results both orally and in writing.

**Components:** Laboratory**Attributes:** One communication unit, Offered Spring Term**Req. Designation:** Technology

**School of Arts and Sciences - Biology - Subject: Biology****BY 214(3)****Genetics**

The overall goal of this course is to provide a comprehensive introduction to the science of genetics. Classical principles of Mendelian genetics will be covered, however, the emphasis will be placed on fundamentals of molecular genetics and recent advances. Major topics include gene structure and function, genetic recombination, genetic engineering, genomics, gene and chromosome mutations, regulation of gene transcription, cell cycle and cancer genetics, developmental genetics, and an introduction to population genetics.

**Components:** Lecture

**Attributes:** Science, Technology and Society, Offered Each Term

**Requirement Group:** Prerequisites: BY160 or consent of the instructor

**Req. Designation:** Technology

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**BY 218(3)****Cell Biology**

This course examines the fundamental principles of eukaryotic cell biology at the molecular level, with an emphasis on roles in human homeostasis and disease. Topics will include: structure and function of the plasma membrane, transmembrane transport, protein trafficking, the cytoskeleton, signal transduction pathways, cellular energetics, and the control of cell division and cellular proliferation. Students will be introduced to the process of experimental cell biology, methods, and data analysis in relation to societal issues.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** BY160 or Instructor Consent

**Req. Designation:** Technology

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**BY 220(3)****Intro to Evolution**

An introduction to evolutionary biology, in particular how scientists observe evolution, what drives it, and what we can learn from it. We will begin with a brief evolutionary history of life on earth - from the first microbes, to multicellular life, to the transition from water to land, dinosaurs, and the emergence of humans - exploring and interpreting the various types of evidence that support this history. We will focus on the basic processes that drive evolutionary change - mutation, natural selection, and genetic drift, as well as some additional complexities such as the evolutionary consequences of sex and ecological interactions, highlighting interesting and unique examples of biodiversity from across the tree of life, as well as applied examples from healthcare and environmental science. Note that BY 214 is not a prerequisite for this course.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisite: BY140

**Req. Designation:** Technology

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**BY 222(3)****Ecology**

Ecology is the study of factors that control the distribution and abundance of species in nature. Ecological interactions will be explored at the individual through ecosystem level in terrestrial, freshwater, and marine habitats. Emphasis will be on fundamental ecology, but applications to human-related problems will be explored.

**Components:** Lecture

**Attributes:** One communication unit, Offered Fall Term

**Requirement Group:** Prerequisite: BY140 or Corequisite: BY140.

**Req. Designation:** Technology

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**BY 224(2)****Ecology Laboratory**

Field and laboratory exploration of physical, chemical, and biological factors influencing animal and plant species, populations, and communities in upstate New York. Students will learn field and laboratory techniques in ecology and general identification of some organismal groups. Course will include required field trips to surrounding habitats and laboratory experiments.

**Components:** Laboratory

**Attributes:** One communication unit, Offered Fall Term

**Requirement Group:** Corequisites: BY222

**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology**

BY 226(3)

Course ID:013082

2021-09-06

**Plant Biotechnology**

This course will provide knowledge and understanding of molecular biology in plants, focusing on biotechnological tools for crop improvement. Despite wide application of "omics" tools in applied plant research, a one-gene-at-a-time approach is still required for understanding the mechanisms of how gene expression is regulated and how gene products function. This course covers the basic principles and application of gene expression measurements, mechanisms of regulating gene expression, recombinant DNA technology and genetic transformation and their application to crop improvement, and genome editing with RNAi and CRISPR. This course will provide an opportunity for students to develop critical thinking on biotechnological tools for plant improvement by understanding experimental techniques and how they can be applied to revealing mechanisms that regulate gene expression.

Components: Lecture

Requirement Group: Prerequisite: BY 220

Req. Designation: Technology

BY 280(3)

Course ID:010176

2016-04-19

**Environmental Science**

This course will investigate the key concepts and principles of environmental science, emphasizing human impacts to the earth. The themes will include, energy flows through nature, and biogeochemical systems and how they have been perturbed by human activities. Technology and population growth have enabled humans to increase both the rate and scale of their impact on the environment. Quantitative analysis of air, soil, and water quality on local, regional, and global scales will be a significant component of the course. Emerging principles in environment science, including sustainability, industrial ecology, risk assessment, and the precautionary principle will be introduced. The course will prepare students to qualitatively and quantitatively analyze fluid and contaminant flow in varied biological and geologic systems.

Components: Lecture

Course Equivalents: EV 280

Attributes: Offered Fall Term

Requirement Group: Prerequisites: sophomore standing, CM131/CM132 or CM103/CM104, or consent of the instructor.

Req. Designation: Technology

BY 300(1)

Course ID:007396

2015-02-03

**Recent Advances in Biological Research**

The objective of this course is to present recent advances in biological and biomolecular research, and to describe opportunities for graduate study and undergraduate summer research. Students will receive one credit for attending biology seminars (6 per semester), reading a journal article prior to each presentation, writing short review of each seminar, and participating in discussions. This course can be taken for credit more than once.

Components: Lecture

Attributes: One communication unit, Offered Each Term

Requirement Group: Prerequisites: BY140 and BY160

Req. Designation: Technology

BY 302(3)

Course ID:007398

2015-01-23

**Plant Science of Northern New York**

Upon completion of the course, the student will be aware of the classification of plants, recognize and appreciate the life cycles of the main plant phyla, plant physiology, plant metabolism, understand the relationships among plant tissue and organ structures and function, and the plant community structure along environmental gradients in a temperate zone such as the region in northern New York.

Components: Lecture

Requirement Group: Prerequisites: BY 140 and BY 142

Req. Designation: Technology

**Science - Biology - Subject: Biology**

BY 304(3)

Course ID:011482

2015-01-23

**Introductory Zoology**

In this course, we will conduct a diversity survey of animal life with emphasis on invertebrates. Course content will primarily consist of comparing the major animal phyla emphasizing integration of form, function, ecology, and phylogeny.

**Components:** Lecture**Attributes:** Offered Spring When Needed**Requirement Group:** Prerequisites: BY140/142 and BY160/162, or consent of the instructor**Req. Designation:** Technology

**School of Arts and Sciences - Biology - Subject: Biology**

BY 305(3) Course ID:013149

2022-02-09

**Biochemistry for Health Sciences**

This course provides the fundamental knowledge that is essential to the study of biochemistry at advanced levels. This course integrates biochemistry with physiology and cell biology and is aimed specifically at introductory health science students. It provides a general introduction to the biochemical basis of various cellular functions and their relevance to disease. Topics covered include structure, function and chemistry of biomolecules, energy metabolism, molecular genetics, the biochemistry of cancer, and recent biotechnology. The course is intended for health science students who have no previous background in sciences. It assumes no prior knowledge and covers some chemistry and molecular biology basics.

**Components:** Lecture**Course Equivalents:** CM 305**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Inst for a Sustainable Environ - Biology - Subject: Biology****BY 309(3)** Course ID:007880 2019-09-26**Introduction to Environmental and Occupational Health**

[Cross-listed with EHS309] Study of the recognition, evaluation and control of chemical, biological, radiological, physical and ergonomic hazards found in the work environment and surrounding community. Key aspects of the course will include hazard assessment, basic anatomy and physiology associated with routes of entry and toxicology of hazardous agents, environmental, health and safety regulations, exposure monitoring instrumentation, and effective controls to minimize the risk of illness or injury.

**Components:** Lecture**Course Equivalents:** EHS 309**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: CM132 or CM104/106**Req. Designation:** Technology**BY 312(3)** Course ID:011816 2022-03-23 **Instructor Consent Required****Adirondack Ecology and Environmental Science**

[Cross-listed with EV 312] This course introduces ecological and environmental science concepts relevant for understanding the structure and function of terrestrial, aquatic, and human systems in the Adirondack Park. Students will learn to identify important plant and animal species representative of the Adirondack Mountains, and learn major features of ecological systems in the Park. The course will also provide the students an assessment of human impacts on the ecology of the Adirondack Park.

Enrollment is limited to those students participating in the Adirondack Semester Program.

**Components:** Lecture**Course Equivalents:** EV 312**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Biology - Subject: Biology**

BY 313(3) Course ID:011376 2015-03-05

**Biogeochemical Earth Systems Science**

[Cross-listed with CE 313, EV 313] This course will investigate the key concepts and principles of environmental science emphasizing the earth's biogeochemical cycles and how they have been perturbed by human activities. Quantitative analysis of air, soil and water quality on local, regional and global scales will be a significant component of the course. Emerging principles in environmental science, including sustainability, industrial ecology, risk assessment and the precautionary principle will be introduced. In addition to the quantitative aspects, the course will consider the historical, social, and political contexts in which the practice of environmental science takes place.

Components: Lecture

Course Equivalents: EV 313, CE 313

Attributes: Offered Spring Term

Requirement Group: Prerequisites: CM132 (or CM104), or consent of the instructor

Req. Designation: Technology

BY 314(4) Course ID:007401 2014-11-19

**Bioinformatics**

[Cross-listed with CM 314] This course and companion lab provides students with an introduction to the theory and methods of DNA and protein sequence analysis. Students receive experience retrieving information from sequence and genome databases. Methods of sequence alignments include dynamic programming and statistical methods of molecular evolutionary change are outlined. Emphasis is also placed on calculating the statistical significance of results. Protein structural alignments and displays, and structural prediction are covered. Gene prediction algorithms, methods of phylogenetic analysis and database similarity searching are explained. The course introduces students to the analysis of genomes for protein families and domains and to the analysis of gene expression patterns.

Components: Laboratory, Lecture

Requirement Group: Prerequisites: BY160 and BY214.

Req. Designation: Technology

BY 315(3) Course ID:010126 2022-08-10

**Bioinformatics for Disease Research**

This course will provide students with an introduction to the theory and methods of DNA, RNA, and protein sequence analysis in the context of disease biology. Integrated computer laboratory exercises will give students significant experience retrieving, manipulating, and analyzing information from sequence and genome databases. Enrollment is limited to students participating in the Trudeau Semester.

Components: Lecture

Attributes: Science, Technology and Society, Given When Needed

Requirement Group: Enrollment is limited to students participating in the Trudeau Semester.

Req. Designation: Technology

BY 319(1) Course ID:011492 2014-11-19

**Current Readings in Animal Behavior**

[Cross-listed with PY 319] The field of animal behavior is a rapidly advancing one, especially at the interface of neurobiology and cognition, and the interface of cognition and functional analysis of behavior (behavioral ecology and sociobiology). This one credit hour course is designed as a 'journal club' with a focus on the latest developments in theory and empirical research on animal behavior. The course is intended for any student who has a sincere interest in integrative animal behavior.

Components: Lecture

Course Equivalents: PY 319

Requirement Group: Prerequisites: BY222 or PY151

Req. Designation: Technology

BY 320(3) Course ID:007404 2015-01-20

**Microbiology**

This course will provide a fundamental introduction to the study of microbial life forms. The diverse biology of these organisms will be reviewed and application to human health and society, the natural environment, and biotechnology will be emphasized. Upon completion of the course, students will be capable of assessing microbial growth and metabolism and understand its applications in natural and engineered environments.

Components: Lecture

Attributes: Offered Spring Term

Requirement Group: Prerequisites: BY160, BY214 and CM132 or CM104 or consent of the instructor.

Req. Designation: Technology

**School of Arts and Sciences - Biology - Subject: Biology**

BY 322(2) Course ID:007405 2015-01-20

**Microbiology Laboratory**

Laboratory exercises will stress the classical techniques for handling bacteria and demonstrate concepts presented in the lecture series: both clinical and environmental aspects of applied microbiology will be explored. Upon completion of the course, students will be capable of safely manipulating microbes in a laboratory setting, as well as become competent in techniques used to observe and culture microbes.

**Components:** Laboratory**Attributes:** Two communication units, Offered Spring Term**Requirement Group:** Prerequisites: BY162, CM132 or CM104 or consent of the instructor.**Req. Designation:** Technology

BY 324(3) Course ID:012146 2016-03-25

**Parasitology**

The natural history, ecology and molecular biology of parasites are explored with an emphasis on life cycles, host/parasite interactions and evolution of parasitism. Basic principles of epidemiology, transmission, diagnosis, treatment and prevention are examined in parasites of medical, veterinary, and economic importance. Lectures will be supplemented by demonstrations of fixed materials and by exercises in identification and diagnoses.

**Components:** Lecture**Attributes:** Offered Even Falls**Requirement Group:** Prerequisite: BY 140 and BY 160**Req. Designation:** Technology

BY 328(3) Course ID:007408 2015-03-03

**Conservation Biology**

BY428 provides an overview of the core theory of conservation biology, and how conservation biology is applied for environmental conservation and management. Major topics of this course will include conservation prioritization, the problems of small population size on the long-term persistence of a species, conservation genetics, habitat fragmentation and nature reserve design, invasive species, consequences of extinctions on an ecosystem processes and community structure, and the possible effects on biodiversity of global climate change. A course emphasis will be on the challenge of translating the core lessons of conservation biology to effective policy and environmental management.

Prerequisites: BY222 or consent of the instructor.

**Components:** Lecture**Attributes:** Science, Technology and Society, Offered Even Springs**Requirement Group:** Prerequisites: BY222 or consent of instructor.**Req. Designation:** Technology

BY 330(3) Course ID:011412 2020-08-25

**Great Lakes Water Protection**

[Cross-listed with EV 330] The Laurentian Great Lakes contain 20% of the world's surface fresh water and serve both water supply and waste disposal services for over 30 million residents in the United States and Canada. Technological advances have controlled the outflow of the Great Lakes at the St. Lawrence River and this has brought with it social benefits and environmental costs. The United States and Canada share the management of this resource and have shared notable success controlling environmental consequences of development yet are faced with emerging issues. The LGL/SLR system will be examined from a multidisciplinary, multinational perspective to illustrate that a shared resource can be maintained. Students will be able to understand the forces (geomorphic, biological, chemical, social, economic, and political) that have shaped and impacted a globally significant resource.

**Components:** Lecture**Course Equivalents:** EV 330**Attributes:** One communication unit, Contemporary and Global Issues, Science, Technology and Society, University Course, Offered Spring Term**Requirement Group:** Prerequisite: At least Sophomore standing.**Req. Designation:** Technology

BY 340(3) Course ID:007409 2015-03-05

**Behavioral Ecology and Sociobiology**

[Cross-listed with PY 340] This course is concerned with the adaptive functions of animal behavior, emphasizing ecological and evolutionary perspectives. Topics covered include foraging behavior, sexual selection, social systems, parental care, and cooperation and conflict. One major focus will be on evaluating the arguments of proponents and critics of sociobiology on whether the field is useful at explaining human behavior.

**Components:** Lecture**Course Equivalents:** PY 340**Attributes:** Individual and Group Behavior, Offered Odd Springs**Requirement Group:** Prerequisites: BY140 or PY151 or consent of instructor.**Req. Designation:** Technology

**School of Arts and Sciences - Biology - Subject: Biology**

BY 345(3)

Course ID:012884

2018-09-17

**The Human Genome**

This course explores our current understanding of genomics as applied to the human genome. We will begin with an introduction to genome structure and function, and then apply that knowledge to understanding patterns of human history and evolutionary adaptation, exploring the genetic causes of disease with genome-wide association studies, and discuss the multifaceted impacts of the personal genomics revolution.

**Components:** Lecture**Attributes:** Science, Technology and Society, Offered Spring Term**Requirement Group:** Prerequisites: BY140 or permission of the instructor**Req. Designation:** Technology

BY 350(3)

Course ID:007411

2015-02-12

**Comparative Vertebrate Anatomy**

This course compares anatomical structures throughout different classes of vertebrates. We begin by defining anatomical terms and identifying what constitutes a vertebrate. We will also learn how vertebrate organ systems develop and the physical constraints placed on development of these systems. The anatomical study will be broken down into major organ systems that will be discussed one at a time. For each of the organ systems, there will be a discussion of relevant structure and function followed a description of the major changes in form and function throughout vertebrate evolution. Since there are numerous classes of vertebrates, we will concentrate on representatives from some of the better studied examples.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: BY160 or consent of the instructor. Corequisite: BY352.**Req. Designation:** Technology

BY 352(2)

Course ID:007412

2015-02-12

**Comparative Vertebrate Anatomy Lab**

Through the use of dissection and histological observation, we will observe and make direct comparisons of anatomical structures from representative vertebrates. The organ systems that are dissected in this course will follow the topics presented in BY350. After the first two introductory labs, you will dissect specific organ systems one at a time in each of your specimens. This will allow you to make direct comparisons between comparable structures in different vertebrates. The animals that will be dissected (Necturus - Mud Puppy, Dogfish shark, pigeon, and cat) are representative vertebrates chosen to illustrate changes to the organ systems as vertebrates became more complex.

**Components:** Laboratory**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: BY160 or consent of the instructor. Corequisite: BY350.**Req. Designation:** Technology

BY 357(3)

Course ID:011519

2014-11-19

**Human Cognitive Evolution**

[Cross-listed with PY 357] Evolutionary psychology is concerned with the adaptive problems and selective pressures our ancestors encountered in their environments, the psychological mechanisms that evolved to help them solve those problems, and the way those evolved mechanisms function in current environments. This way of thinking about the brain, mind, and behavior is changing how scientists approach old topics, and is opening up new ones. This course will focus on current developments and selected topics in evolutionary psychology (e.g., foraging, mate choice, parental investment, cooperation and culture) and explore the evolution of cognition from a broad comparative perspective.

**Components:** Lecture**Course Equivalents:** PY 357**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology

BY 358(3)

Course ID:007413

2014-11-20

**Animal Learning and Cognition**

[Cross-listed with PY 358] This course focuses upon how animals acquire, process, store and recall information about their environment and social partners. Topics that will be examined include how animals perceive and classify stimuli; how they learn and remember; how they orient and navigate; how they measure time, number, and amount; how they acquire abstract concepts; how they perceive social relationships; and how they communicate. A diversity of invertebrate and vertebrate organisms will be included (sea slugs to primates!), and there will be an emphasis on understanding taxon-specific specializations as well as general patterns across animals.

**Components:** Lecture**Course Equivalents:** PY 358**Requirement Group:** Prerequisites: BY140 or PY151 or consent of the instructor.**Req. Designation:** Technology

**School of Arts and Sciences - Psychology - Subject: Biology****BY 359(3)****Course ID:012047****2015-02-17****Perception**

Perception deals with our conscious experience of the world, ourselves and each other. This course will examine how perceptions are measured (psychophysics); how visual, auditory, touch and pain sensory stimulation is actively organized into conscious perceptions; developmental aspects of perception; the role of cognitive factors, such as attention; and how altered conscious states (e.g., achieved through meditation, hallucinogenic drugs) affect perception. Fundamental principles of perception discussed in this course will be used to explain how we experience the world, ourselves, and each other.

**Components:** Lecture**Course Equivalents:** PY 359**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology****BY 360(3)** Course ID:007414 2015-01-20**Comparative Physiology**

In this course, students will be instructed in all the main branches of modern animal physiology with a strong emphasis on the integration of physiological knowledge, ecology, and evolutionary biology. In addition to an in-depth treatment of mammalian physiology, students will be exposed to the various physiological systems that have evolved in other vertebrate, as well as invertebrate, animals. The primary goal is to understand how these physiological systems allow animals to survive in the environments that they inhabit. Prerequisite: BY160 or consent of the instructor.

**Components:** Lecture**Course Equivalents:** BY 560**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: BY160 or consent of instructor.**Req. Designation:** Technology**BY 362(2)** Course ID:007415 2015-01-20**Comparative Physiology Laboratory**

In this laboratory-based course, students will gain practical exposure to basic research techniques used in the study of animal physiology. Class activities include studying action potential propagation, the mammalian dive reflex, electrooculography and the physiological effects of exercise.

**Components:** Laboratory**Attributes:** One communication unit, Offered Spring Term**Requirement Group:** Corequisite: BY360.**Req. Designation:** Technology**BY 363(3)** Course ID:012755 2016-09-23**Pharmacology of Infectious Disease**

This course will introduce students to the basic principles of immunology and pharmacology with an emphasis on current treatment strategies employed to combat infectious disease. Students will learn how vaccines are used to prevent infection, in addition to the deployment of small molecule drugs and newer antibody-based therapies for the treatment of existing infectious disease. Course information will be disseminated to students in the form of lectures, readings from review and original research articles, and through group discussion that involves case studies and problem-based learning.

**Components:** Lecture**Attributes:** Offered Even Springs**Requirement Group:** Prerequisites: BY160**Req. Designation:** Technology

**Science - Biology - Subject: Biology**

BY 368(1)

Course ID:011577

2021-04-12

Instructor Consent Required

**Mathematical Biology Seminar**

[Cross-listed with MA 368] The objective of this course is to present recent advances in research that combines biological and mathematical analysis, and to describe opportunities for interdisciplinary summer research in biology and mathematics. Students will receive one credit for attending seminars (6 per semester), reading a journal article prior to each presentation, writing a short review of each seminar, and participating in discussions. This course can be taken for credit more than once.

Components: Seminar

Course Equivalents: MA 368

Req. Designation: Technology

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**School of Arts and Sciences - Biology - Subject: Biology**

**BY 380(3 - 6)** Course ID:007886 2015-08-18

**Techniques in Immunological Research**

This course will provide students with a basic understanding of molecular, cellular and imaging techniques used at the Trudeau Institute to help researchers study the immune system. Students will learn principles and procedures relating to molecular biology, cellular biology, histology, flow cytometry, light microscopy, and cell sorting. The course will cover basic quantification of gene expression at the transcriptional and post-translational level. The course will also cover basic quantification of cell populations using flow cytometers to collect and analyze subpopulations of cells from tissues. Histology and light microscopy techniques will be used to locate similar cell populations within a tissue section. Students will gain confidence in the selection and application of the appropriate cell imaging techniques required to assess mammalian cell tissues.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Enrollment is limited to students participating in the Trudeau Semester.

**Req. Designation:** Technology

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**BY 385(3)** Course ID:012961 2019-09-25

**Plant Biotechnology**

This course will provide knowledge and understanding of plant biotechnological tools for plant improvement. Topics include the basic principles and application of tissue culture, recombinant DNA technology and genetic transformation and their application to crop improvement, genome editing with RNAi and CRISPR, and social and environmental impacts of biotechnology. This course will provide an opportunity for students to develop critical thinking on biotechnological tools for plant improvement.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: BY214

**Req. Designation:** Technology

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**BY 387(2)** Course ID:012960 2019-09-25

**Plant Biotechnology Lab**

This course will provide you with a hands-on experience and knowledge and understanding of plant biotechnological tools for plant improvement. During this course, you will drive one big project which transforms a dwarf *Arabidopsis* mutant. By doing this project, you will learn hormone physiology and the function of a green revolution gene. Topics include the basic principles and application of tissue culture, recombinant DNA technology and genetic transformation using both bacteria and *Agrobacterium* and their application to crop improvement. This course will provide an opportunity for students to develop critical thinking on biotechnological tools for plant improvement.

**Components:** Laboratory

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: BY162. Corequisite: BY385.

**Req. Designation:** Technology

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**BY 399(3)** Course ID:012994 2019-11-13

**Sustainability & Environmental Conservation in Kenya**

Students explore the economic, political, and social development of Kenya, and the environmental and social consequences of the Kenya's development path, with focus on different strategies for environmental conservation, agriculture development, and infrastructure development. The objectives are to understand (1) how a model developing nation with an export and tourism-based economy functions, (2) what are the environmental and social consequences of development and (3) how an African nation's economy and its social & environmental welfare are linked to the political and economic policies of the US and other developed nations.

**Components:** Lecture

**Attributes:** Contemporary and Global Issues, Cultures and Societies, University Course, Offered Even Springs

**Req. Designation:** Technology

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**BY 400(1 - 4)** Course ID:007419 2015-01-23 Instructor Consent Required

**Directed Study in Bioscience**

Students study specialized topics in bioscience not otherwise available in formal courses. Under supervision of a faculty member, a semester-long course of study tailored to professional interests is designed based on readings from relevant texts and primary literature.

Prerequisites: Consent of the instructor.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology****BY 401(0)** Course ID:007420 2016-03-23**Professional Assessment**

This course is designed to assess the professional development of biology majors by (1) completion of a standardized test to assess their level of knowledge in the field of biology, (2) submission of a professional resume, and (3) submission of a personal statement for graduate/professional school or employment.

**Components:** Independent Study**Attributes:** Given When Needed**Requirement Group:** Restriction: Senior standing or consent of the Biology Department Chair.**Req. Designation:** Technology**BY 405(1 - 6)** Course ID:007424 2017-01-13 **Instructor Consent Required****Undergraduate Research in Bioscience**

Students conduct an original bioscience research project based on investigation of a specific problem related to areas of faculty expertise. Research methodology may involve field, laboratory, computational, or theoretical approaches. Presentation of research results at a scientific meeting or local symposium is strongly encouraged.

Prerequisite: consent of the instructor.

**Components:** Research**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Biology**

BY 406(3) Course ID:007425

2020-09-02

**Biomedical Analysis and Instrumentation**

[Cross-listed with CM 406] Biomedical Analysis and Instrumentation is a lecture course designed to provide advanced undergraduates and graduate students in basic sciences, biosciences and bioengineering disciplines with scientific and engineering aspects of instrumentation, sample analysis, measuring and processing signals from living organisms. Functioning and calibration of biomedical transducers and devices actually used in clinical practice for analyzing clinical biomarkers for disease diagnostics will be reviewed. Emerging research in bioinstrumentation, biomedical technologies, stand alone and wearable sensing devices, analytical method development and validation will be also be covered. Special emphasis will be placed on measurement principles of medical instrumentation used in health technologies ranging from laboratory scale to next generation wearables. Training in professional ethics, grant writing, patenting, innovation, entrepreneurial activities and FDA regulation for new device development, laboratory management, as well as communication

**Components:** Lecture

**Course Equivalents:** CM 406, CM 506, BY 506

**Attributes:** Offered Even Springs

**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology**

BY 410(1 - 6)

Course ID:007429

2017-01-13

Instructor Consent Required

**Undergraduate Thesis Research in Bioscience**

A formal thesis project is arranged under supervision of a faculty member who guides the student in planning and execution of original research work and preparation of a written thesis. This course is primarily intended for junior or senior biology majors who wish to pursue graduate or professional studies in bioscience. Work done in satisfaction of the requirements for a degree will be assigned a grade when the thesis is submitted and approved.

Prerequisite: consent of the instructor.

Components: Research

Attributes: Given When Needed

Req. Designation: Technology

BY 412(4)

Course ID:007431

2015-02-12

**Molecular Biology Laboratory**

This course will provide students with a hands-on introduction to modern molecular biology techniques. Students will learn techniques such as bacterial transformation and plasmid DNA purification, restriction digest and gel electrophoresis, isolation of DNA and RNA from eukaryotic cells, Southern hybridization, reverse transcription, polymerase chain reaction, and cloning PCR products, and web-based analytical programs. The lectures and reading will cover the theory and applications of these molecular techniques.

Components: Laboratory

Attributes: One communication unit, Offered Fall Term

Requirement Group: Prerequisites: BY214 or consent of the instructor.

Req. Designation: Technology

**Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Biology**

BY 416(3) Course ID:007433 2023-05-30

**Principles of Toxicology and Epidemiology**

[Cross-listed with EHS 518] See EHS 416 Occupational Toxicology for description.

**Components:** Lecture

**Course Equivalents:** EHS 416, EHS 518, BY 518

**Attributes:** Offered Odd Falls

**Requirement Group:** Prerequisites: EHS 309 or consent of the instructor.

**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology****BY 419(3)** Course ID:007402 2015-02-12**Immunology**

An overview of the immune system, with emphasis on current concepts and literature. Topics covered include: cells and tissues of the immune system; structure and function of antibodies; genetic basis of antibody diversity; humoral and cellular immunity; cellular interactions; major histocompatibility complex; the complement system; transplantation; tumor immunity.

**Components:** Lecture**Attributes:** One communication unit, Offered Fall Term**Requirement Group:** Prerequisites: BY 140, BY 160 and BY 214, or consent of the instructor**Req. Designation:** Technology**BY 420(3)** Course ID:007436 2021-09-14**Advanced Evolutionary Biology**

An in-depth look into the mechanisms driving evolution at both the phenotypic and genomic level, and how an understanding of evolution is crucial for many applied problems in environmental science and human health. Topics include ecological drivers of evolution, how and why DNA sequences and genomes change, population genetics and evolutionary theory, the evolution of gene families and networks, and horizontal gene transfer. The processes driving evolution will also be explored using computer simulations and evolution experiments with microbes. Students registering in the graduate section of this course will be required to complete extended versions of assignments and exams.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: BY220 or permission of the instructor.**Req. Designation:** Technology**BY 424(2)** Course ID:012788 2020-04-15**Experimental Evolution Laboratory**

[Cross-listed with BY524] An introduction to experimental approaches used in evolutionary biology. Students will conduct lab experiments using microbes to investigate a range of topics in experimental evolution, observing and exploring evolution as it happens in real time. Topics explored will include adaptive diversification, the evolution of fitness trade-offs, evolutionary loss of redundant traits, and evolutionary rescue.

**Components:** Laboratory**Course Equivalents:** BY 524**Attributes:** Offered Fall Term**Requirement Group:** Corequisites: BY420 and BY522**Req. Designation:** Technology**BY 425(3)** Course ID:010432 2015-03-05**Biological Systems and Environmental Change**

Human activities are resulting in dramatic global environmental change, in the forms of biodiversity loss, altered biogeochemical cycles, introduced invasive species, chemical toxification of the environment, climate change, unsustainable exploitation of natural resources, and habitat loss, degradation, and fragmentation. In this course, we will examine how these forms of environmental change disturb biological systems by critically reading key research papers, and discussing their implications for future research and policy action.

**Components:** Lecture**Course Equivalents:** BY 525**Attributes:** Contemporary and Global Issues, Science, Technology and Society, University Course, Offered Odd Springs**Requirement Group:** Prerequisites: BY222 or graduate standing.**Req. Designation:** Technology**BY 427(3)** Course ID:012915 2018-11-02**Advanced Mass Spectrometry: Practical Applications**

Practical Applications will introduce the students to mass spectrometry and its applications within different fields, including pharmaceutical and biotech industry, academia, government, forensics, etc. Various types of instruments will be discussed, as well as their application within different fields. The course will then focus on different types of well-known "omics", such as proteomics, metabolomics, glycomics, or lipidomics, but also on specialized types of "omics" such as peptidomics, post-translational modification-omics (PTM-omics), interactomics, foodomics, microbiomics, venomics, DNA- RNA- & Protein-adductomics, genomics, proteogenomics or transcriptomics. Particular applications of all these kinds of "omics" in biotechnology & pharmaceutical industry, healthcare, biowarfare and forensics will also be discussed.

**Components:** Lecture**Course Equivalents:** CM 422, CM 522, BY 527**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: CM/BY460/560, or consent of the instructor**Req. Designation:** Technology

**School of Arts and Sciences - Biology - Subject: Biology**

BY 428(3) Course ID:012959

2019-09-25

**Kinesiology**

Knowledge of the correlates of structure and function is fundamental to the measurement and evaluation of human movement in movement science, health care professions, and product design. This course focuses on application of concepts of human movement to specific regions and joints of the human musculoskeletal system. Included are 1) application of the concepts of biological tissues and tissue mechanics in understanding non-pathological and pathological human movement of each joint and region, and 2) use of tools of measurement and evaluation in studying non-pathological and pathological human movement.

**Components:** Lecture**Attributes:** Offered Even Springs**Requirement Group:** Prerequisites: BY471 and PH131 or PH141.**Req. Designation:** Technology

BY 430(3) Course ID:007399

2017-01-13

**Developmental Biology**

The course will focus on how an organism develops into a complex multicellular organism from a single cell. We will begin with the genetics of development and discuss mechanisms by which genes become sequentially activated as embryogenesis proceeds. The mechanics and genetics of both invertebrate and vertebrate development will be discussed beginning with fertilization and ending as embryogenesis is completed. We will also discuss some additional developmental events that occur during embryogenesis and later in adults. Because of technological advances in developmental biology, topics in this field have also become important societal issues. Throughout the semester, we discuss the ethical implications of using these advances and their impact on society.

**Components:** Lecture**Course Equivalents:** BY 510**Requirement Group:** Prerequisites: BY160 or consent of the instructor**Req. Designation:** Technology

BY 431(3) Course ID:007439

2014-12-05

**Limnology**

Limnology is the study of physical, chemical, and biological properties of fresh water bodies, e.g. lakes, rivers, reservoirs, and wetlands. This introductory course will provide an array of topics that will, by the multi-disciplinary nature of limnology, call upon students' knowledge of biology, chemistry and physics and place them within the context of aquatic science. The focus of the instruction will be aquatic ecology at all levels of biological organization. Upon completion of the course, the student will be able to characterize the physical, chemical and biological/ecological properties of a freshwater through the selection and application of appropriate sampling methods. Some fieldwork will be required.

**Components:** Lecture**Requirement Group:** Prerequisites: BY222 or CM132 or consent of the instructor. Corequisite: BY 432**Req. Designation:** Technology

BY 432(2) Course ID:011944

2014-12-05

**Limnology Laboratory**

This co-requisite of Limnology (aquatic science) will provide students the opportunity to engage in water sampling of regional lakes and rivers, analysis of samples in the laboratory, introduction to data synthesis, and report writing. Some fieldwork will be required.

**Components:** Laboratory**Requirement Group:** Corequisite: BY431**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Biology**

BY 440(3) Course ID:007443

2014-11-24

**Biomedical Engineering Fundamentals**

[Cross-listed with BR 400, ES 402] This interdisciplinary course will introduce students to basic principles of biomedical rehabilitation engineering. The course will present principles of disability and the diverse roles of engineering in medicine and rehabilitation. Students will use engineering methods to study anatomical and physiological systems including applications in rehabilitation engineering, bioinstrumentation, biosignal and image processing, biomechanics, and biomaterials.

**Components:** Lecture**Course Equivalents:** BR 400, BR 500, BY 540, ES 402**Requirement Group:** Prerequisites: MA131/132, PH131/132, BR 200, MA 232 Corequisites: BY 471/473 or BY 472/474**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology****BY 445(3)** Course ID:012827 2017-08-15**Biological Oceanography**

The goal of this course is to introduce students to the fundamentals of ocean science through an integrative approach that emphasizes physical (circulation, tides & waves), chemical (biogeochemistry) and biological (marine life) principles. Through a series of inquiry based and computational exercises, an exploration of the scientific literature and the use of flipped classrooms, we will consider the future of the world's oceans in light of the contemporary challenges they face such as global climate change, pollution and an ever expanding aquaculture trade.

**Components:** Lecture**Attributes:** Offered Even Springs**Requirement Group:** Prerequisites: BY140, BY160, and MA180 or MA131**Req. Designation:** Technology**BY 448(3)** Course ID:007445 2016-01-06**Medical Microbiology**

This course will systematically examine human pathogens with a focus on why the biologic properties of organisms are important to disease in humans, including the basic principles of the host immune response, laboratory diagnosis, bacteriology, virology, mycology and parasitology. This class will emphasize basic science with clinical practice to understand the clinical relevance of the organisms examined using clinical cases from literature reports to illustrate the epidemiology, diagnosis, and treatment of infectious diseases. The course will emphasize student interaction and exploration of the scientific literature.

**Components:** Lecture**Attributes:** One communication unit, Offered Spring Term**Requirement Group:** Prerequisites: BY 160 and BY 214 (or instructor approval)**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Biology****BY 450(3)** Course ID:007446 2014-11-20**Biochemistry I**

[Cross-listed with CM 460] This course is a one semester introduction to the molecular basis of biological processes. The first part of the course will cover the structure and function of the four major classes of biomolecules - proteins, carbohydrates, lipids, and nucleic acids. The second part covers the organization and regulation of the major energy generating and biosynthetic pathways.

**Components:** Lecture**Course Equivalents:** BY 650, CM 460, CM 560**Requirement Group:** Prerequisites: CM241 or consent of the instructor.**Req. Designation:** Technology**BY 451(3)** Course ID:007447 2019-04-17**Biochemistry II**

[Cross-listed with CM 461] A continuation of Biochemistry I focusing on autotrophic and anabolic metabolism.

**Components:** Lecture**Course Equivalents:** CM 461**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: BY450 or equivalent**Req. Designation:** Technology

**Science - Biology - Subject: Biology****BY 452(3)****Pharmacology**

[Cross-listed with CM 452] The science of Pharmacology concerns the molecular mechanisms by which drugs act on the human body and the applications of drugs in clinical therapy. This course will introduce students to general principles of drug action and survey selected classes of drugs according to their physiological effects and uses in the treatment of certain diseases.

**Components:** Lecture**Requirement Group:** Prerequisites: BY160 and CM241 or consent of the instructor**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology**

BY 453(2)

Course ID:012129

2015-10-27

**Pharmacology Lab**

The goal of this course is to facilitate a greater understanding of key concepts in pharmacodynamics, pharmacokinetics that are discuss in the lecture component and observe how they are applied in the context of the clinical environment. The lab will be simulation based, employing virtual organ bath experiments to derive and interpret dose-response curves, and virtual patient software to investigate drug pharmacokinetics and dosing strategies.

**Components:** Laboratory**Attributes:** Offered Even Springs**Requirement Group:** Corequisites: BY 160 and BY 452**Req. Designation:** Technology

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**School of Arts and Sciences - Psychology - Subject: Biology**

BY 454(3) Course ID:007448 2021-01-15

**Biological Psychology**

[Cross-listed with PY 454] A comprehensive investigation of the neuroanatomical and neurophysiological foundations of behavior. Topics include, but are not limited to: perception, motivation, emotion, states of consciousness, learning, memory and mental illness.

**Components:** Lecture**Course Equivalents:** PY 454**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology**

BY 455(3) Course ID:010884 2016-01-19

**Cell and Molecular Biology of Cancer**

This course will focus on the cellular and molecular alterations that cause human cancer. Topics include cell cycle regulations, oncogenes and tumor suppressor genes, cancer viruses, multistep tumorigenesis, invasion and metastasis, and new developments in cancer diagnosis and therapy. Emphasis will be placed on student interaction and exploring the scientific literature.

**Components:** Lecture**Attributes:** One communication unit, Offered Spring Term**Requirement Group:** Prerequisites: BY160 and BY214 or consent of the instructor.**Req. Designation:** Technology

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**School of Arts and Sciences - Psychology - Subject: Biology****BY 458(3)****Course ID:010472****2023-05-25****Cognitive Neuroscience**

[Cross-listed with PY 458] This course introduces a sampling of the theories and research concerning how various mental processes are accomplished within the brain. Emphasis will be placed on developing an understanding of both the physiological bases of the techniques and the issues involved in relating measures of brain activity to cognitive functioning. Students will be exposed to current topics of study in a number of areas of cognition: perception, language, memory, among others. In this course we will study a number of different techniques for studying the brain, including electrophysiological recording techniques, functional imaging techniques, and methods that involve brain lesions and disrupting neural activity.

**Components:** Lecture**Course Equivalents:** PY 458**Attributes:** Individual and Group Behavior, Science, Technology and Society, Offered Fall Term**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology

**School of Arts and Sciences - Biology - Subject: Biology****BY 460(3)****Neurobiology**

[Cross-listed with PY 460] Neurons are electrically excitable cells that initiate or control many complex functions such as sensory perception, locomotion, memory, and learning. This course introduces the study of neuronal mechanisms at the cellular and molecular level. Topics include: membrane biophysics, ion channels, electrical signaling, synaptic transmission, glia, sensory transduction, neuromodulation, and neuronal plasticity.

**Components:** Lecture**Course Equivalents:** BY 561, PY 460**Requirement Group:** Prerequisites: BY160 or BY360 or consent of instructor.**Req. Designation:** Technology**BY 465(3)****Course ID:012835****2017-09-28****Molecular and Genome Evolution**

[Cross-Listed with BY565] An overview of the molecular underpinnings of evolution, and how those molecular changes can be used to characterize and understand the evolutionary history of genes, proteins and organisms. Topics include how and why DNA sequences and genomes change, molecular phylogenetics and evolutionary models, gene duplication and the evolution of gene families, and horizontal gene transfer. For BY 565, additional readings and an additional written and oral report will be required.

**Components:** Lecture**Course Equivalents:** BY 565**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: BY420**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Biology**

BY 470(3) Course ID:007452

2019-04-19

**Biochemistry & Biotechnology Laboratory**

[Cross-listed with CM 470] This course is a one semester course in the fundamental laboratory approaches for biochemistry and biotechnology. While largely a hands-on course, laboratory experiments will be supplemented with lectures that integrate the theoretical and practical principals covered in the exercises. Topics include protein purification, characterization and analysis, enzyme kinetics and molecular modeling.

**Components:** Laboratory**Course Equivalents:** CM 470**Attributes:** Two communication units, Offered Spring Term**Requirement Group:** Prerequisites: CM221 and CM223 or BY450/CM460 or consent of the instructor.**Req. Designation:** Technology

**School of Arts and Sciences - Biology - Subject: Biology**

**BY 471(3)** Course ID:007453 2018-10-23

**Anatomy and Physiology I**

This course is the first course in a two semester sequence that studies the anatomy and physiology of the human body in detail. Topics covered in this semester include basic cellular activities, anatomy and physiology of skeletal, muscular, circulatory and lymphatic systems. This course is appropriate for students in the pre-PT program as well as pre-health majors in any other health-related field that require a two-semester Anatomy and Physiology sequence.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: BY 160 or by consent of the instructor Corequisite: BY 473

**Req. Designation:** Technology

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**BY 472(3)** Course ID:007454 2015-01-20

**Anatomy and Physiology II**

This course is the second course in a two semester sequence that studies the anatomy and physiology of the human body in detail. Topics covered in this semester include the anatomy and physiology of major organ systems as well as homeostasis. This course is appropriate for students in the pre-PT program as well as pre-health majors in any other health-related field that require a two-semester anatomy and physiology sequence.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: BY471 and BY473, or consent of the instructor. Corequisites: BY474.

**Req. Designation:** Technology

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**BY 473(2)** Course ID:007455 2018-10-23

**Anatomy and Physiology I Lab**

Companion laboratory course to Anatomy and Physiology I, introducing students to anatomical terminology and histology. The students will focus on anatomy of the human skeletal, muscular and circulatory systems.

**Components:** Laboratory

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: BY 160, or by permission of the instructor Co-requisite: BY471

**Req. Designation:** Technology

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**BY 474(2)** Course ID:007456 2018-10-23

**Anatomy and Physiology II Laboratory**

Companion laboratory course to Human Anatomy and Physiology II, introducing students to anatomical terminology, histology, and organ physiology. The students will focus on human physiology of the major organ systems and the technology used to analyze them.

**Components:** Laboratory

**Attributes:** One communication unit, Offered Spring Term

**Requirement Group:** Prerequisite: BY471 and BY473, or consent of the instructor. Co-requisite: BY472.

**Req. Designation:** Technology

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**BY 476(3)** Course ID:010508 2019-12-02

**Current Topics in Biology & Medicine**

[Cross-listed with BY576] This is a discussion-based seminar course that broadly examines advances and implications of modern biology of interest to society, scientists, and students planning a career in medicine, research, or teaching. Students are required to read a variety of current texts, participate in class discussions, and write a substantive essay. Example topics include the discovery of DNA, genome sequencing, applications of bioinformatics, the revolution in applied biotechnology, human physiology under extreme conditions, intellectual history of biology and medicine as explored by prominent science writers, the prognosis for life on earth.

**Components:** Lecture

**Course Equivalents:** BY 576

**Attributes:** One communication unit, Offered Spring Term

**Requirement Group:** Prerequisites: BY160 or BY214 or consent of instructor.

**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology**

BY 480(3)

Course ID:007400

2015-03-03

**Advanced Cell Biology**

This course will focus on understanding how cells function normally, and how cell dysfunction can cause human disease. Topics include DNA replication and repair, cell cycle control and cancer, cell communication and intracellular signaling, regulation of gene expression, the cell surface and the cytoskeleton. Current methods used in cell and molecular biology research will be discussed. The course will emphasize student interaction and exploration of the scientific literature.

**Components:** Lecture**Attributes:** One communication unit, Offered Fall Term**Requirement Group:** Prerequisites: BY160/162 and BY214 or consent of the instructor.**Req. Designation:** Technology

**Science - Biology - Subject: Biology**

BY 482(3)

Course ID:011478

2014-11-20

**Molecular Genetics**

This course will provide students with detailed information on the structure, packages, and expression of genes within the genome of both prokaryotes and eukaryotes. Topics will include chromatin packaging and structure; DNA replication mutation and repair; transcription; RNA splicing; translation; and control of gene expression. Included with each of these topics will be primary research papers, which will be discussed during class. During discussions, experiments in the papers will be analyzed as to how they work (focusing on current biotechnology) and critical analysis of the conclusions. Evaluation will involve exams based on material presented during the course as well as participation in discussions and written analysis of presented research papers. This course contains advanced topics and is designed primarily for graduate or advanced undergraduate students.

**Components:** Lecture**Course Equivalents:** BY 582**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: BY160, BY214, BY450, CM103 or 131, and CM104 or 132.**Req. Designation:** Technology

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**Engineering - Electrical & Computer Eng - Subject: Biology**

BY 485(3)

Course ID:011198

2014-11-20

**Neural Engineering**

[Cross-listed with EE 485, ES 485] This course applies engineering principles to the study of neuroscience and to the design of devices or techniques intended to replace missing or augment existing functions such as seeing, hearing, speaking, and walking. The course provides a detailed overview of sensorimotor systems, neurophysiology, neuroanatomy, neuropathology and clinical neurology. The class sequences through the various sensory and movement systems, providing a quantitative basis for how the nervous systems works for these systems, for how it dysfunctions, for the disability produced, and finally for how function can be restored by neuroprostheses. Students will prepare and present a paper on a neural engineering topic.

**Components:** Lecture**Course Equivalents:** EE 585, EE 485, ES 485**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology**

BY 486(3) Course ID:011809 2015-02-12

**Molecular Biotechnology**

Molecular biotechnology is a rapidly evolving scientific discipline impacting on many aspects of our daily life. This course will review basic concepts and methodologies in recombinant DNA technology, cover the use of molecular biotechnology for the production of useful products in areas of microbial, plant and animal biotechnology and address social and economic issues rising with the availability of these technologies.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: BY160 and BY214, or consent of the instructor.**Req. Designation:** Technology

BY 488(3) Course ID:011810 2015-02-12

**Stem Cells and Regenerative Medicine**

This course will cover biological and medical perspectives of stem cells from their fundamental basic biology and mechanisms of organ regeneration through the use of induced-pluripotent stem cells (iPSCs) for therapeutic benefit. It will deal with mammalian and human embryonic stem cells (hESCs) and focus on how iPSCs generate distinct fates during human development and how this can be used for regenerative therapy of common human diseases.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: BY160 and BY214, or consent of the instructor.**Req. Designation:** Technology

BY 490(3) Course ID:007459 2015-03-05

**Term Integrated Project in Bioscience**

This problem-based course will task students to analyze and suggest solutions to a complex problem in the field of infectious disease research. The course is intended to reinforce what they have learned in the other courses during the Trudeau Semester in Bioscience. Enrollment is limited to students participating in the Trudeau Semester.

**Components:** Project Team**Attributes:** One communication unit, Contemporary and Global Issues, Science, Technology and Society, University Course, Given When Needed**Requirement Group:** Enrollment is limited to students participating in the Trudeau Semester.**Req. Designation:** Technology

BY 495(1 - 2) Course ID:011277 2015-01-23 Instructor Consent Required

**Undergraduate Teaching Assistantship in Bioscience**

Students obtain teaching experience by assisting a faculty member in teaching a lecture or laboratory course. Pedagogical activities may include leading laboratory or discussion sections, designing and testing laboratory exercises, and assisting in student assessment.

Prerequisites: Consent of the instructor.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology

BY 498(0) Course ID:007463 2015-08-19 Instructor Consent Required

**Internship in Bioscience**

During the fall semester, spring semester, or summer, a student must complete an off-campus professional experience directly related to a career in the basic or applied biosciences that meets the professional goals of the student and the Clarkson university-wide requirements for a professional experience. The experience should involve minimally 120 hours of training and work, and must be pre-approved by the student's faculty advisor or Chair of Biology. A formal report upon completion of the internship is required.

Prerequisites: Consent of the instructor.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology

BY 499(0) Course ID:007464 2015-08-18 Instructor Consent Required

**Professional Experience in Bioscience**

During the fall semester, spring semester, or summer, a student must complete a professional experience that is not necessarily directly bioscience-related, but clearly meets the professional goals of the student and the Clarkson university-wide requirements for a professional experience. The experience should involve minimally 120 hours of training and work, and must be pre-approved by the student's faculty advisor or Chair of Biology. A formal report upon completion of the internship is required.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Biology**

BY 506(3) Course ID:013051

2020-09-02

**Biomedical Analysis and Instrumentation**

[Cross-listed with CM 506] Biomedical Analysis and Instrumentation is a lecture course designed to provide advanced undergraduates and graduate students in basic sciences, biosciences and bioengineering disciplines with scientific and engineering aspects of instrumentation, sample analysis, measuring and processing signals from living organisms. Functioning and calibration of biomedical transducers and devices actually used in clinical practice for analyzing clinical biomarkers for disease diagnostics will be reviewed. Emerging research in bioinstrumentation, biomedical technologies, stand alone and wearable sensing devices, analytical method development and validation will be also be covered. Special emphasis will be placed on measurement principles of medical instrumentation used in health technologies ranging from laboratory scale to next generation wearables. Training in professional ethics, grant writing, patenting, innovation, entrepreneurial activities and FDA regulation for new device development, laboratory management, as well as communication

**Components:** Lecture

**Course Equivalents:** BY 406, CM 406, CM 506

**Attributes:** Offered Even Springs

**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology**

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BY 510(3) Course ID:007465 2014-12-05

**Developmental Biology**

This course will cover the same subject area and topics as that of BY 310. Additional materials at the graduate level will be expected of those who register under this catalog number.

**Components:** Lecture

**Course Equivalents:** BY 430

**Req. Designation:** Technology

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BY 512(4) Course ID:007486 2016-12-22

**Molecular Biology Laboratory**

This course will deal with the same subject area and topics as that of BY 412. Additional materials at the graduate level will be expected of those who register under this catalog number.

Prerequisites: graduate standing.

**Components:** Laboratory

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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BY 514(4) Course ID:007890 2015-01-20

**Bioinformatics**

This course and companion lab will cover the same subject area and topics as BY314. Additional materials at the graduate level will be expected of those who register under this catalog number.

Prerequisite: Graduate standing.

**Components:** Laboratory, Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Biology**

BY 518(3) Course ID:010304

2022-01-26

**Principles of Toxicology and Epidemiology**

[Cross-listed with IH 416, BY 416, IH 518] This course covers the same topics as IH416 (BY416) and includes additional material on the graduate level.

**Components:** Lecture**Course Equivalents:** BY 416, EHS 416, EHS 518**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology****BY 519(3)** Course ID:007467 2015-02-12**Immunology**

This course will cover the same subject area and topics as that of BY 419. Additional materials at the graduate level will be expected of those who register under this catalog number.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**BY 520(3)** Course ID:007468 2014-12-05**Microbiology**

This course will cover the same subject area and topics as that of BY 320. Additional materials at the graduate level will be expected of those who register under this catalog number.

**Components:** Lecture**Req. Designation:** Technology**BY 522(3)** Course ID:007487 2021-09-14**Advanced Evolutionary Biology**

[Cross-Listed with BY420] An in-depth look into the mechanisms driving evolution at both the phenotypic and genomic level, and how an understanding of evolution is crucial for many applied problems in environmental science and human health. Topics include ecological drivers of evolution, how and why DNA sequences and genomes change, population genetics and evolutionary theory, the evolution of gene families and networks, and horizontal gene transfer. The processes driving evolution will also be explored using computer simulations and evolution experiments with microbes. Students registering in the graduate section of this course will be required to complete extended versions of assignments and exams.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**BY 524(2)** Course ID:012789 2017-02-03**Experimental Evolution Laboratory**

[Cross-listed with BY424] An introduction to experimental approaches used in evolutionary biology. Students will conduct lab experiments using microbes to investigate a range of topics in experimental evolution, observing and exploring evolution as it happens in real time. Topics explored will include adaptive diversification, the evolution of fitness trade-offs, evolutionary loss of redundant traits, and evolutionary rescue.

**Components:** Laboratory**Course Equivalents:** BY 424**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: BY522**Req. Designation:** Technology**BY 525(3)** Course ID:010433 2014-12-05**Biological Systems and Environmental Change**

Human activities are resulting in dramatic global environmental change, in the forms of biodiversity loss, altered biogeochemical cycles, introduced invasive species, chemical toxification of the environment, climate change, unsustainable exploitation of natural resources, and habitat loss, degradation, and fragmentation. In this course, we will examine how these forms of environmental change disturb biological systems by critically reading key research papers, and discussing their implications for future research and policy action.

**Components:** Lecture**Course Equivalents:** BY 425**Req. Designation:** Technology**BY 527(3)** Course ID:012916 2018-11-02**Advanced Mass Spectrometry**

Practical Applications will introduce the students to mass spectrometry and its applications within different fields, including pharmaceutical and biotech industry, academia, government, forensics, etc. Various types of instruments will be discussed, as well as their application within different fields. The course will then focus on different types of well-known "omics", such as proteomics, metabolomics, glycomics, or lipidomics, but also on specialized types of "omics" such as peptidomics, post-translational modification-omics (PTM-omics), interactomics, foodomics, microbiomics, venomics, DNA- RNA- & Protein-adductomics, genomics, proteogenomics or transcriptomics. Particular applications of all these kinds of "omics" in biotechnology & pharmaceutical industry, healthcare, biowarfare and forensics will also be discussed.

**Components:** Lecture**Course Equivalents:** CM 422, CM 522, BY 427**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: CM/BY460/560, or consent of the instructor**Req. Designation:** Technology

**School of Arts and Sciences - Biology - Subject: Biology****BY 528(3)** Course ID:011663 2012-01-31**Conservation Biology**

BY528 provides a graduate-level overview of the core theory of conservation biology, and how conservation biology is applied for environmental conservation and management. Major topics of this course will include conservation prioritization, the problems of small population size on the long-term persistence of a species, conservation genetics, habitat fragmentation and nature reserve design, invasive species, consequences of extinctions on ecosystem processes and community structure, and the possible effects on biodiversity of global climate change. A course emphasis will be on the challenge of translating the core lessons of conservation biology to effective policy and environmental management. BY528 students will do additional readings, mathematical simulation exercises, and recitations beyond BY428 students.

Prerequisite: Graduate Standing.

Components: Lecture

Req. Designation: Technology

**BY 531(3)** Course ID:007471 2014-12-05**Limnology**

Limnology (aquatic science) is the study of physical, chemical, and biological properties of fresh water bodies, e.g. lakes, rivers, reservoirs, and wetlands. This introductory course will provide an array of topics that will, by the multi-disciplinary nature of limnology, call upon students' knowledge of biology, chemistry and physics and place them within the context of aquatic science. The focus of the instruction will be aquatic ecology at all levels of biological organization. Upon completion of the course, the student will be able to characterize the physical, chemical and biological/ecological properties of freshwater through the selection and application of appropriate sampling methods. This course covers the same subject area as BY 431 and includes additional materials at the graduate level.

Prerequisite: BY222 or CM132 or consent of the instructor.

Components: Lecture

Requirement Group: Corequisite: BY 532

Req. Designation: Technology

**BY 532(2)** Course ID:011956 2014-12-05**Limnology Laboratory**

This co-requisite of Limnology (aquatic science) will provide students the opportunity to engage in water sampling of regional lakes and rivers, analysis of samples in the laboratory, introduction to data synthesis, and report writing. Some fieldwork will be required.

Components: Laboratory

Requirement Group: Corequisite: BY 531

Req. Designation: Technology

**Engineering - Electrical & Computer Eng - Subject: Biology**

BY 540(3) Course ID:010662 2014-11-18

**Introduction to Biomedical Rehabilitation Engineering and Science**

[Cross-listed with BR 500] This interdisciplinary course will introduce students to basic principles of biomedical rehabilitation engineering. The course will present principles of disability and the diverse roles of engineering in medicine and rehabilitation. Students will use engineering methods to study anatomical and physiological systems including applications in rehabilitation engineering, bioinstrumentation, biosignal and image processing, biomechanics, and biomaterials.

Prerequisites: MA131/132, PH131/132, junior or senior standing.

Components: Lecture

Course Equivalents: BY 440, BR 400, BR 500, ES 402

Req. Designation: Technology

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**School of Arts and Sciences - Biology - Subject: Biology****BY 548(3)** Course ID:007473 2014-09-18**Medical Microbiology**

This course will cover the same subject area and topics as that of BY 448. Additional materials at the graduate level will be expected of those who register under this catalog number.

**Components:** Lecture  
**Req. Designation:** Technology

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**BY 552(3)** Course ID:013112 2021-06-01**Pharmacology**

This course will cover the same subject area and topics as that of BY 452. Graduate students will be required to do additional reading and submit a literature review concerning a topic of their choice, relating to the course material.

**Components:** Lecture  
**Attributes:** Given When Needed  
**Req. Designation:** Technology

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**BY 555(3)** Course ID:010885 2016-08-15**Cell and Molecular Biology of Cancer**

This course will deal with the same subject area and topics as that of BY455. Additional materials at the graduate level will be expected of those who register under this catalog number.

Prerequisites: graduate standing.

**Components:** Lecture  
**Attributes:** Offered Spring Term  
**Req. Designation:** Technology

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**BY 560(3)** Course ID:007475 2015-01-20**Comparative Physiology**

In this course, graduate students will be instructed in all the main branches of modern animal physiology with a strong emphasis on the integration of physiological knowledge, ecology, and evolutionary biology. In addition to an in-depth treatment of mammalian physiology, graduate students will be exposed to the various physiological systems that have evolved in other vertebrate, as well as invertebrate, animals. In addition to meeting the demands of the BY360 course, graduate students will be required to do additional reading and submit a literature review concerning a topic of their choice relating to the course material.

Prerequisite: Graduate Standing.

**Components:** Lecture  
**Course Equivalents:** BY 360  
**Attributes:** Offered Spring Term  
**Req. Designation:** Technology

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**BY 561(3)** Course ID:007491 2016-11-01**Neurobiology**

This course will cover the same subject area and topics as that of BY 460. Additional materials at the graduate level will be expected of students who register under this catalog number.

Prerequisites: graduate standing.

**Components:** Lecture  
**Course Equivalents:** BY 460, PY 460  
**Attributes:** Offered Fall Term  
**Req. Designation:** Technology

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**BY 565(3)** Course ID:012836 2017-09-28**Molecular and Genome Evolution**

[Cross-Listed with BY465]An overview of the molecular underpinnings of evolution, and how those molecular changes can be used to characterize and understand the evolutionary history of genes, proteins and organisms. Topics include how and why DNA sequences and genomes change, molecular phylogenetics and evolutionary models, gene duplication and the evolution of gene families, and horizontal gene transfer. For BY 565, additional readings and an additional written and oral report will be required.

**Components:** Lecture  
**Course Equivalents:** BY 465  
**Attributes:** Offered Spring Term  
**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology**

BY 571(3)

Course ID:012092

2015-06-01

**Anatomy & Physiology I**

This is the first semester of a two-semester sequence covering the basic principles of Human Anatomy and Physiology. The course will focus on the anatomical organization and physiology of the human body using a systems approach. Lectures will emphasize a basic understanding of how anatomical organization at the cell, tissue and organ level correlates with physiological processes. Clinical connections will be drawn wherever relevant. In addition to covering the same subject areas as that of BY471, some advanced topics will be discussed and the students will be given additional reading and writing assignments. This course can assist students in finding a relevant research question to pursue investigation in the field of biomedical science.

Prerequisite: Graduate standing, or permission of the instructor

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

BY 572(3)

Course ID:012093

2018-01-08

**Anatomy & Physiology II**

This is the second semester of a two-semester sequence covering the basic principles of Human Anatomy and Physiology. The course will focus on the anatomical organization and physiology of the human body using a systems approach. Lectures will emphasize a basic understanding of how anatomical organization at the cell, tissue and organ level correlates with physiological processes. Clinical connections will be drawn wherever relevant. In addition to covering the same subject areas as that of BY472, some advanced topics will be discussed and the students will be given additional reading and writing assignments. This course can assist students in finding a relevant research question to pursue investigation in the field of biomedical science.

Prerequisites: Graduate standing, or permission of the instructor

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

BY 573(2)

Course ID:012094

2015-06-01

**Anatomy & Physiology I Laboratory**

This is the first semester of a two-semester sequence covering the basic principles of Human Anatomy and Physiology. This is the corresponding laboratory for BY571 and will involve anatomical study using a computer-assisted methodology and demonstrations of anatomical models and specimens. In addition to covering the same subject areas as that of BY473, some advanced topics will be discussed and the students will be given additional reading and writing assignments.

Components: Laboratory

Attributes: Offered Fall Term

Requirement Group: Corequisite: BY 571

Req. Designation: Technology

BY 574(2)

Course ID:012095

2018-01-08

**Anatomy & Physiology II Laboratory**

This is the corresponding laboratory for BY572. The laboratory exercises will focus on physiology and will involve study using a computer-assisted methodology. The students will learn the principles and methodologies of various physiological measurements including bioelectric signals, pulmonary function tests and nerve reflexes. The course will require students to submit a written project and give an oral presentation for successful completion. In addition to covering the same subject areas as that of BY474, some advanced topics will be discussed and the students will be given additional reading and writing assignments.

Components: Laboratory

Attributes: Offered Spring Term

Requirement Group: Corequisite: BY 572

Req. Designation: Technology

BY 576(3)

Course ID:010509

2015-02-12

**Current Topics in Biology and Medicine**

[Cross-listed with BY476] This course will cover the same subject area and topics as that of BY476. Additional materials at the graduate level will be expected of students who register under this catalog.

Prerequisites: graduate standing.

Components: Lecture

Course Equivalents: BY 476

Attributes: Offered Spring Term

Req. Designation: Technology

**School of Arts and Sciences - Biology - Subject: Biology**

BY 580(3)

**Advanced Cell Biology**

This course will cover the same subject area and topics as that of BY 480. Additional materials at the graduate level will be expected of those who register under this catalog number.

**Components:** Lecture  
**Req. Designation:** Technology

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**Science - Biology - Subject: Biology**

BY 582(3)

**Molecular Genetics**

This course will provide students with detailed information on the structure, packages, and expression of genes within the genome of both prokaryotes and eukaryotes. Topics will include chromatin packaging and structure; DNA replication mutation and repair; transcription; RNA splicing; translation; and control of gene expression. Included with each of these topics will be primary research papers, which will be discussed during class. During discussions, experiments in the papers will be analyzed as to how they work (focusing on current biotechnology) and critical analysis of the conclusions. Evaluation will involve exams based on material presented during the course as well as participation in discussions and written analysis of presented research papers. This course contains advanced topics and is designed primarily for graduate or advanced undergraduate students. Graduate students will do additional course work.

**Components:** Lecture**Course Equivalents:** BY 482**Attributes:** Offered Spring Term**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: Biology**

BY 586(3) Course ID:011811 2015-02-12

**Molecular Biotechnology**

Molecular biotechnology is a rapidly evolving scientific discipline impacting on many aspects of our daily life. This course will review basic concepts and methodologies in recombinant DNA technology, cover the use of molecular biotechnology for the production of useful products in areas of microbial, plant and animal biotechnology and address social and economic issues rising with the availability of these technologies. Additional materials will be expected at the graduate level.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

BY 588(3) Course ID:011812 2015-02-12

**Stem Cells and Regenerative Medicine**

This course will cover biological and medical perspectives of stem cells from their fundamental basic biology and mechanisms of organ regeneration through the use of induced-pluripotent stem cells (iPSCs) for therapeutic benefit. It will deal with mammalian and human embryonic stem cells (hESCs) and focus on how iPSCs generate distinct fates during human development and how this can be used for regenerative therapy of common human diseases. Additional materials expected at the graduate level.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

BY 600(1 - 4) Course ID:007893 2015-01-23 Instructor Consent Required

**Directed Study in Bioscience**

Students study advanced topics in bioscience not otherwise available in formal graduate courses. Under supervision of a faculty member, a semester-long course of study is designed based on readings from appropriate texts and primary literature.

Prerequisites: Graduate standing and consent of the instructor.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

BY 604(3) Course ID:012070 2015-03-27

**Molecular Pharmacology**

In this course, students will be introduced to the techniques used to study the structure and function of membrane receptor proteins, in particular those of two families that together comprise over 80% of pharmaceutical drug targets: ion channels and G protein-coupled receptors. Specifically, students will see how knowledge of a receptor's 3-dimensional structure and signal transduction mechanism aids understanding of drug action and can assist in the design of newer, better therapeutic agents.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

BY 608(2) Course ID:007894 2015-09-18

**Teaching in Biosciences**

This course is intended to improve bioscience teaching training for graduate students. Graduate students will read literature based on the current state of biology education at the university level (e.g. AAAS Vision and Change in Undergraduate Biology Education). Students will also learn how to design undergraduate bioscience teaching labs, and effectively teach the labs. Activities will include writing a course syllabus, and designing and conducting an original lab activity with resources available on the Clarkson campus. The designed lab can be at the level of a freshman lab, or an upper level biology course. Students will need to consider how the lab will be conducted, what is expected for pre-lab and post-lab assignments, and how lab students will be evaluated. Other activities will include how to write effective laboratory protocols and learning to manage a bioscience laboratory.

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

BY 610(3) Course ID:007485 2015-02-03

**Ecological Statistics and Experimental Design**

Ecological statistics and experimental design covers a broad and eclectic area of applied statistics used in data description, exploratory data analysis, and statistical hypothesis testing used in environmental science. This course also introduces R as a powerful application for doing experimental design and statistics.

Components: Laboratory, Lecture

Attributes: Offered Each Term

Req. Designation: Technology

**School of Arts and Sciences - Biology - Subject: Biology**

BY 622(1)

**Graduate Seminar**

Weekly meetings to discuss topics of current research interest and attendance of research seminars presented in the biology department. Each candidate for the IBB M.S. or IBB Ph.D. must enroll and participate in BY622 every semester of their degree and present at least one seminar or more for each calendar year that they are in the program. Prerequisite: graduate standing.

**Components:** Seminar**Attributes:** Offered Each Term**Req. Designation:** Technology

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**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Biology**

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BY 650(3) Course ID:007489 2015-02-12

**Biochemistry I**

[Cross-listed as CM 560] This course covers the same topics as BY 450 and includes additional material on the graduate level.

**Components:** Lecture

**Course Equivalents:** BY 450, CM 460, CM 560

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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BY 651(3) Course ID:007490 2014-11-20

**Biochemistry II**

[Cross-listed with CM 561] This course will cover the same subject area and topics as that of BY 451.

Additional materials at the graduate level will be expected of those who register under this catalog number.

Prerequisites: graduate standing.

**Components:** Lecture

**Course Equivalents:** CM 561

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**Science - Biology - Subject: Biology**

BY 690(2) Course ID:012739 2016-09-05

**Critical Thinking and Research Proposal Development in Biology**

This course provides a thorough coverage of the essential elements of research proposal writing, a skill that is required throughout one's scientific career but for which formal training is frequently lacking. After an introductory lecture that provides a general overview of the conceptualization and writing of a research proposal, students will be guided through a series of exercises designed to develop these critical skills. Subsequent meetings will be in the form of small tutorial groups with a faculty member leading discussion of primary literature and the outstanding questions in a particular field of research. Students will exchange their written reports with their peers to get feedback from their peers at different stages of draft preparation before submitting them to the faculty instructor for grading. Students will be encouraged to meet with their peers outside of class hours to discuss their reports/proposals. This course aims at preparing IB&B PhD students for their pre-proposal and full proposal writing, which are the written

Components: Lecture

Attributes: Offered Odd Springs

Req. Designation: Technology

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**School of Arts and Sciences - Biology - Subject: Biology****BY 900(1 - 15)** Course ID:011278 2015-02-03**Thesis, Dissertation or Special Project in Bioscience**

Student performs independent research toward a masters or doctorate degree under the guidance of a faculty thesis advisor. A graduate thesis committee monitors student progress and provides guidance toward completion of the project. Work done in satisfaction of the requirements for a degree will be assigned a grade when the thesis is submitted and approved.

Prerequisites: Graduate standing.

Components: Thesis Research

Attributes: Offered Each Term

Req. Designation: Technology

**BY 999(1 - 10)** Course ID:011095 2015-01-13**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

**CE 1(2 - 4)** Course ID:008056 2015-01-13

**Civil and Environmental Engineering Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. (Not offered at Clarkson, for transfer credit only.)

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**CE 2(2 - 4)** Course ID:008057 2015-01-13

**Civil and Environmental Engineering Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used as a Professional Elective. (Not offered at Clarkson, for transfer credit only.)

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**CE 6(2 - 4)** Course ID:009721 1901-01-01

**CEE Elective**

Transfer Credit Only

**Components:** Lecture

**Attributes:** Engineering Foundation Curriculum Course, Transfer Credit Only

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**CE 212(3)** Course ID:007499 2022-04-27

**Introduction to Engineering Design**

This course teaches students how to solve problems through an intentional process known as engineering design. Students learn the seven steps of the iterative engineering design process: Ask, Imagine, Plan, Create, Test, Improve, and Share. Students practice the iterative engineering design process by working with multidisciplinary peer groups to solve real-world engineering problems. This course emphasizes continuous improvement and sustainability in engineering design; the broader impacts of engineering innovation on the planet and society; and professional skills like collaboration, communication, critical thinking, and engineering ethics.

**Components:** Laboratory, Lecture

**Course Equivalents:** AE 212, ME 212

**Attributes:** 1.5 Design Credits, One communication unit, Offered Fall Term

**Requirement Group:** Prerequisites: Civil & Environmental Engineering at least Sophomore standing or consent of the instruc

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**CE 301(3)** Course ID:007500 2020-08-18

**Introduction to Geospatial Analysis and Geographic Information Systems**

[Cross-listed with SC 301] An introductory course in the concepts and uses of Geographic Information Systems (GIS) including analysis of GIS-based local and global geographic datasets. Provides basic knowledge of GIS theory and applications using existing state-of-the-art GIS software and current spatial data resources. Applications include: overlay analysis, spatial data query, map generation and terrain surface analysis. Students will also learn the basics of GPS data collection, remote sensing, 3D visualization, probability, statistics, and error analysis.

**Components:** Laboratory, Lecture

**Course Equivalents:** SC 301

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisite: At least Sophomore standing.

**Req. Designation:** Technology

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**CE 302(3)** Course ID:013047 2023-01-24

**Surveying, Geodetic Control, and Engineering Measurements**

Fundamentals of terrestrial surveying measurements include leveling, distances, and angle measurements to compute Orthometric heights relative to a vertical survey datum and 2-D Cartesian coordinates in a horizontal survey datum for engineering projects. Exposure to advanced surveying techniques including GPS, UAV, bathymetric survey, LiDaR, and use of Autodesk Civil3D will be covered.

**Components:** Laboratory, Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisite: C- or better in MA131

**Req. Designation:** Technology

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**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 304(3) Course ID:013043

2020-08-18

**Introduction to Scheduling and Estimating**

An introduction to the principles and theories of estimating and scheduling a construction project. Basic and advanced estimating and scheduling techniques will be discussed for both building and heavy/civil projects. The use of computers in estimating and scheduling will be highlighted in the course. Project: the student will estimate the cost of and submit a schedule for a medium sized building project given a complete set of contract documents and other project information. (2 credits of design)

**Components:** Lecture**Attributes:** Two Design Credits, Offered Spring Term**Requirement Group:** Prerequisite: At least Sophomore standing.**Req. Designation:** Technology

CE 305(3) Course ID:007507

2018-06-13

**Construction Planning and Management**

This course will focus on project planning, design services contracts, construction contract documents, construction management, labor relations, construction bonds and insurance, construction scheduling, estimating and bidding procedures, cost control, value engineering, and construction administration. Some topics will be presented by guest lecturers. (1 credit of design)

**Components:** Lecture**Attributes:** One Design Credit, Offered Spring Term**Requirement Group:** Requirement: Must have Sophomore or above standing.**Req. Designation:** Technology

CE 310(3) Course ID:007501

2017-01-09

**Geotechnical Engineering I: Soil Mechanics**

An introduction to geotechnical engineering. Identification, classification and engineering properties of soil. Topics include stress-strain and strength relationships, consolidation, permeability and compaction of soils. Related geotechnical design problems included. Laboratory experience included. (1 credit of design)

**Components:** Laboratory, Lecture**Attributes:** One Design Credit, One communication unit, Offered Spring Term**Requirement Group:** Prerequisites: ES222**Req. Designation:** Technology

CE 313(3) Course ID:011378

2022-06-07

**Biogeochemical Earth Systems Science**

[Cross-listed with EV 313, BY 313] This course will investigate the key concepts and principles of environmental science emphasizing the earth's biogeochemical cycles and how they have been perturbed by human activities. Quantitative analysis of air, soil and water quality on local, regional and global scales will be a significant component of the course. Emerging principles in environmental science, including sustainability, industrial ecology, risk assessment and the precautionary principle will be introduced. In addition to the quantitative aspects, the course will consider the historical, social, and political contexts in which the practice of environmental science takes place.

**Components:** Lecture**Course Equivalents:** BY 313, EV 313**Attributes:** Given When Needed**Requirement Group:** Prerequisites: CM132 (or CM104), or consent of the instructor**Req. Designation:** Technology

CE 315(3) Course ID:007510

2022-06-07

**Geology For Engineers**

This course explores the fundamentals of geology with respect to civil engineering. Topics include rock and mineral types, soils, soil formation and properties, geologic structures and topography, active tectonics and earthquake hazards. In addition, the course will cover slope stability, landslides, sediments and sediment transport, groundwater, formation and use of earth materials, and alteration of rocks and minerals.

Instruction is conducted through lecture and laboratory exercises.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: CM 131 and PH 131 Corequisite: CM 132**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 316(3) Course ID:013148 2022-03-18

**Earth's Dynamic Climate: Science & Impacts**

The course will present the scientific background, from a geologic perspective, behind the Earth's climate system, including drivers, processes and responses. Time will be spent examining proxy records to understand how we know about climates of the past. The second part of the course will use an earth science-based approach through the use of geologic principles to examine the past, present and potential impacts on earth systems and the societies constructed in various environments with a focus on how climate variations have and may impact civil and environmental engineering projects through applications of process geomorphology.

Components: Lecture

Attributes: Offered Fall Term

Requirement Group: Prerequisites: CM131, PH131, or consent of instructor

Req. Designation: Technology

CE 317(3) Course ID:013175 2022-08-04

**Geologic Hazards**

The course will present a process based approach to understanding Earth hazards. Material presented will explore the why, how and impacts of processes including mass movements, earthquakes, tsunamis, flooding and other natural events that cause episodic and catastrophic impacts on the surface of the Earth. The course will use applied geomorphology to examine the landscape to understand the susceptibility to geologic hazards, identify past events and predict potential future events.

Components: Lecture

Attributes: Offered Spring Term

Requirement Group: MA131 and PH131

Req. Designation: Technology

CE 320(3) Course ID:007502 2015-02-23

**Structural Analysis**

Linear elastic analysis of structural systems including the computation of internal and external forces and displacements produced by the application of loads. Statically determinate and indeterminate systems are considered. Laboratory experience included. (1 credits of design)

Components: Laboratory, Lecture

Attributes: One Design Credit, One communication unit, Offered Fall Term

Requirement Group: Prerequisites: ES222

Req. Designation: Technology

CE 330(3) Course ID:007503 2018-07-13

**Water Resources Engineering I**

An introduction to water resources engineering. Topics include flow in pressurized conduits, hydraulic machinery, open channel flow, design of wastewater flow systems, hydrological cycle, rainfall and runoff analysis. Laboratory experience included. (1 credit of design)

Components: Laboratory, Lecture

Attributes: One Design Credit, One communication unit, Offered Fall and Spring

Requirement Group: Prerequisite: ES330.

Req. Designation: Technology

CE 340(3) Course ID:007504 2023-06-01

**Introduction to Environmental Engineering**

An introduction to the fundamentals of environmental engineering and science. Discussion of the role of engineering in current and emerging environmental issues. Topics include: materials balances, reactor flow models, and chemical fate and transport, with applications in natural and engineered environmental systems. (1 credit of design)

Components: Lecture

Attributes: One Design Credit, Offered Spring Term

Requirement Group: Prerequisites: MA131 and CM104 or CM132. Corequisite: MA232.

Req. Designation: Technology

CE 380(3) Course ID:012771 2023-06-01

**Fundamentals of Environmental Engineering**

This course explores chemical and physical fundamentals in solving environmental engineering problems related to water quality, water and wastewater treatment, air pollution, solid and hazardous waste management, sustainability, and risk assessment. The importance of mass balances and the physical and chemical processes involved in transferring chemicals within and between air, water and soil will be studied. Laboratory experiences included. (1 credit of design).

Components: Laboratory, Lecture

Attributes: One Design Credit, One communication unit, Offered Spring Term

Requirement Group: Prerequisites: CH210 or consent of instructor

Req. Designation: Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 404(3) Course ID:010431 2020-08-18

**Applications in Scheduling and Estimating**

An application of estimating and scheduling for a construction project. Students will take part in an intensive, project-based scheduling and estimating effort leading up to and including regional level competition as part of the Associated Schools of Construction. Projects will include commercial building, heavy/civil works, pre-construction services, and design-build projects. As part of a team, participants will prepare bid or proposal documentation, develop detailed reports, and provide an oral presentation to a client panel. (This course includes 2 design credits)

**Components:** Lecture**Attributes:** Two Design Credits, Offered Fall Term**Requirement Group:** Prerequisites: CE 304, or consent of the instructor**Req. Designation:** Technology

CE 406(3) Course ID:007508 2020-08-19

**Infrastructure Construction**

This course develops the procedures for the design and construction for a heavy civil construction project. Estimating resources (labor, materials, and equipment selection) as well as determining the sequence and required planning for a horizontal construction effort and/or a foundation/retaining structure (including: contract documents, project reports, equipment rental rates and equipment brochures and other project information). Students will also develop a distinct project packet to execute a project of this type for presentation to the faculty, potential guests, and students. (2 credits of design)

**Components:** Lecture**Attributes:** Two Design Credits, Offered Fall Term**Requirement Group:** Prerequisites: CEE junior or senior standing.**Req. Designation:** Technology

CE 408(3) Course ID:011636 2015-09-15

**Building Information Modeling (BIM) and Intergraded Project Delivery (IPD)**

Course provides an introduction to the emerging field of building information modeling and integrated project management for construction projects. Course will cover basic techniques and methods to the use of current/state of the art computer aided design software including Autodesk Revit, and Autodesk Navisworks. (2 credits of design)

**Components:** Lecture**Attributes:** Two Design Credits, Offered Each Term**Requirement Group:** Prerequisites: CEE Junior or Senior standing**Req. Designation:** Technology

CE 409(3) Course ID:012026 2015-03-09

**Fundamentals of Building Systems**

An examination of building life support systems and technology of interest to civil engineers in the planning, operation, and maintenance of buildings. Topics include human comfort, electrical, mechanical, water and waste, transportation, lighting, and other systems necessary for building utilization. Special cases will be examined in integrated project delivery, sustainable design practices, and energy modeling.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: Must have junior or senior standing.**Req. Designation:** Technology

CE 410(3) Course ID:012045 2018-11-13

**Sustainable Infrastructure and Building**

A study of the use of sustainability rating systems for infrastructure and building projects. Utilizing the USGBC LEED and the ISI Envision rating systems, this course will teach the fundamentals of sustainable building and acquaint students with the processes required to certify/verify projects to meet an independent rating standard. This course will prepare students to take the LEED GA and/or Envision ENV PV exams.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: Must have junior or senior standing.**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 411(3) Course ID:007509 2022-06-07

**Construction Materials Engineering**

Proper procedures for installation of major construction materials, including soil, concrete, steel, pipe, masonry units, etc. Material production including Portland cement concrete, concrete masonry units, bituminous concrete, and structural steel. Project specifications will be reviewed governing the above material, including methods of designing, testing and inspecting construction materials and completed installations. (2 credits of design)

**Components:** Lecture**Attributes:** Two Design Credits, Offered Fall Term**Requirement Group:** Prerequisites: Junior or Senior standing**Req. Designation:** Technology

CE 415(3) Course ID:007511 2015-02-23

**Foundations, Stability, and Retaining Structures**

Application of principles of soil mechanics to the design of shallow and deep foundations, retaining structures and slope stability. Bearing capacity theory and settlements. Interpretation of soil boring logs as related to geotechnical engineering design. (3 credits of design)

**Components:** Lecture**Attributes:** Three Design Credits, Offered Fall Term**Requirement Group:** Prerequisite: CE310.**Req. Designation:** Technology

CE 419(3) Course ID:013193 2023-01-10

**Applied Geophysics**

Application of geophysical methods for analyzing sites, locating buried infrastructure, non-destructive testing and tracking contamination plumes. Several geophysical methods will be introduced in class and applied on field projects. Methods include ground penetrating radar, electromagnetics, acoustics, resistivity, conductivity and spatial analysis.

**Components:** Lecture**Course Equivalents:** CE 519**Attributes:** Offered Odd Falls**Requirement Group:** Prerequisites: PH132 and CE301**Req. Designation:** Technology

CE 420(3) Course ID:007512 2023-06-01

**Computational Methods of Structural Analysis**

The matrix stiffness method, theory and implementation in MATLAB, for the analysis of trusses, beams, frames, and grids. Discussion of thermal effects, support settlements, nonlinear effects, and other modeling considerations.

**Components:** Lecture**Attributes:** One Design Credit, Offered Spring Term**Requirement Group:** Prerequisites: CE320 with minimum grade of C or consent of the instructor.**Req. Designation:** Technology

CE 430(3) Course ID:007898 2015-02-23

**Water Resources Engineering II**

Hydraulic structures, design of open channels, flood routing, runoff models, design of stormwater management systems, groundwater hydrology, transport and mixing processes. (1 credit of design)

**Components:** Lecture**Attributes:** One Design Credit, Offered Spring Term**Requirement Group:** Prerequisite: CE330.**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng****CE 433(3)****Course ID:010510****2021-11-09****Human Exposure Analysis**

Human exposure analysis is an emerging science concerned with how humans come into contact with chemicals in the environment via inhalation, ingestion, and dermal contact. The course focuses on scientific and engineering issues, including direct measurement and model constructs. Students gain an understanding of the complexities, uncertainties, and physical, chemical and biological issues relevant to human exposures resulting from the use and release of toxic compounds. Topics include human exposure analysis terminology, pollutant fate and transport, human activity patterns, occupational exposure, indoor air quality, dosimetry, and statistical and mechanistic tools for exposure assessment. For the final project, the students design and perform a small-scale human exposure study using monitoring instruments and/or exposure models. (2 credits of design.)

**Components:** Lecture**Course Equivalents:** CE 533**Attributes:** Two Design Credits, Offered Even Falls**Requirement Group:** Prerequisites: Senior or graduate status in engineering or IH or consent of the instructor.**Req. Designation:** Technology**CE 434(3)****Course ID:011708****2021-11-09****Sustainable Development Engineering**

This course outlines the principles of sustainable engineering for improving sanitation and environmental health in developing communities both internationally and nationally. Topics include sustainable development and appropriate technologies for water and wastewater treatment, water storage and delivery, watershed management, solid waste management, and indoor air quality. The course highlights the importance of community participation and relationship building throughout the development and implementation of engineering projects. At least 2/3 of the course is dedicated to a team-based, sustainable development design project. (2 credits of design)

**Components:** Lecture**Course Equivalents:** CE 534**Attributes:** Two Design Credits, One communication unit, Science, Technology and Society, Offered Odd Falls**Requirement Group:** Prerequisite: CE340 or consent of the instructor.**Req. Designation:** Technology**CE 435(3)****Course ID:011393****2023-06-02****Groundwater Hydrology and Geochemistry**

[Cross-listed with EV 435] This class provides fundamental understanding of the key physical and chemical processes impacting groundwater resources and quality. Emphasis is on groundwater geology, physical characteristics of flow, and geochemical properties of groundwater. Groundwater contamination and contaminant transport and modeling will be introduced. The course will prepare students to qualitatively and quantitatively analyze fluid and contaminant flow in varied geologic systems.

**Components:** Lecture**Attributes:** One Design Credit, Given When Needed**Requirement Group:** Prerequisites: CM132 (or CM104/6) and MA232 and CE330 OR instructor consent**Req. Designation:** Technology**CE 441(3)****Course ID:007514****2023-06-02****Reinforced Concrete Design**

The investigation and design of reinforced structural elements such as beams, slabs, columns and footings to meet ACI 318 code requirements. (3 credits of design)

**Components:** Lecture**Attributes:** Three Design Credits, Offered Spring Term**Requirement Group:** Prerequisite: CE320 or consent of the instructor.**Req. Designation:** Technology**CE 442(3)****Course ID:007515****2021-11-09****Steel Design**

Determination of loads for design; behavior and design of tension members, columns, beams, beam-columns, bolted connections, and welded connections; use of LRFD specifications and the Uniform Building Code. (3 credits of design)

**Components:** Lecture**Attributes:** Three Design Credits, Offered Fall Term**Requirement Group:** Prerequisite: CE320 or consent of the instructor.**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 448(3) Course ID:010696 2022-06-07

**Introduction to Architectural Engineering**

This course will examine the integration of architecture and engineering disciplines in building design and will include introduction to the architectural design process; historical development of architecture/engineering; issues of structural, electrical, HVAC, plumbing, environmental, and acoustical engineering in buildings; economic, construction, and spatial maintenance considerations; professional practice and building codes. Students will be assigned graphic, freehand drawing/sketching, calculation and written exercises as well as a final project. (2 credits of design)

Components: Laboratory, Lecture

Attributes: Two Design Credits, Offered Fall Term

Requirement Group: Prerequisites: ES220 and CE212, or consent of instructor.

Req. Designation: Technology

CE 452(3) Course ID:007907 2022-06-07

**Advanced Strength of Materials**

A study of properties of materials, general stress-strain relationships, modern strength theories, unsymmetrical bending, curved beams, beams on elastic foundations, and the equations of elasticity and plasticity (1 credit of design)

Components: Lecture

Course Equivalents: ME 452

Attributes: Given When Needed

Requirement Group: Prerequisites: ES222

Req. Designation: Technology

CE 453(3) Course ID:010562 2018-07-13

**Properties & Performance of Concrete Materials**

This course explores the materials science aspects of properties and behavior of Portland Cement Concrete, including the properties of raw materials in concrete such as cement, aggregates, mineral and chemical admixtures, and fibers. Topics include: physical and chemical aspects of cement hydration and the role of binder types, the influence of type and morphology of hydrates, fresh and hardened concrete properties, introduction to fracture behavior of concrete, and concrete durability issues such as freezing and thawing, sulfate attack, and corrosion of reinforcing steel. (1 credit of design)

Components: Lecture

Attributes: One Design Credit, Offered Spring Term

Requirement Group: Prerequisite: ES260.

Req. Designation: Technology

CE 461(3) Course ID:007516 2015-02-23

**Transportation Systems Design**

Planning and design of transportation systems with emphasis on highway geometric design components, highway pavement, airport and other selected topics. (3 credits of design)

Components: Lecture

Attributes: Three Design Credits, Offered Fall Term

Requirement Group: Prerequisites: At least junior standing.

Req. Designation: Technology

CE 463(3) Course ID:012829 2018-07-13

**Railroad Engineering**

[Cross Listed with CE563] This course focuses on principles of railroad transportation and covers the following topics: Railroad engineering efficiency, economics, and energy; Cost-benefit analyses of rail transportation systems; Route selection; Geometric design of railroad alignment; Train speed, power, and acceleration requirements; Railroad engineering materials characterization (rail, crosstie, ballast, sub-ballast, and subgrade); Subgrade design and construction and drainage; and High Speed Rail (HSR) design and construction.

Components: Lecture

Course Equivalents: CE 563

Attributes: Given When Needed

Req. Designation: Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 470(3) Course ID:011710 2021-01-25

**River Restoration**

This course provides fundamental understanding of hydrologic, hydraulic, and geomorphic processes of river restoration systems and their ecological impacts. Topics include river hydraulics, sediment transport, fluvial geomorphology, aquatic habitats, channel design, reservoir sedimentation, dam removal/decommission, and fish passage. Emphasis will be given to fluvial geomorphology and hydraulic design of river restoration projects. Computer modeling of river hydraulics and morphodynamics with applications to river restoration design will be introduced.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: CE330; or permission of the instructor.**Req. Designation:** Technology

CE 477(3) Course ID:007520 2021-11-09

**Atmospheric Chemistry**

[Cross-listed with CM 476] This course will cover the evolution of the atmosphere from its initial formation to its natural background condition to its current state perturbed by human activities and reviews appropriate legislation; detailed descriptions of the chemistry of the carbon, nitrogen and sulfur cycles; characterization of the atmospheric aerosol and its role in heterogeneous reaction sand materials transport; stratospheric ozone and problems with its depletion; airborne radio-activity and its role in atmospheric ion chemistry.

**Components:** Lecture**Course Equivalents:** CE 577, CH 576, CM 476, CM 576**Attributes:** Offered Odd Springs**Requirement Group:** Prerequisites: CM370 or CM371 or ES340.**Req. Designation:** Technology

CE 478(3) Course ID:007521 2022-02-02

**Solid Waste Management and Landfill Design**

This course provides a basic understanding of the essential concepts of solid waste management to include identification, collection, transport, processing and disposal of solid wastes. Emphasis is placed upon the legal requirements and practice resulting from the Resource Conservation and Recovery Act (RCRA) and applicable state law. Solid waste issues include characterization, generation, collection, routes, recycling, landfills, and siting. The design and operation of collection routes, transfer stations, Material Recovery Facilities (MRFs), and landfills are covered. Composting and thermal processing operations are also included. (2 credits of design)

**Components:** Lecture**Attributes:** Two Design Credits, Offered Even Falls**Requirement Group:** Prerequisites: Must have junior or senior standing.**Req. Designation:** Technology

CE 479(3) Course ID:007522 2022-06-07

**Water and Wastewater Treatment Design**

A study of physical and chemical operations and biological processes utilized in the treatment of water and wastewater for municipalities and industry. The course emphasizes theoretical and design aspects of these processes.

**Components:** Lecture**Course Equivalents:** CE 579**Attributes:** Three Design Credits, One communication unit, Offered Fall Term**Requirement Group:** Prerequisites: ES330, CE340, or consent of the instructor.**Req. Designation:** Technology

CE 481(3) Course ID:007524 2022-02-02

**Hazardous Waste Management Engineering**

This course is an introduction to the emerging field of hazardous waste management. This course provides an understanding of environmental regulations, management techniques to minimize the generation and disposal of hazardous wastes, and technologies to treat wastes and remediate disposal sites.

**Components:** Lecture**Attributes:** 2.5 Design Credits, One communication unit, Offered Even Falls**Requirement Group:** Prerequisite: CE340 or Corequisite: CE340.**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 482(3) Course ID:010534

2023-06-02

**Environmental Systems Analysis Design**

This course presents the basic principles of systems analysis as applied to resource allocation and design problems commonly encountered in the field of environmental engineering. Central to the material covered is the concept of optimal problem solution and its use in choosing among alternative designs or policies. All students will complete a semester project; a greater level of quantitative analysis will be expected from students taking the course for graduate credit. (2 credits of design)

**Components:** Lecture**Course Equivalents:** CE 582**Attributes:** Two Design Credits, Offered Odd Falls**Requirement Group:** Prerequisites: CE340 or CE579 or equivalent course OR consent of the instructor.**Req. Designation:** Technology

CE 486(3) Course ID:007525

2018-07-13

**Industrial Ecology**

An exploration of the methods necessary for designing and implementing changes in manufacturing processes to increase sustainability. This course will identify the impacts associated with resource consumption and environmental pollution, and present the quantitative tools necessary for assessing environmental impacts and to design for sustainability. Topics include: industrial ecology, life cycle analysis and the integration of the environment into economic activities. (1 credit of design)

**Components:** Lecture**Attributes:** One Design Credit, Offered Even Falls**Requirement Group:** Prerequisites: prior college level exposure to the concepts of mass and energy conservations, one of t**Req. Designation:** Technology

CE 487(3) Course ID:013147

2023-01-24

**Environmental Engineering Laboratory**

This course provides students laboratory experiences and develops students' abilities to conduct environmental relevant experimentation, analyze and interpret data, and write scientific laboratory reports. The content of lectures and experiments include theory and application of environmental laboratory methods for measurement of physical, chemical, and biological characteristics in natural and engineered environmental systems within air, water, and soil media. A final project emphasizes experimental design, and requires team work and oral presentations.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Offered Fall Term**Requirement Group:** Requisites: CE 340, CE 380, and junior or higher standing, or instructor consent**Req. Designation:** Technology

CE 490(3) Course ID:007526

2023-06-02

**Civil Engineering Senior Design**

A comprehensive design of an open ended project related to the core areas of civil engineering design as well as construction management will be developed by teams of students. The design will be based on knowledge acquired in prior courses, professional ethics and engineering economics. Written reports and oral presentations about the design will be made to the faculty, potential guests and student peers. (3 credits of design)

**Components:** Lecture**Attributes:** Three Design Credits, One communication unit, Offered Spring Term**Requirement Group:** Prerequisites: Senior standing Corequisites: CE310, and either CE441 or CE442 (or consent of the instruc**Req. Designation:** Technology

CE 491(3) Course ID:007527

2023-06-02

**Environmental Engineering Senior Design**

A comprehensive design of an open ended project related to core areas of environmental engineering design will be developed by teams of students. The design will be based on knowledge acquired in prior courses, professional ethics and engineering economics. Written reports and oral presentations about the design will be made to the faculty and student peers. (3 credits of design)

**Components:** Lecture**Attributes:** Three Design Credits, One communication unit, Offered Spring Term**Requirement Group:** Prerequisites: Senior standing and CE430, CE479, CE480, CE481, CE478 or CE586, or consent of instructo**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 495(1 - 3) Course ID:007528 2015-02-12

**Special Projects in Civil and Environmental Engineering**

An individual project is undertaken by the student under the guidance of a staff member. A complete report is required.

Prerequisite: consent of the department chair.

Components: Independent Study

Attributes: Offered Fall Term

Req. Designation: Technology

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CE 496(1 - 3) Course ID:007529 2015-01-20

**Special Projects in Civil and Environmental Engineering**

An individual project is undertaken by the student under the guidance of a staff member. A complete report is required.

Prerequisite: consent of the department chair.

Components: Independent Study

Attributes: Offered Spring Term

Req. Designation: Technology

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CE 499(0) Course ID:012880 2022-06-07

**Fundamentals of Engineering Exam Preparation**

This course provides preparation for students taking the NCEES Fundamentals of Engineering (FE) Exam. Topics covered will mirror the materials covered specific to the Civil Engineering and Environmental Engineering FE examinations. Lectures will be provided by faculty from across the department facilitated by the department office.

Components: Lecture

Attributes: Offered Fall and Spring

Req. Designation: Technology

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CE 502(3) Course ID:013048 2020-08-25

**Applications in Geospatial Analytics, Science, & Engineering**

[Cross-listed with SC 502, EV 502] This course will use techniques in geospatial analytics, science, and engineering to address applied challenges in various contextual situations. Geotagging, network analysis, spatial visualization, geospatial data manipulation, cartographic presentations, and other similar methods will be studied and applied to real-world or research applications. Students will develop a set of tools that enable completion of projects in the major field using geospatial capabilities.

Prerequisites: Graduate standing, CE 301, or consent of the instructor

Components: Lecture

Course Equivalents: SC 502, EV 502

Attributes: Offered Spring Term

Req. Designation: Technology

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CE 505(3) Course ID:013044 2020-08-25

**Project Controls and Lean Methods in Construction**

[Cross-listed with EM 505] This course will cover the use of construction project management controls typical in varying scales of projects. Using the Lean Construction model, the course will cover Lean as both a system and culture, while emphasizing the central place of project delivery processes. Topics in project controls will include: Goal Setting, Scheduling, Budgeting, Problem Solving, and Decision-Making.

Prerequisites: Graduate standing, CE 305, or consent of the instructor

Components: Lecture

Course Equivalents: EM 505

Attributes: Offered Spring Term

Req. Designation: Technology

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CE 506(3) Course ID:012138 2016-02-26

**Advanced Construction Engineering**

A study of emerging technologies, trend setting techniques, and new means and methods in construction engineering management. Topics include: emerging technologies which are intended to enhance the analysis, design, construction, performance, and asset management for construction engineering projects; lessons learned from construction sites covering infrastructure and building projects; construction equipment management and selection for construction applications; composite, hybrid, or new materials for construction applications, emerging trends in project delivery, project cost control, and procurement of construction services.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Restriction: Graduate standing required.

Req. Designation: Technology

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**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 507(3) Course ID:013212 2023-05-31

**Construction Operations**

This course provides a comprehensive review of the construction process and industry. It focuses on operational, technical, and management responsibilities from the initial stages of identifying potential project pursuits to final contract closeout and delivery. The course will give students an in-depth perspective of the many challenges of operating a successful construction company - one that they may not typically be exposed to until later in their careers.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

CE 508(3) Course ID:013046 2022-06-07

**Building Information Modeling for Construction Prefabrication**

This course goes beyond the basics of Building Information Modeling (BIM) moving models from conceptual into application, specifically in order to be able to prefabricate building elements. Students will work to create virtual elements that are then printed via 3D printer or shop prefabricated during the course. The course will cover advanced and emerging techniques and methods to the use of current/state of the art computer aided design software including Autodesk Revit.

Prerequisites: Graduate standing, CE 408, or consent of the instructor

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

CE 509(3) Course ID:013191 2023-01-09

**Advanced Building Science**

Examination and design of building life support systems, building science, and technology of engineers for planning, operation, and maintenance of buildings. Topics include building envelope analysis and design, human comfort, electrical, mechanical, water and waste, lighting, and other systems necessary for building utilization. Special attention to integrated project delivery, sustainable design practices, and energy modeling will be integrated into a comprehensive project; a greater level of quantitative analysis will be expected from students taking the course for graduate credit.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

CE 510(3) Course ID:012046 2018-07-13

**Sustainable Infrastructure and Building**

An application of the use of sustainability rating systems for infrastructure and building projects. Students will use the USGBC LEED and the ISI Envision systems to execute an analysis of a real or realistic project. Focusing on fundamentals of sustainable construction, this course will acquaint students with the processes required to certify/verify projects to meet an independent rating standard. This course will prepare students to take the LEED GA and/or Envision ENV PV exams

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

CE 511(3) Course ID:013173 2022-08-04

**Applied Machine Learning for Civil Engineers**

This course covers fundamentals of various supervised and unsupervised machine learning methods including regression, classification, clustering, and artificial neural networks. In addition, basic concepts in machine learning such as regularization, gradient descent, bias/variance trade-off, and evaluation and model selection techniques will be included. This class is hands-on with lots of practical examples. The objective of this course is to help students: 1) Apply machine learning algorithms to real-world engineering problems, 2) Relate the theoretical concept of model complexity to model building and tuning in practice, 3) Understand model selection and evaluation techniques, including validation, cross-validation, and testing, 4) Identify and calculate key metrics used to assess performance of machine learning models. Python libraries such as Scikit-Learn, TensorFlow, and Keras will be used in this course for implementation of machine learning algorithms. Students interested in taking this course are encouraged to have previous basic knowledge in

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**


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CE 512(3) Course ID:007531 2022-01-26

**Structural Dynamics**

Response of discrete/continuous systems to dynamic loading. Formulation/solution of problems of one or more degrees of freedom. Modal analysis. Numerical integration and transform techniques. Response of dynamic systems to base motion using response spectrum methods.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CE 513(3) Course ID:011980 2015-01-23

**Elastic Waves and Non-Destructive Tests**

The course will include 3 modules: elastic waves, inversion, and applications to real-world problems. The module of elastic waves will cover stress propagation problems in elastic solids and waveguides. The module of inversion will include (i) the fundamentals on inverse theory, experimental data and signal processing, (ii) basic inversion methods (global and deterministic optimizations, simulated annealing and genetic algorithm, Gauss-Newton and gradient methods, etc.). Lastly, the module of real-world problems will consist of applications in site characterization, sinkhole detection, unknown foundation, bridge deck evaluation.

Prerequisites: Numerical Methods, Partial Differential Equations

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CE 514(3) Course ID:007532 2022-07-22

**Constitutive Modeling for Geomaterials**

This course will introduce elastic, plastic, and viscous models of geomaterials. This course will help students understand the role of constitutive laws in geotechnical analyses and equip students with the ability to select appropriate models for specific material types, calibrate model parameters and assess their limitations.

Requisites: CE310 or equivalent

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CE 515(3) Course ID:007533 2015-02-12

**Foundations, Stability, and Retaining Structures**

Application of principles of soil mechanics to the design of shallow and deep foundations, retaining structures and slope stability. Interpretation of soil boring logs as related to geotechnical engineering design. Preparation of design templates using spreadsheets. (3 credits of design)

Prerequisite: CE310.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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CE 517(3) Course ID:007535 2022-06-07

**Foundations and Ground Improvement**

Introduction or review of soil mechanics and foundation engineering. Understanding of different ground improvement methods such as aggregate piers, vibro stone columns, dynamic compaction, wick drains, grouting, and deep soil mixing. Selection and design of ground improvement methods.

**Components:** Lecture

**Attributes:** Offered Fall When Needed

**Req. Designation:** Technology

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CE 518(3) Course ID:013083 2022-06-07

**Soil Structure Interaction**

Application of soil mechanics and foundation engineering to analyze load transfer of deep foundations.

Development of p-y curves of laterally loaded piles and T-z and Q-z curves for axially loaded piles.

Understanding of behaviors of grouped piles subjected to lateral and vertical loads. Calculation of vertical stiffness of pile foundations and natural frequency. Long-term performance prediction.

**Components:** Lecture

**Requirement Group:** Prerequisite: CE310 or consent of the instructor

**Req. Designation:** Technology

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**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 519(3) Course ID:007536

2023-01-10

**Applied Geophysics**

Application of geophysical methods for analyzing sites, locating buried infrastructure, non-destructive testing and tracking contamination plumes. Several geophysical methods will be introduced in class and applied on field projects. Methods include ground penetrating radar, electromagnetics, acoustics, resistivity, conductivity and spatial analysis.

**Components:** Lecture**Course Equivalents:** CE 419**Attributes:** Offered Odd Falls**Req. Designation:** Technology

CE 520(3) Course ID:007537

2023-06-01

**Computational Methods of Structural Analysis**

The matrix stiffness method, theory and implementation in MATLAB, for the analysis of trusses, beams, frames, and grids. Discussion of thermal effects, support settlements, nonlinear effects, and other modeling considerations.

**Components:** Lecture**Attributes:** One Design Credit, Offered Spring Term**Req. Designation:** Technology

**Engineering - Mechanical & Aerospace Eng - Subject: Civil and Environmental Eng**

CE 527(3) Course ID:007541

2019-03-08

**Advanced Fluid Mechanics**

An introductory level graduate course in fluid mechanics. Spatial and material coordinates, kinematics of fluid motion, continuity and momentum equations, constitutive relations, simple solutions, potential flows, boundary layer theory, creeping flow, flow through porous media, particle motion, interfacial phenomena, turbulence.

Prerequisite: CH301 or ES330 or equivalents.

**Components:** Laboratory, Lecture

**Course Equivalents:** ME 527, ME 527

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: CH301 or ES330 or equivalent

**Req. Designation:** Technology

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**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 533(3) Course ID:011815

2018-07-13

**Human Exposure Analysis**

Human exposure analysis is an emerging science concerned with how humans come into contact with chemicals in the environment via inhalation, ingestion, and dermal contact. The course focuses on scientific and engineering issues, including direct measurement and model constructs. Students gain an understanding of the complexities, uncertainties, and physical, chemical and biological issues relevant to human exposures resulting from the use and release of toxic compounds. Topics include human exposure analysis terminology, pollutant fate and transport, human activity patterns, occupational exposure, indoor air quality, dosimetry, and statistical and mechanistic tools for exposure assessment. For the final project, the students design and perform a small-scale human exposure study using monitoring instruments and/or exposure models. (2 credits of design.)

**Components:** Lecture**Course Equivalents:** CE 433**Attributes:** Offered Even Falls**Req. Designation:** Technology

CE 534(3) Course ID:011709

2021-11-09

**Sustainable Development Engineering**

This course outlines the principles of sustainable engineering for improving sanitation and environmental health in developing communities both internationally and nationally. Topics include sustainable development and appropriate technologies for water and wastewater treatment, water storage and delivery, watershed management, solid waste management, and indoor air quality. The course highlights the importance of community participation and relationship building throughout the development and implementation of engineering projects. At least 2/3 of the course is dedicated to a team-based, sustainable development design project. (2 credits of design)

**Components:** Lecture**Course Equivalents:** CE 434**Attributes:** Offered Odd Falls**Req. Designation:** Technology

CE 535(3) Course ID:011395

2023-06-02

**Groundwater Hydrology and Geochemistry**

[Cross-listed with EV 535] This class provides fundamental understanding of the key physical and chemical processes impacting groundwater resources and quality. Emphasis is on groundwater geology, physical characteristics of flow, and geochemical properties of groundwater. Groundwater contamination and contaminant transport and modeling will be introduced. The course will prepare students to qualitatively and quantitatively analyze fluid and contaminant flow in varied geologic systems.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: CM132 (or CM104/6) and MA232 and CE330 OR instructor consent**Req. Designation:** Technology

**Engineering - Mechanical & Aerospace Eng - Subject: Civil and Environmental Eng**

CE 538(3)

Course ID:007542

2014-11-20

**Finite Element Methods**

[Cross-listed with MA 572, ME 515] This course is an introduction to the finite element method, from a mathematical as well as a modeling and applications point of view. The basic theory and implementation will be discussed in the context of continuum problems in linear elasticity, potential flow and plate modeling. If time permits, additional applications such as structures, electromagnetics, fluid mechanics, ground water and geotechnics will also be discussed. Topics include: weak formulations and the principle of virtual work, discretization and interpolation-function selection, assembly and solution of the system equations, error estimates and accuracy assessment. When taught in conjunction with CE 438/ME 453 the course requires additional independent work for those registered for the graduate course.

Prerequisite: MA232, MA339, or MA330, ES222, ES330 and the ability to program. Consent of the instructor may be used to replace some prerequisites.

Components: Lecture

Course Equivalents: MA 572, ME 515

Req. Designation: Technology

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**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 541(3) Course ID:013040

2020-04-20

**Bridge Engineering**

An introduction to bridge engineering. Topics will focus on highway bridge planning, design, construction and management with emphasis on structural engineering, hydraulic engineering, geotechnical engineering and economics. Bridge projects also are influenced heavily by issues such as maintenance of traffic, environmental considerations, public input, construction methods, materials, estimating and scheduling all of which will be covered in various degrees.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: CE320**Req. Designation:** Technology

CE 549(3) Course ID:012025

2015-03-05

**Experimental Methods in Structures**

This course will introduce fundamental principles, procedures, and applications of experimental methods in structures. Topics covered in this course include sensors, data acquisition, vibration measurement, signal processing, similitude law, system identification, and structural modeling. Students will learn Labview programming to design a simple experiment. If time allows, state-of-the-art experimental methods such as hybrid simulation will be presented. The course consists of lectures and hands-on laboratory sessions.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

CE 551(3) Course ID:007549

2022-02-02

**Theory of Elasticity**

[Cross-listed with ME 551] A study of the mathematical theory of elasticity and its application to engineering problems; development of general stress-strain relationships, equations of equilibrium and compatibility; plane stress and plane strain; stress functions; applications to beam bending and torsion. Prerequisite: ES222, CE/ME554 or consent of the instructor.

**Components:** Lecture**Course Equivalents:** ME 551**Attributes:** Given When Needed**Req. Designation:** Technology

CE 552(3) Course ID:007550

2022-06-07

**Advanced Strength of Materials**

Discussion and theory concerning properties of materials, general stress-strain relationships, modern strength theories, unsymmetrical bending, curved beams, beams on elastic foundations, the equations of elasticity and plasticity (1 credit of design)

**Components:** Lecture**Course Equivalents:** ME 552**Attributes:** Given When Needed**Req. Designation:** Technology

CE 553(3) Course ID:010520

2018-07-13

**Properties and Performance of Concrete Materials**

This course explores the materials science aspects of properties and behavior of Portland Cement Concrete, including the properties of raw materials in concrete such as cement, aggregates, mineral and chemical admixtures, and fibers. Topics include: physical and chemical aspects of cement hydration and the role of binder types, the influence of type and morphology of hydrates, fresh and hardened concrete properties, introduction to fracture behavior of concrete, and concrete durability issues such as freezing and thawing, sulfate attack, and corrosion of reinforcing steel.

Prerequisite: ES260.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

CE 554(3) Course ID:007551

2014-11-18

**Continuum Mechanics**

[Cross-listed with ME 554] The course involves the analysis of stress and deformation at a point and the derivation of the fundamental equations by applying the basic laws of conservation of mass, energy, and momentum and those of thermodynamics. Vector and cartesian tensors are reviewed. Relationships (constitutive laws) are then developed between stress, strain, and strain rate. The basic equations governing the behavior of any continuum and applications to solids and fluids are covered.

**Components:** Lecture**Course Equivalents:** ME 554**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 555(3) Course ID:010605 2019-09-17

**Structural Damage Assessment, Rehabilitation, and Repair**

An investigation of structural damage and methods applicable for assessing their capacity, durability, and future use. Additionally, evaluation and design of methods of practicable rehabilitation and/or repair of structural elements using traditional and non-traditional methods and materials. Case studies will often be used to assess structural damage. (1 credit of design)

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

CE 563(3) Course ID:012830 2018-07-13

**Railroad Engineering**

[Cross Listed with CE463] This course is designed to help students gain knowledge in following topics: Railroad engineering efficiency, economics, and energy; Cost-benefit analyses of rail transportation systems; Geometric design of railroad alignment; Train speed, power, and acceleration requirements; Railroad engineering materials characterization (rail, crosstie, ballast, sub-ballast, and subgrade); Subgrade design and construction and drainage; and High Speed Rail (HSR) design and construction. Graduate students are required to do an independent term project which allows them to study a particular area of railway engineering in more depth, and gives the students experience with the railroad engineering literature as well as more experience in technical communications (the term paper).

**Components:** Lecture**Course Equivalents:** CE 463**Attributes:** Given When Needed**Req. Designation:** Technology

CE 569(3) Course ID:011979 2015-01-23

**Watershed Analysis**

Conceptual and quantitative analysis of watershed processes will be introduced with an emphasis on modeling surface water hydrology and water resources management. Watershed modeling concepts including analysis of time series, spatially variable data, model calibration, and uncertainty analysis will be studied and demonstrated. The course will emphasize critical analysis of current hydrologic computational methods through literature review and hands-on use of watershed models.

Prerequisites: Hydrology/Water Resources Engineering

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

CE 570(3) Course ID:011711 2021-01-25

**River Restoration**

This course provides fundamental understanding of hydrologic, hydraulic, and geomorphic processes of river restoration systems and their ecological impacts. Topics include river hydraulics, sediment transport, fluvial geomorphology, aquatic habitats, channel design, reservoir sedimentation, dam removal/decommission, and fish passage. Emphasis will be given to fluvial geomorphology and hydraulic design of river restoration projects. Computer modeling of river hydraulics and morphodynamics with applications to river restoration design will be introduced. Prerequisites: CE330 (Water Resources Engineering) or equivalent.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

CE 571(3) Course ID:011981 2015-01-23

**Computational River Dynamics**

This course covers basic principles and numerical methods for modeling free-surface turbulent flow, sediment transport and contaminant transport. Topics include mathematical description of free-surface flow and sediment transport, fundamentals of sediment transport, advanced numerical methods, one-, two- and three-dimensional models, domain decomposition and model integration, simulation of dam-break fluvial processes, simulation of vegetation effects on flow and sediment transport, cohesive sediment transport modeling, and contaminant transport modeling.

Prerequisites: Hydraulics, Numerical Methods, Sediment Transport

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**


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**CE 572(3)** Course ID:007553 2019-04-19

**Advanced Open Channel Hydraulics**

Introduction to open channel flows, uniform flow and flow resistance, energy and momentum principles, critical depth, gradually varied flow and water surface profiles, rapidly varied flow and channel controls, unsteady flow and translator waves, boundary layers theory, water waves, turbulence in artificial and natural channels and measurements, and shallow water equations and numerical solutions. Application of 1D/2D/3D hydraulic models to engineering problem solving.

Prerequisites: Undergraduate Fluid Mechanics, Water Resources Engineering I or equivalent or consent of the instructor.

**Components:** Lecture

**Attributes:** Offered Even Falls

**Req. Designation:** Technology

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**CE 573(3)** Course ID:007554 2015-01-23

**Sediment Transport**

Incipient motion, bed forms, depth-discharge relation for alluvial streams, transport of bed load and suspended load, natural river and coastal processes.

Prerequisite: CE430 or CE572 or consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**CE 574(3)** Course ID:007555 2019-04-24

**Ecohydraulics**

Introduction to ecohydraulics: Instream flow requirements and fish habitat suitability; River connectivity and fishpasses; Fishpass hydraulics and design optimization; Fish hydrodynamics; Effect of turbulence on fish stability; Mixing and dispersion in rivers and its effect to fish (fickian diffusion, turbulent shear flows, advective diffusion, turbulent dispersion and mixing); Transport and reaction of water pollutants; and Stream water temperature modeling with a case study.

Prerequisites: Undergraduate Fluid Mechanics, Water Resources Engineering I or equivalent or consent of the instructor.

**Components:** Lecture

**Attributes:** Offered Odd Falls

**Req. Designation:** Technology

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**CE 575(3)** Course ID:007556 2015-01-23

**Coastal Engineering**

Theory of water waves; tides and harbor oscillations; wave forces on coastal structures; wind wave analysis; beach erosion and shore protection; off-shore pipelines and outfall diffusers.

Prerequisite: CE572 or consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**CE 576(3)** Course ID:007557 2015-01-23

**Hydraulic Engineering in Cold Regions**

Ice engineering for rivers, lakes and coastal zones. Topics to be covered include thermal regimes in surface water bodies; frazil ice; river ice hydraulics; transport of ice in lakes and coastal zones and ice force on structures.

Prerequisite: CE430 or CE572 or consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**CE 577(3)** Course ID:007558 2021-11-09

**Atmospheric Chemistry**

[Cross-listed with CH 576, CM 576] The course will cover the evolution of the atmosphere from its initial formation to its natural background condition to its current state perturbed by human activities; detailed descriptions of the chemistry of the carbon, nitrogen and sulfur cycles; characterization of the atmospheric aerosol and its role in heterogeneous reactions and materials transport; stratospheric ozone and problems with its depletion; airborne radioactivity and its role in atmospheric ion chemistry. This course covers the same topics as CE 477 and includes additional material on the graduate level.

Prerequisite: CM370 or CM371 or ES340.

**Components:** Lecture

**Course Equivalents:** CE 477, CH 576, CM 476, CM 576

**Attributes:** Offered Odd Springs

**Req. Designation:** Technology

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**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 579(3) Course ID:007559

2022-06-07

**Water and Wastewater Treatment Design**

A study of the physical, chemical and biological operations and processes utilized in the treatment of water and wastewater for both municipalities and industries. The course emphasizes both theoretical and design aspects of these processes, and includes appropriate laboratory demonstrations. Preparation of an individual design report will be required. (2 credits of design)

Prerequisites: ES330 or consent of the instructor. No credit if credit given for CE479 or similar course.

**Components:** Lecture

**Course Equivalents:** CE 479

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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CE 580(3) Course ID:007560

2015-02-12

**Environmental Chemistry**

The fundamentals of inorganic, organic, and physical chemistry with particular emphasis on those topics having application to environmental engineering practice. Chemical equilibria among gaseous, aqueous and solid phases are stressed with a strong mathematical approach. This course provides a basis for the understanding of chemical phenomena in aquatic environments.

Prerequisite: consent of the instructor.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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CE 581(3) Course ID:007561

2022-02-02

**Hazardous Waste Management Engineering**

This course is an introduction to the emerging field of hazardous waste management. This course provides an understanding of environmental regulations, management, techniques to minimize the generation and disposal of hazardous wastes, and technologies to treat wastes and remediate disposal site. (1.5 credits of design)

Prerequisites: CE340 or CE579 or equivalent course, or consent of instructor.

**Components:** Lecture

**Attributes:** Offered Even Falls

**Req. Designation:** Technology

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CE 582(3) Course ID:007562

2023-06-02

**Environmental Systems Analysis and Design**

This course presents the basic principles of systems analysis as applied to resource allocation and design problems commonly encountered in the field of environmental engineering. Central to the material covered is the concept of optimal problem solution and its use in choosing among alternative designs or policies. All students will complete a semester project; a greater level of quantitative analysis will be expected from students taking the course for graduate credit. (2 credits of design)

Prerequisites: CE340 or CE579 or equivalent course, EC350, or consent of instructor.

**Components:** Lecture

**Course Equivalents:** CE 482

**Attributes:** Offered Odd Falls

**Requirement Group:** Prerequisites: CE340 or CE579 or equivalent course OR consent of the instructor.

**Req. Designation:** Technology

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CE 584(3) Course ID:007564

2015-02-12

**Chemodynamics**

This course investigates what happens to a chemical when it is introduced into the environment and the factors that determine and influence its distribution. The dynamics of pollutant transfer in the environment, the relationship between their physical-chemical properties and transport, their persistence in the biosphere and their partitioning in biota are studied. Quantitative models of pollutant transfer between air-water, air-soil and water-sediment are developed. (1 credit of design)

Prerequisite: consent of the instructor.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 586(3) Course ID:007566 2018-07-13

**Industrial Ecology**

An exploration of the methods necessary for designing and implementing changes in manufacturing processes to increase sustainability. This course will identify the impacts associated with resource consumption and environmental pollution, and present the quantitative tools necessary for assessing environmental impacts and to design for sustainability. Topics include: industrial ecology, life cycle analysis and the integration of the environment into economic activities. (1 credit of design)

Prerequisites: prior college level exposure to the concepts of mass and energy conservations, one of the following: CE340, CH250, ES330, ES340, CH301, CH271 or consent of the instructor.

**Components:** Lecture

**Attributes:** Offered Even Falls

**Req. Designation:** Technology

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CE 587(3) Course ID:007567 2023-01-24

**Environmental Engineering Laboratory**

This course provides students laboratory experiences and develops students' abilities to conduct environmental relevant experimentation, analyze and interpret data, and write scientific laboratory reports. The content of lectures and experiments include theory and application of environmental laboratory methods for measurement of physical, chemical, and biological characteristics in natural and engineered environmental systems within air, water, and soil media. A final project emphasizes experimental design, and requires team work and oral presentations.

**Components:** Laboratory, Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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CE 590(1 - 6) Course ID:012889 2021-01-26

**Graduate Degree Completion Project**

A project in civil and environmental engineering under the direction of a faculty advisor or program director. Credit for this work is given when the requirements for the degree are completed including the presentation of a project as appropriate to the degree program.

**Components:** Lecture

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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CE 591(3) Course ID:012139 2016-07-01

**Special Topics in Construction Engineering Management**

This course includes lectures and seminars covering emerging topics in civil and environmental engineering. Topics will include, but are not limited to: emerging technologies, including both software and hardware systems, which are intended to enhance the analysis, design construction, performance, and asset management for civil and environmental engineering projects; lessons learned from construction, civil, and environmental engineering sites covering infrastructure and building projects; and construction, civil and environmental engineering equipment management and selection for site applications. Presentations are given by subject area experts with complement lectures by the instructor. Case studies will be reviewed and researched for further development and discussion within the course.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Restriction: Graduate standing required.

**Req. Designation:** Technology

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CE 595(1 - 3) Course ID:011433 2015-01-23

**Special Topics in Civil and Environmental Engineering**

Advanced study of selected topics in the area of civil and environmental engineering.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CE 610(1) Course ID:010161 2023-01-30

**Civil and Environmental Engineering Seminar**

Students, staff and visiting lecturers present research results and topics of current interest.

**Components:** Seminar

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 612(1 - 15) Course ID:007570 2015-02-03

**Thesis, Dissertation Credits**

Analytical or experimental studies in civil and environmental engineering under the direction of a faculty adviser. Credit for this work is given when the requirements for the degree are completed including the presentation of a thesis or dissertation as appropriate to the degree program.

**Components:** Thesis Research  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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CE 621(3) Course ID:012747 2016-09-16

**Advanced Structural Dynamics**

This course provides fundamental and advanced theories of structural dynamics and their applications to natural hazards engineering. Topics covered in the course include numerical integration methods for dynamic analysis; nonlinear hysteresis models; nonlinear time history analysis; soil-foundation-structure/fluid-structure interactions; state-of-the-art simulation methods for civil infrastructure systems.

**Components:** Lecture  
**Attributes:** Offered Odd Springs  
**Requirement Group:** Prerequisite: CE512 or permission of instructor  
**Req. Designation:** Technology

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CE 622(3) Course ID:012831 2022-02-02

**Uncertainty Quantification and Optimization in Computational Mechanics**

Uncertainty Quantification plays an essential role in the validation of the predictive content of computational engineering and science models. Uncertainty in the simulation-based paradigm is typically manifested either in the form of variability of model parameters or in the stochastic external effects to which this system is subjected. In this course, students will be introduced to the mathematical foundations, numerical algorithms, and computational tools necessary for: (1) the propagation of parametric uncertainty in computational mechanics simulations; (2) the analysis of the response of simulation based models to random inputs; and (3) the rational treatment of uncertainty in design optimization problems. The course will involve a term project.

**Components:** Lecture  
**Attributes:** Given When Needed  
**Requirement Group:** CE 622 Prerequisites: CE538/ME515 and EE529/ME529  
**Req. Designation:** Technology

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CE 631(3) Course ID:012023 2015-03-05

**Cement Chemistry**

This is an advanced graduate level course. It covers materials science aspects of conventional and modified portland cement concrete including (i) dry and wet cement chemistry (ii) hydration mechanisms, and microstructure modification (iii) techniques to characterize cementitious systems (SEM, TEM, MIP, NMR, BET, Pore Solution Analysis etc.) and (iv) materials science based discussions on mechanical and durability performance of concrete .

**Components:** Lecture  
**Attributes:** Given When Needed  
**Requirement Group:** Prerequisites: CE 553, Properties and Performance of Concrete Materials  
**Req. Designation:** Technology

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CE 632(3) Course ID:013130 2021-10-11

**Elastic and Inelastic Stress Analysis**

Presents certain key aspects of inelastic solid mechanics centered around viscoelasticity, creep, viscoplasticity, and plasticity. It is divided into three parts consisting of the fundamentals of elasticity, useful constitutive laws, and applications to simple structural members, providing extended treatment of basic problems in static structural mechanics, including elastic and inelastic effects.

**Components:** Lecture  
**Course Equivalents:** ME 632  
**Attributes:** Offered Even Springs  
**Req. Designation:** Technology

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**Engineering - Civil & Environmental Eng - Subject: Civil and Environmental Eng**

CE 633(3)

Course ID:007576

2022-06-07

**Plasticity**

This course provides an introduction to the subject of plasticity. The physical background of inelastic deformation in metals and geological materials is discussed. Continuum constitutive theory is presented including yield criteria, flow rules, and plastic hardening. Extension to the rate-dependent (viscoplastic) material is discussed. Uniqueness and extremum theorems are derived and discussed and field equations for general, two-dimensional and axisymmetric problems are presented. Selected problems from metal and soil/rock plasticity are presented and solved using various techniques, including slip-line theory, limit analysis and 'exact' methods. Other topics such as localization and diffuse instability in plastic deformation and application of FEM in plasticity are presented as time allows.

Prerequisite: CE554 or ME554; recommended CE551 or ME551.

**Components:** Lecture

**Course Equivalents:** ME 633

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CE 681(3)

Course ID:007581

2015-01-20

**Environmental Physico-Chemical Processes**

This class provides fundamental understanding of the chemical and physical processes that govern the migration and fate of pollutants in environmental systems. Emphasis will be placed on the application of these concepts to water treatment processes. Topics include: mass transfer and kinetics, coagulation, precipitation, adsorption, ion exchange, chemical oxidation, sedimentation, filtration and related processes.

Prerequisites: CE340 or CE579 or equivalent course, CE580, or consent of the instructor.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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CE 682(3)

Course ID:007582

2015-01-20

**Environmental Biological Processes**

Principles and applications of biological phenomena and processes in relation to environmental engineering practice. Emphasis is given to biokinetic analysis and design of biological treatment processes applicable to the treatment of water, municipal and industrial wastewater and hazardous wastes. Topics include: microbial growth kinetics and bioenergetics; aerobic, anaerobic fixed-film, nitrification, denitrification and phosphorus removal biological processes; sludge treatment and disposal; advanced wastewater treatment processes.

Prerequisites: CE340 or CE579 or equivalent course, CE580, CE584, and BY323, or consent of instructor.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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CE 684(1 - 3)

Course ID:007583

2015-01-23

**Special Topics in Environmental Engineering**

Advanced topics in specialized aspects of environmental engineering.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CE 686(3)

Course ID:007584

2015-01-23

**Environmental Engineering Design**

Emphasis will be on water and wastewater treatment plant design, hazardous waste site remediation, groundwater remediation and solid waste disposal.

Prerequisites: CE681 and CE682 or consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CE 999(1 - 10)

Course ID:011075

2015-01-13

**Civil and Environmental Engineering Elective**

A graduate level course for which there is no comparable Clarkson course. Used for transfer credit only. (Not offered at Clarkson, for transfer credit only.)

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**Engineering - Chemical & Biomolecular Eng - Subject: Chemical Engineering**

CH 1(2 - 4) Course ID:008058 2015-01-13

**Chemical Engineering Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study  
 Attributes: Transfer Credit Only  
 Req. Designation: Technology

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CH 2(2 - 4) Course ID:008059 2015-01-13

**Chemical Engineering Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.  
 This course may be used as a Professional Elective.

Components: Independent Study  
 Attributes: Transfer Credit Only  
 Req. Designation: Technology

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CH 210(3) Course ID:011418 2020-10-15

**Molecular Properties**

An introduction to key chemical engineering concepts that include properties of gases, laws of thermodynamics, transport of gases and liquids, and chemical kinetics.

Components: Laboratory, Lecture  
 Attributes: Offered Fall Term  
 Requirement Group: Prerequisites: CM132 (or CM104), MA132 and PH131  
 Req. Designation: Technology

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CH 220(3) Course ID:011419 2019-07-18

**Material Balances**

Students will learn how to set up flow sheets for chemical processes with multiple units and perform material balances accounting for chemical reactions, phase equilibria, multistage separations, and recycle. While emphasis will be on steady state operations, unsteady processes will also be considered. A case study will be performed in teams.

Components: Discussion, Lecture  
 Attributes: Offered Fall Term  
 Requirement Group: Prerequisites: CM 132 (or CM 104), MA 132, and PH 131 Corequisite: CH 210 or CM 371  
 Req. Designation: Technology

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CH 260(3) Course ID:011434 2016-09-16

**Thermodynamics & Energy Balances**

The fundamentals of thermodynamics, including real fluids, thermodynamic properties of gases. Application of conservation of energy principles in chemical engineering.

Components: Lecture  
 Attributes: Offered Spring Term  
 Requirement Group: Prerequisites: CH210  
 Req. Designation: Technology

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CH 320(3) Course ID:007587 2019-07-18

**Phase Equilibria**

Thermodynamics of pure components and solutions. Fugacities, activities, and equilibrium, calculations.

Components: Lecture  
 Attributes: Offered Fall Term  
 Requirement Group: Prerequisites: CH 260 or ES340  
 Req. Designation: Technology

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CH 330(3) Course ID:011579 2011-01-25

**Transfer Process Fundamentals**

Fundamentals of fluid mechanics, heat and mass transfer relevant to transfer processes: Newtonian and non-Newtonian flow behavior, hydrostatics, macroscopic and microscopic balances, flow measurement, dimensional analysis, laminar and turbulent flow in ducts and over immersed bodies, Fourier's law, steady and unsteady conduction in rectangular, cylindrical, and spherical geometries, fins, convective heat transfer in flow through ducts and over immersed objects, natural convection, Fick's law, diffusion in binary and multicomponent systems, correlations for heat and mass transfer.

Components: Lecture  
 Requirement Group: Prerequisites: MA232; Corequisites: CH210 and CH220  
 Req. Designation: Technology

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**Engineering - Chemical & Biomolecular Eng - Subject: Chemical Engineering**

CH 350(1) Course ID:007590 2015-01-20

**Chemical Engineering Laboratory**

A series of experiments in fluid mechanics, heat transfer, complementing the junior ChE courses, are performed. Laboratory safety, data analysis, and communications skills stressed. Does not meet each week; schedule will be posted.

**Components:** Laboratory**Attributes:** One communication unit, Offered Spring Term**Requirement Group:** Prerequisites: CH330**Req. Designation:** TechnologyCH 360(3) Course ID:007591 2022-11-11 **Instructor Consent Required****Chemical Reactor Analysis I**

The principles of chemical reactor design for homogeneous and heterogeneous reactions. Analysis of the chemical reactor from a kinetic and thermodynamic point of view, including design methods for flow and non-flow reactors and experimental methods.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: CH210, CH220, MA232, and Junior or Senior standing (or permission of the instructor) Co**Req. Designation:** Technology

CH 370(3) Course ID:011610 2021-01-12

**Transfer Process Design**

Fundamentals of transfer process design, design of pipes, flow meters, pump calculation, heat transfer equipment design, correlations for various heat transfer coefficients, pressure drop in heat transfer equipment, pumping requirements for heat transfer equipment, mass transfer equipment, tray, rotating, pulsed, packed column design, efficiency concept, transfer unit concept, membrane separations, chromatographic separation methods.

**Components:** Lecture**Attributes:** Two communication units, Offered Spring Term**Requirement Group:** Prerequisites: CH330**Req. Designation:** Technology

CH 390(1 - 4) Course ID:007593 2017-01-13

**Undergraduate Research Project**

A theoretical or experimental investigation of an original problem under the supervision of a faculty member. Student should select topic from list in ChE office and discuss with indicated faculty member.

**Components:** Research**Attributes:** Offered Each Term**Req. Designation:** Technology

CH 391(1 - 4) Course ID:007594 2017-01-13

**Undergraduate Research Project**

A theoretical or experimental investigation of an original problem under the supervision of a faculty member. Student should select topic from list in ChE office and discuss with indicated faculty member.

**Components:** Research**Attributes:** Offered Each Term**Req. Designation:** Technology

CH 392(1 - 4) Course ID:007595 2017-01-13

**Undergraduate Research Project**

A theoretical or experimental investigation of an original problem under the supervision of a faculty member. Student should select topic from list in ChE office and discuss with indicated faculty member.

**Components:** Research**Attributes:** Offered Each Term**Req. Designation:** Technology

CH 410(2) Course ID:007599 2019-07-19

**Chemical Engineering Laboratory**

A series of experiments complementing the ChE senior courses are conducted. The student will gain familiarity with the equipment, practices, tools, and scope of Chemical Engineering. Extensive report writing. Laboratory safety and applied statistics and data analysis stressed. Does not meet each week; schedule will be posted.

**Components:** Laboratory**Attributes:** Two communication units, Offered Fall Term**Requirement Group:** Prerequisites: CH330**Req. Designation:** Technology

**Engineering - Chemical & Biomolecular Eng - Subject: Chemical Engineering**

CH 420(3) Course ID:011704 2019-07-19

**Process Economics & Conceptual Design**

Engineering economics, conceptual design principles, equipment costing, safety considerations.

**Components:** Laboratory, Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: CH330 Corequisites: EC350, or the combination of EC150 and EC200, or the combination EC**Req. Designation:** Technology

CH 430(3) Course ID:012865 2022-06-21

**Chemical Process Safety**

Applications of chemical process principles to process safety and hazards analysis, mitigation and prevention, with emphasis on the chemical process industries.

**Components:** Lecture**Course Equivalents:** CH 530**Attributes:** Offered Spring Term**Req. Designation:** Technology

CH 440(3) Course ID:007920 2021-02-19

**Plasma Engineering**

[Cross Listed with CH540] This course will focus on the fundamentals of plasma science and engineering with particular emphasis on non-equilibrium plasmas and plasma in water environments. Focus areas addressed include material processing, chemical synthesis and conversion, environmental remediation, disinfection and biomedical applications.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: CH330 and CH360**Req. Designation:** Technology

CH 456(1 - 3) Course ID:007603 2015-02-03

**Experimental Projects**

One or more project experiments related to various chemical processes are conducted. Selection of experiments is based on the student's needs and interests, and may involve existing experiments or the development of new ones.

**Components:** Lecture**Attributes:** Offered Each Term**Req. Designation:** Technology

CH 460(3) Course ID:007604 2019-07-19

**Process Dynamics and Control**

Process systems analysis and control. Methods for the analysis of systems and the use of these methods in the design of control systems.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: CH220, CH330, and MA231.**Req. Designation:** Technology

CH 465(3) Course ID:007605 2021-01-22

**Biochemical Engineering**

Use of microorganisms and enzymes to carry out industrial scale production of useful products. Enzyme and cell growth kinetics, reactor types, design principles and operating processes (agitation, aeration, sterilization, separations), and examples of some typical industrial processes.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: CH330**Req. Designation:** Technology

CH 482(3) Course ID:007608 2018-11-08

**Design Project**

A comprehensive design is performed independently. When possible, the work will be done in a team.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisite: CH420**Req. Designation:** Technology

**Engineering - Chemical & Biomolecular Eng - Subject: Chemical Engineering**

CH 490(3) Course ID:007612 2018-12-11

**Elementary Transport Phenomena**

Principles of transport of momentum, energy, and mass will be covered from a fundamental perspective, pointing out analogies where appropriate. Topics include the Navier-Stokes and continuity equations, analysis of one dimensional flows, boundary layer theory, the energy and species conservation equations, energy transport by conduction and convection, steady two-dimensional problems, and unsteady one-dimensional problems. Enrollment is restricted to seniors who will graduate in the calendar year in which the course is offered.

Components: Lecture

Attributes: Offered Spring Term

Requirement Group: Prerequisites: CH330 and 3.5 GPA or consent of the instructor.

Req. Designation: Technology

CH 501(1 - 4) Course ID:007613 2016-02-10

**Directed Study in Chemical Engineering Principles I**

For graduate students with a baccalaureate degree in a field other than chemical engineering.

Components: Independent Study

Attributes: Offered Fall Term

Req. Designation: Technology

CH 502(1 - 4) Course ID:007614 2016-01-06

**Directed Study in Chemical Engineering Principles II**

For graduate students with a baccalaureate degree in a field other than chemical engineering.

Components: Independent Study

Attributes: Offered Spring Term

Req. Designation: Technology

CH 503(1 - 4) Course ID:012783 2017-01-12

**Directed Study in Chemical Engineering III**

For graduate students with a baccalaureate degree in a field other than chemical engineering.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

CH 530(3) Course ID:012866 2018-03-16

**Chemical Process Safety**

Applications of chemical process principles to process safety and hazards analysis, mitigation and prevention, with emphasis on the chemical process industries.

Components: Lecture

Course Equivalents: CH 430

Attributes: Offered Fall Term

Req. Designation: Technology

CH 540(3) Course ID:007923 2021-02-19

**Plasma Engineering**

[Cross Listed with CH440] This course will focus on the fundamentals of plasma science and engineering with particular emphasis on non-equilibrium plasmas and plasma in water environments. Focus areas addressed include material processing, chemical synthesis and conversion, environmental remediation, disinfection and biomedical applications.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

CH 546(3) Course ID:007616 2015-01-20

**Chemical Reactor Analysis II**

Advanced topics in chemical reactor analysis, including residence time distributions, reactor stability, fixed and fluidized bed reactors and advanced design methods.

Prerequisites: CH445.

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

**Engineering - Chemical & Biomolecular Eng - Subject: Chemical Engineering**

CH 547(3) Course ID:012069 2015-03-24

**Advanced Hydrocarbon Thermodynamics**

This course will provide a consistent approach to the use of thermodynamics for the solution of practical process engineering problems encountered during the design and simulation of chemical processing plants with special emphasis on gas plants and refineries. Topics such as industrial equations of state, pressure-temperature diagrams, modeling with water, high pressure thermodynamic equilibrium, critical phenomena and inclusion of solids in the understanding of phase diagrams will be studied.

Components: Lecture

Attributes: Offered Odd Falls

Req. Designation: Technology

CH 551(3) Course ID:007617 2015-01-23

**Multicomponent Mass Transfer**

Principles of mass transfer in multicomponent mixtures. Models of multicomponent diffusion, interaction effects, and applications to processes such as distillation and condensation.

Prerequisites: CH330

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

CH 560(3) Course ID:007926 2015-02-12

**Transport Phenomena**

A study of fluid mechanics, heat, and mass transport, identifying analogies where appropriate, with emphasis on physical understanding. Topics include conservation equations and constitutive relations, boundary conditions, solutions in simple situations, boundary layers, forced and natural convection, phase change phenomena, multicomponent mass transport, film and penetration models, mass transport with chemical reaction, simultaneous heat and mass transport, and experimental techniques.

Components: Lecture

Attributes: Offered Fall Term

Requirement Group: Prerequisite: CH330 and CH370 or equivalent Co-requisite: CH561

Req. Designation: Technology

CH 561(3) Course ID:007619 2015-02-12

**Chemical Engineering Analysis**

Analysis of chemical engineering problems in transport phenomena, reactor engineering and engineering thermodynamics.

Prerequisites: MA331 or equivalent.

Corequisites: CH330 or ES330.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

CH 571(3) Course ID:007621 2016-09-13

**Advanced Chemical Engineering Thermodynamics**

Laws, principles and concepts of classical thermodynamics, including the properties of pure fluids and of solutions, the thermodynamics of flow processes, chemical reaction equilibria, etc.

Prerequisite: CH260 and CH320

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

CH 576(3) Course ID:007622 2021-11-09

**Atmospheric Chemistry**

[Cross-listed with CE 577, CM 576] The course will cover the evolution of the atmosphere from its initial formation to its natural background condition to its current state perturbed by human activities; detailed descriptions of the chemistry of the carbon, nitrogen and sulfur cycles; characterization of the atmospheric aerosol and its role in heterogeneous reactions and materials transport; stratospheric ozone and problems with its depletion; airborne radioactivity and its role in atmospheric ion chemistry. This course covers the same topics as CE 477 and includes additional material on the graduate level.

Prerequisite: CM370 or CM371 or ES340.

Components: Lecture

Course Equivalents: CE 477, CE 577, CM 476, CM 576

Attributes: Offered Odd Springs

Req. Designation: Technology

**Engineering - Chemical & Biomolecular Eng - Subject: Chemical Engineering**

**CH 582(3)** Course ID:007623 2017-11-08 Instructor Consent Required  
**Design Project**

A comprehensive design is performed independently. When possible, the work will be done in a team.

**Components:** Lecture  
**Attributes:** Offered Spring Term  
**Req. Designation:** Technology

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**CH 590(3)** Course ID:007626 2015-01-20

**Elementary Transport Phenomena**

(Cannot be taken by MS or PhD students in Chemical Engineering). Principles of transport of momentum, energy, and mass will be covered from a fundamental perspective, pointing out analogies where appropriate. Topics include the Navier-Stokes and continuity equations, analysis of one dimensional flows, boundary layer theory, the energy and species conservation equations, energy transport by conduction and convection, steady two-dimensional problems, and unsteady one-dimensional problems.

Prerequisites: CH 330 and a 3.5 GPA, or instructor consent

**Components:** Lecture  
**Attributes:** Offered Spring Term  
**Req. Designation:** Technology

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**CH 610(1)** Course ID:007627 2023-01-09

**Chemical Engineering Seminar**

Students, staff and visiting lecturers present research results and topics of current interest. Attendance is required.

**Components:** Seminar  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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**CH 611(1 - 15)** Course ID:007628 2015-02-03

**Thesis, Dissertation Credits**

Analytical or experimental studies in chemical engineering under the direction of a faculty adviser. Credit for this work is given when the requirements for the degree are completed including the presentation of a thesis or dissertation as appropriate to the degree program.

**Components:** Thesis Research  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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**CH 612(1 - 4)** Course ID:007629 2015-02-03

**Directed Study**

Special reading or laboratory study of a specific problem under the direction of a member of the faculty.

**Components:** Independent Study  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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**CH 665(3)** Course ID:007633 2015-01-23 Instructor Consent Required

**Selected Topics in Polymers and Soft Materials**

An advanced graduate course in science and engineering of polymers and soft materials. Topics of special interest will be selected to conform to the mutual interests and needs of students and faculty.

**Components:** Lecture  
**Attributes:** Given When Needed  
**Req. Designation:** Technology

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**CH 999(1 - 4)** Course ID:011126 2015-01-13

**Special Topics in Chemical Engineering**

Used for awarding transfer credits for graduate courses completed elsewhere for which no equivalent Clarkson university graduate course can be identified.

**Components:** Independent Study  
**Attributes:** Transfer Credit Only  
**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Educational Chemistry**

CHM 580(3) Course ID:012239 2021-10-08

**MAT Project in Chemistry (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: Chinese Language****CHN 517(3) Course ID:012245 2022-04-08****Chinese Language and Linguistics I**

[Formerly CHN 517A] This course is designed to strengthen students' understanding of second language acquisition theory and teaching strategies. Its primary focus is on Chinese as a second language at the K-12 level. The course assumes that students in the course are already teaching in a Chinese language program with some or minimal CFL training. The course emphasizes instructional strategies, planning, and assessment common to most methods courses. In addition, this course introduces students to program development and assessment since most K-12 programs require their Chinese teachers to build out the language program over a series of several years. The course will address students' real time issues and concerns in the classroom as well as learn to see the 'bigger picture' of the CFL program and curriculum.

**Components:** Seminar**Attributes:** Offered Fall Term**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology**CHN 530(3) Course ID:012246 2021-10-08****Chinese Language and Linguistics II**

This 3-credit course is designed for students who contemplate a career teaching Chinese at the secondary or college level. The purpose of the class is to provide students with a general overview of the basic issues in Chinese linguistics from phonetics, morphology to syntax. Teaching strategies related to these issues will also be briefly discussed.

**Components:** Seminar**Attributes:** Offered Spring Term**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology**CHN 580(3) Course ID:012247 2021-10-08****MAT Project in Chinese (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

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CM 1(1 - 4) Course ID:008060 2015-01-13

**Chemistry Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study  
Attributes: Transfer Credit Only  
Req. Designation: Technology

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CM 2(1 - 4) Course ID:008061 2015-01-13

**Chemistry Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.  
This course may be used to satisfy a Science Foundation Curriculum Requirement.

Components: Independent Study  
Attributes: Transfer Credit Only  
Req. Designation: Technology

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CM 31(2) Course ID:012145 2016-03-21

**HEOP Introduction to General Chemistry I**

Introduction to the foundations of major theories of chemistry and their practical applications. Topics include; foundation of measurement, chemical calculations and dimensional analysis, the concept of the mole, reaction stoichiometry, basic thermo-chemical principles, and the structure and organization of the periodic table.

Components: Lecture  
Attributes: Offered Summer Term  
Requirement Group: Prerequisite: For HEOP students only.  
Req. Designation: Technology

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CM 103(3) Course ID:007639 2015-02-12

**Structure and Bonding**

An introduction to the electronic and geometric structures of representative inorganic and organic molecules, to the relations between structure and chemical and physical properties, and to the principles of chemical bonding. This course is designed for students majoring in chemistry.

Components: Discussion, Lecture  
Attributes: Offered Fall Term  
Req. Designation: Technology

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CM 104(3) Course ID:007640 2015-01-20

**Chemical Equilibrium and Dynamics**

This course is an introduction to chemical equilibrium and kinetics. It includes some basic thermodynamics and the evaluation and use of equilibrium constants, and also the measurement and mechanistic interpretation of the rates of chemical reactions. Examples are selected to cover a wide spectrum of chemical problems and to stress experimental techniques as well as theory.

Components: Discussion, Lecture  
Attributes: Offered Spring Term  
Requirement Group: Prerequisites: CM103 or CM131  
Req. Designation: Technology

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CM 105(2) Course ID:007641 2015-02-12

**Chemistry Laboratory I**

Some fundamental principles underlying the experimental study of chemical phenomena. Some typical reactions of inorganic and organic compounds will be studied. This course will include introductions to various fields of chemical experimentation.

Components: Laboratory  
Attributes: Offered Fall Term  
Requirement Group: Corequisites: CM103  
Req. Designation: Technology

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CM 106(2) Course ID:007642 2015-01-20

**Chemistry Laboratory II**

Experimental studies of the equilibria and rates of some chemical reactions, employing some volumetric and gravimetric analysis and including introductions to spectrophotometric and potentiometric measurements and to the use of computers in chemical experimentation.

Components: Laboratory  
Attributes: Offered Spring Term  
Requirement Group: Prerequisites: CM105 or, with consent of the instructor, CM131. Corequisite: CM104.  
Req. Designation: Technology

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**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

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CM 121(1) Course ID:007643 2015-01-20

**Freshmen Seminar**

A course to acquaint incoming freshmen with activities and facilities in the Chemistry Department, provide a forum for discussion of curriculum choices and career options in chemistry.

**Components:** Seminar

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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CM 131(4) Course ID:007644 2016-09-14

**General Chemistry I**

A general overview of chemistry, including principles and theories as well as descriptive chemistry of important elements and compounds. Laboratory experiments augment lecture topics to provide a small group hands-on learning experience.

**Components:** Discussion, Laboratory, Lecture

**Attributes:** Offered Fall and Spring

**Req. Designation:** Technology

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CM 132(4) Course ID:007645 2015-01-20

**General Chemistry II**

A continuation of CM 131. Chemical principles, theories, and descriptive chemistry with laboratory experiments to provide additional exposure to lecture topics in a small group environment.

**Components:** Discussion, Laboratory, Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: CM131

**Req. Designation:** Technology

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CM 221(3) Course ID:007647 2015-02-12

**Spectroscopy**

A study of spectroscopic techniques, including both their analytical applications and the use of molecular spectroscopy in the identification and characterization of chemical compounds. The techniques discussed include atomic emission and absorption, fluorescence, visible-ultraviolet, infrared and mass spectroscopy and nuclear magnetic resonance spectroscopy.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: CM104 or CM132

**Req. Designation:** Technology

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CM 223(3) Course ID:007648 2015-02-12

**Spectroscopy Laboratory**

This laboratory course accompanies CM 221.

**Components:** Laboratory

**Attributes:** Two communication units, Offered Fall Term

**Requirement Group:** Prerequisites: CM106 or CM132 Corequisites: CM221

**Req. Designation:** Technology

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CM 241(3) Course ID:007649 2015-02-12

**Organic Chemistry I**

An introductory course in organic chemistry dealing with the structures, names, chemical and physical properties, preparations, spectroscopy and reaction mechanisms of organic compounds.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: CM104 or CM132

**Req. Designation:** Technology

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CM 242(3) Course ID:007650 2015-01-20

**Organic Chemistry II**

A continuation of CM 241.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisite: CM241

**Req. Designation:** Technology

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**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 244(3) Course ID:007651 2020-01-15

**Organic Chemistry Laboratory I**

In this laboratory course, procedures for the synthesis of typical organic compounds are combined with spectroscopic and other physical and chemical techniques to illustrate the study of functional-group chemistry and the characterization and identification of organic compounds.

**Components:** Laboratory**Attributes:** Two communication units, Offered Fall and Spring**Requirement Group:** Prerequisite: CM 241, Organic Chemistry I Corequisite: CM 242, Organic Chemistry II**Req. Designation:** Technology

CM 300(3) Course ID:007652 2015-01-20

**Instrumental Laboratory**

Laboratory work designed to illustrate principles discussed in CM 320, CM 371 and CM 372.

**Components:** Laboratory**Attributes:** Two communication units, Offered Spring Term**Requirement Group:** Prerequisite: CM371 Corequisite: CM320**Req. Designation:** Technology

CM 302(3) Course ID:013092 2021-02-26

**Forensic Chemistry**

This course introduces the principles, methods and instrumentation of chemistry behind the work of crime investigation and will be illustrated with case studies. It will explain how to obtain analytical results through sample preparation, instrumental analysis and data interpretation. It covers topics commonly applicable to the everyday functions of a crime laboratory including forensic analysis of drugs, explosives and inks, DNA profiling, blood analysis etc. The laboratory section will provide an opportunity for students to practice forensic chemistry techniques. This course is open to students with minimal study in chemistry but who are interested in forensic chemistry as well as those with a substantive background in chemistry.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite CM223 Spectroscopy Laboratory or approval by Instructor**Req. Designation:** Technology

CM 305(3) Course ID:013136 2022-02-09

**Biochemistry for Health Sciences**

This course provides the fundamental knowledge that is essential to the study of biochemistry at advanced levels. This course integrates biochemistry with physiology and cell biology and is aimed specifically at introductory health science students. It provides a general introduction to the biochemical basis of various cellular functions and their relevance to disease. Topics covered include structure, function and chemistry of biomolecules, energy metabolism, molecular genetics, the biochemistry of cancer, and recent biotechnology. The course is intended for health science students who have no previous background in sciences. It assumes no prior knowledge and covers some chemistry and molecular biology basics.

**Components:** Lecture**Course Equivalents:** BY 305**Attributes:** Offered Spring Term**Req. Designation:** Technology

CM 312(3) Course ID:007655 2015-01-20

**Survey of Inorganic Chemistry**

A review of fundamental chemical principles and a study of the qualitative description of binding in inorganic molecules and of the properties, structures and reactions of elements and their compounds.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: CM371 or equivalent**Req. Designation:** Technology

CM 320(3) Course ID:007657 2022-04-12

**Separations and Electrochemistry**

This course deals with techniques of separation and electrochemical techniques used in research and analysis. It includes single- and multistage techniques of separation, with emphasis on chromatographic methods; and the principles and applications of potentiometric, polarographic, voltammetric and some other electroanalytical techniques.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry****CM 342(2)** Course ID:012112 2018-02-26**Food Chemistry**

Food chemistry is a one-semester course that will teach about basic structural principles of food essentials and their chemistry. The course will teach specifically: (i) Molecular basis for the sensation of flavor; (ii) Structure and properties of edible polysaccharides, proteins, and fats; (iii) Chemical and physical changes that these molecules undergo under different food-related treatments (e.g. heating, cooling, mechanical processing); (iv) Brief chemistry of digestion (enzymatic and microbial).

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: CM241 with a grade of B or higher Corequisites: CM242**Req. Designation:** Technology**CM 345(4)** Course ID:007659 2015-02-12**Advanced Laboratory**

Advanced techniques in manipulation of chemical compounds and their isolation and characterization are studied. Examples are low temperature and inert atmosphere reaction conditions, synthesis of both inorganic and organic compounds in the form of fine particles, use of thermal analysis, electron microscopy and X-ray diffraction to determine product shapes and composition, and spectroscopic evaluation of metallo-organic complexes having industrial relevance. Course involves extensive use of library facilities to identify background materials as well as details for techniques employed. Course also includes a final presentation based on laboratory and literature findings.

**Components:** Laboratory**Attributes:** Two communication units, Offered Fall Term**Requirement Group:** Prerequisites: CM242 and CM244**Req. Designation:** Technology**CM 371(3)** Course ID:007661 2014-11-20**Physical Chemistry I**

[Cross-listed with PH 371] This course covers the gaseous state, kinetic theory and chemical thermodynamics, with applications to chemical and phase equilibria. The emphasis is on mathematics and problem solving.

**Components:** Lecture**Course Equivalents:** PH 371**Requirement Group:** Prerequisites: CM104 or CM132, MA132, PH131 Corequisites: PH132**Req. Designation:** Technology**CM 372(3)** Course ID:007662 2014-11-20**Physical Chemistry II**

[Cross-listed with PH 372] A continuation of CM 371. Topics may include quantum mechanics, atomic structure, chemical bonds, intermolecular forces, spectroscopy, molecular symmetry, optical activity, photochemistry and photobiology.

**Components:** Lecture**Course Equivalents:** PH 372**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: CM371 or equivalent**Req. Designation:** Technology**CM 391(3)** Course ID:007665 2015-02-03**Independent Study**

An opportunity for junior chemistry majors to undertake research under a faculty member's direction. The research work to be arranged with the faculty member who assists in the choice of a problem and in the planning and execution of the work. A written report must be submitted at the end of each semester summarizing the work and results to date.

Prerequisites: consent of the instructor.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology**CM 401(0)** Course ID:013172 2022-07-15**Assessment in Chemistry and Biomolecular Science**

This course is designed to assess the professional development of chemistry and biomolecular science majors by completion of a standardized test to assess their level of knowledge in their fields. Students will reflect on their undergraduate learning experience through surveys and will submit a resume and personal statement for graduate school or employment. Restriction: Senior standing or consent of the instructor.

Credits: (0), P/NC, Semester Calendar Independent Study.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry****CM 405(0) Course ID:007668 2022-07-15****Professional Experience in Chemistry or Biomolecular Science**

During the fall semester, spring semester, or summer, a student must complete a professional experience that meets the professional goals of the student and the Clarkson's Common Experience requirements for a professional experience. The experience should involve minimally 120 hours of training and work, and must be pre-approved by the student's faculty advisor or Chair of the department of Chemistry and Biomolecular Science. A formal report upon completion of the internship is required.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology**CM 406(3) Course ID:007669 2020-08-25****Biomedical Analysis and Instrumentation**

[Cross-listed with BY 406] Biomedical Analysis and Instrumentation is a lecture course designed to provide advanced undergraduates and graduate students in basic sciences, biosciences and bioengineering disciplines with scientific and engineering aspects of instrumentation, sample analysis, measuring and processing signals from living organisms. Functioning and calibration of biomedical transducers and devices actually used in clinical practice for analyzing clinical biomarkers for disease diagnostics will be reviewed. Emerging research in bioinstrumentation, biomedical technologies, stand alone and wearable sensing devices, analytical method development and validation will be also be covered. Special emphasis will be placed on measurement principles of medical instrumentation used in health technologies ranging from laboratory scale to next generation wearables. Training in professional ethics, grant writing, patenting, innovation, entrepreneurial activities and FDA regulation for new device development, laboratory management, as well as communication

**Components:** Lecture**Course Equivalents:** BY 406, CM 506, BY 506**Attributes:** Offered Even Springs**Requirement Group:** Prerequisites: CM221**Req. Designation:** Technology**CM 409(1 - 2) Course ID:010675 2015-02-03 Instructor Consent Required****Ugrd Teaching Assist in Chem**

Assisting a faculty member in a chemistry course as an undergraduate teaching assistant. Students should check with their major department to determine whether these credits can be used to meet their degree requirements.

**Components:** Lecture**Attributes:** Offered Each Term**Req. Designation:** Technology**CM 413(3) Course ID:007671 2017-09-12****Carbon Capture and Sequestration**

[Cross-listed with CH 413] Sustainable energy generation is seen as one of the largest challenges of our generation. All long-term solutions rely on the direct or indirect conversion of solar energy, yet these solutions appear to be years from implementation. In the coming decades then, while the relative importance of fossil fuels will decrease, absolute use of fossil fuels will not. Carbon Capture and Sequestration (CCS) employed on a global scale can sustain the world's energy use and help mitigate alarmingly high carbon dioxide levels in the atmosphere. The goal of this course is to provide students with a modern view of current and emerging research in CCS. Topics will include our current understanding of carbon dioxide in and around the planet, the geological storage of carbon dioxide, and the science and technology of capturing carbon dioxide with focus on material chemistry aspects. Development of analytical methods and characterization tools for assessing CCS properties and materials will also be discussed. Through this series

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**CM 417(1 - 3) Course ID:007672 2017-01-13****Directed Research in Inorganic Chemistry**

Students will carry out research in inorganic chemistry under the supervision of a faculty member. Topics will be determined by faculty research programs. A formal report is required at the conclusion of this course.

**Components:** Research**Attributes:** Offered Each Term**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 418(1 - 3) Course ID:007673 2022-05-02

**Directed Study in Inorganic Chemistry**

The study of a subject not otherwise available in inorganic chemistry courses may be undertaken under the supervision of a faculty member.

**Components:** Independent Study  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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CM 422(3) Course ID:012913 2018-11-02

**Advanced Mass Spectrometry: Practical Applications**

Practical Applications will introduce the students to mass spectrometry and its applications within different fields, including pharmaceutical and biotech industry, academia, government, forensics, etc. Various types of instruments will be discussed, as well as their application within different fields. The course will then focus on different types of well-known "omics", such as proteomics, metabolomics, glycomics, or lipidomics, but also on specialized types of "omics" such as peptidomics, post-translational modification-omics (PTM-omics), interactomics, foodomics, microbiomics, venomics, DNA- RNA- & Protein-adductomics, genomics, proteogenomics or transcriptomics. Particular applications of all these kinds of "omics" in biotechnology & pharmaceutical industry, healthcare, biowarfare and forensics will also be discussed.

**Components:** Lecture  
**Course Equivalents:** CM 522, BY 427, BY 527  
**Attributes:** Offered Spring Term  
**Requirement Group:** Prerequisites: CM/BY460/560, or consent of the instructor  
**Req. Designation:** Technology

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CM 427(1 - 3) Course ID:007677 2017-01-13

**Directed Research in Analytical Chemistry**

Students will carry out research in analytical chemistry under the supervision of a faculty member. Topics will be determined by faculty research programs. A formal report is required at the conclusion of the course.

**Components:** Research  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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CM 428(1 - 3) Course ID:007678 2015-02-03

**Directed Study in Analytical Chemistry**

The study of a subject not otherwise available in analytical chemistry courses may be undertaken under the supervision of a faculty member.

**Components:** Independent Study  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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CM 430(3) Course ID:007680 2019-09-03

**Colloids and Interfaces**

Physico-chemical principles and experimental techniques related to the characterization and investigation of colloidal systems and interfaces are covered on an introductory level. From the many areas of application, the emphasis will be on those situations that are encountered in everyday life such as environmental problems (aerosols, water treatment), biological aspects (transport and absorption of fat, biological membranes), foods and cosmetics (emulsions), detergency and various technological processes.

**Components:** Lecture  
**Course Equivalents:** CM 530  
**Attributes:** Offered Fall Term  
**Req. Designation:** Technology

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CM 432(3) Course ID:007950 2019-01-01

**Fine Particle Characterization**

This course is intended to familiarize the students with the analytic techniques routinely used to characterize the size, size distribution, shape, composition, structure, and surface properties (composition, charge, topography) of individual particles as well as the properties of dispersion particles. In conjunction with the latter, the course will discuss many concepts covered by colloids and surface science courses.

**Components:** Lecture  
**Course Equivalents:** CM 532  
**Attributes:** Given When Needed  
**Req. Designation:** Technology

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**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 437(1 - 3) Course ID:007683 2017-01-13

**Directed Research in Colloid Chemistry**

Students will carry out research in colloid chemistry under the supervision of a faculty member. Topics will be determined by faculty research programs. A formal report is required at the conclusion of the course.

Components: Research

Attributes: Offered Each Term

Req. Designation: Technology

CM 442(3) Course ID:007688 2019-03-06

**Advanced Organic Chemistry**

The course will cover essential topics of organic chemistry including dynamic stereochemistry, conformational analysis, photochemistry, pericyclic reactions, and chemistry of free radicals.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

CM 444(3) Course ID:007690 2015-01-23

**Medicinal Chemistry**

Various classes of medicinal agents will be discussed in relation to the diseases that they are used to treat. The history and development of these drugs will be covered as well as attempts to correlate chemical structure with biological activity.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisite: CM242.

Req. Designation: Technology

CM 446(3) Course ID:007692 2015-01-23

**Modern Spectroscopic Methods in Organic Chemistry**

This course deals largely with the applications of spectroscopic techniques to the identification of organic compounds. Heavy emphasis will be given to nuclear magnetic resonance techniques for protons, carbon and other nuclei. Practical and theoretical aspects of FT NMR will be emphasized.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisites: CM242 and CM371.

Req. Designation: Technology

CM 447(1 - 3) Course ID:007693 2017-01-13

**Directed Research in Organic Chemistry**

Students will carry out research in organic chemistry under the supervision of a faculty member. Topics will be determined by faculty research programs. A formal report is required at the conclusion of the course.

Components: Research

Attributes: Given When Needed

Req. Designation: Technology

CM 448(1 - 3) Course ID:007694 2015-02-03

**Directed Study in Organic Chemistry**

The study of a subject not otherwise available in organic chemistry courses may be undertaken under the supervision of a faculty member.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

CM 451(3) Course ID:010374 2014-11-20

**Manufacturing Implications of Advanced Materials Processing**

The processing of materials into manufactured goods requires an understanding of the chemical composition of the starting substrates, the nature of intermediates, and the properties of final products. This course focuses on the preparation, modification, characterization, and the applications of fine, ultra-fine, and nanosize metallic particles. The objectives are to: a) provide an overview of the relevant theoretical and practical aspects related to the preparation, characterization, and modification of fine particles in general and metallic particles in particular, b) familiarize students with the industrial approaches for developing and manufacturing fine particles on large scale, and c) teach students how the properties of the resulting particles/colloids can be tailored in order to ensure optimal performance in specific applications. During the semester the students will also participate in several practical sessions in which metal colloids will be prepared and characterized.

Components: Lecture

Course Equivalents: CM 551

Req. Designation: Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 457(1 - 3) Course ID:007699 2017-01-13

**Directed Research in Polymer Chemistry**

Students will carry out research in polymer chemistry under the supervision of a faculty member. Topics will be determined by faculty research programs. A formal report is required at the conclusion of the course.

Components: Research

Attributes: Given When Needed

Req. Designation: Technology

CM 458(1 - 3) Course ID:007700 2015-01-23

**Directed Study in Polymer Chemistry**

The study of a subject not otherwise available in organic chemistry courses may be undertaken under the supervision of a faculty member.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

CM 460(3) Course ID:007702 2014-11-18

**Biochemistry I**

[Cross-listed with BY 450] This course is an introduction to the molecular basis of biological processes. The first part of the course will cover the structure and function of the four major classes of biomolecules - proteins, carbohydrates, lipids and nucleic acids. The second part covers the organization and regulation of the major energy generating and biosynthetic pathways.

Components: Lecture

Course Equivalents: BY 450, BY 650, CM 560

Requirement Group: Prerequisites: CM241 or consent of the instructor.

Req. Designation: Technology

CM 461(3) Course ID:007703 2022-02-02

**Biochemistry II**

[Cross-listed with BY 451] A continuation of Biochemistry I dealing mainly with metabolic pathways, intermediary metabolism, protein synthesis, membrane transport, DNA replication and RNA transcription.

Components: Lecture

Course Equivalents: BY 451

Attributes: Offered Spring Term

Requirement Group: Prerequisite: CM460 or equivalent.

Req. Designation: Technology

CM 466(3) Course ID:010918 2015-01-23

**Bioelectronics & Bionanotechnology**

This course covers novel areas in science and technology that have high importance for fundamental science and practical applications. Bioelectronics is a scientific and technological area that includes electronic coupling of biomaterials (enzymes, DNA, recognition proteins, biological cells) with electronic devices. The bioelectronic systems can be used to develop sensing devices (enzyme-based biosensors, DNA sensors, immunosensors, etc.) and to develop biofuel cells (implantable biofuel cells for biomedical applications, self-powered biosensors, autonomously operated devices). New methods and new materials (functionalized nanoparticles, quantum dots, carbon nanotubes, etc.) developed due to the tremendous recent success in nanotechnology pave the way for the novel possibilities to couple biomaterials and electronic transducers, thus resulting in the new technological field named Bionanotechnology. The students will be introduced into the most important areas of Bioelectronics and Bionanotechnology.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisites: CM372, CM460.

Req. Designation: Technology

CM 467(1 - 3) Course ID:007706 2017-01-13

**Directed Research in Biochemistry**

Students will carry out research in biochemistry under the supervision of a faculty member. Topics will be determined by faculty research programs. A formal report is required at the conclusion of the course.

Components: Research

Attributes: Offered Each Term

Req. Designation: Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 468(1 - 3) Course ID:007707 2015-02-03

**Directed Study in Biochemistry**

The study of a subject not otherwise available in biochemistry courses may be undertaken under the supervision of a faculty member.

**Components:** Independent Study  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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CM 469(3) Course ID:007708 2021-09-08

**Implantable and Wearable Bioelectronics**

Chemistry CM469/569 is a lecture course designed to provide graduate students and advanced undergraduates with a working knowledge in the multidisciplinary research area of bioelectronics, giving particular information about implantable and wearable bioelectronics. The course will concentrate on concepts, experimental realizations and practical applications. This course covers novel areas in science and technology that have high importance for fundamental science and practical applications. Major science areas covered by the course will be in chemistry, particularly biochemistry and electrochemistry. Minor sub-areas studied in the course will be related to biomedical applications and electrical/electronic engineering. All studies in the course will not require any background knowledge except general chemistry and basics of biochemistry. The major topics covered by the class will be related, but not limited, to biosensors, biofuel cells, bioelectronic devices concentrating on the concepts rather than technical details. The course work for

**Components:** Lecture  
**Course Equivalents:** CM 569  
**Attributes:** Offered Spring Term  
**Req. Designation:** Technology

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CM 470(3) Course ID:007709 2019-04-19

**Biochemistry & Biotechnology Laboratory**

[Cross-listed with BY 470] This course is a one semester course in the fundamental laboratory approaches for biochemistry and biotechnology. While largely a hands-on course, laboratory experiments will be supplemented with lectures that integrate the theoretical and practical principals covered in the exercises. Topics include protein purification, characterization and analysis, enzyme kinetics and molecular modeling.

**Components:** Laboratory  
**Course Equivalents:** BY 470  
**Attributes:** Two communication units, Offered Spring Term  
**Requirement Group:** Prerequisites: CM221 and CM223 or BY450/CM460 or consent of the instructor.  
**Req. Designation:** Technology

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CM 472(3) Course ID:007710 2018-10-10

**Chemistry at Surfaces: Structure and Catalysis**

This senior undergraduate and graduate course will survey the field of surface chemistry, with specific attention dedicated to the structure of solid surfaces and chemical processes at solid interfaces. This course will cover the basics of the structure of periodic solids, relate that understanding to solid interfaces, and finally address how surface structure and reduced dimensionality impact chemical reactions (i.e. heterogeneous catalysis). Analytical techniques common to this discipline will also be discussed. Graduate students will be assessed differently than undergraduates in this course. Graduate students will have the additional responsibility of delivering a presentation discussing one of several primary research articles germane to the field that were selected by the instructor, while undergraduate students will submit a paper describing one of these articles in detail.

**Components:** Lecture  
**Course Equivalents:** CM 572  
**Attributes:** Offered Odd Springs  
**Requirement Group:** Prerequisites: CM371 and CM372, or consent of the instructor.  
**Req. Designation:** Technology

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**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 475(3) Course ID:007713 2015-10-19

**Sustainable Nanotechnology**

The goal of this course is to provide graduate students and advanced undergraduates with a modern view of current and emerging research in nanotechnology. Topics will include: fundamental nanoscale properties and applications, green manufacturing and assembly in functional devices, interaction of nanomaterials with biological systems, the physical and chemical phenomena at nano-bio interfaces, fate, transport and transformation of engineered nanomaterials, environmental and health impact, nanometrology, nanotoxicology and hazard identification of nano-based products. Development of analytical methods and characterization tools for assessing nanoscale properties and materials will also be discussed. Students will be exposed to interdisciplinary topics and an integrated training bridging material and environmental sciences with biology and analytical chemistry. Students will be able to demonstrate a basic awareness of risks and benefits of emerging technologies and evaluate overall environmental and societal impact.

**Components:** Lecture

**Course Equivalents:** CM 575, MSE 575, ES 575

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**School of Arts and Sciences - Chemical & Biomolecular Eng - Subject: Chemistry**

CM 476(3) Course ID:007714 2014-11-20

**Atmospheric Chemistry**

[Cross-listed with CE 477] The course will cover the evolution of the atmosphere from its initial formation to its natural background condition to its current state perturbed by human activities; detailed descriptions of the chemistry of the carbon, nitrogen and sulfur cycles; characterization of the atmospheric aerosol and its role in heterogeneous reactions and materials transport; stratospheric ozone and problems with its depletion; airborne radioactivity and its role in atmospheric ion chemistry.

**Components:** Lecture**Course Equivalents:** CE 477, CE 577, CH 576, CM 576**Attributes:** Offered Odd Springs**Requirement Group:** Prerequisites: CM370 or CM371 or ES340.**Req. Designation:** Technology

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**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 477(1 - 3) Course ID:007715 2017-01-13

**Directed Research in Physical Chemistry**

Students will carry out research in physical chemistry under the supervision of a faculty member. Topics will be determined by faculty research programs. A formal report is required at the conclusion of the course.

Components: Research

Attributes: Offered Each Term

Req. Designation: Technology

CM 478(1 - 3) Course ID:007716 2020-04-03

**Directed Study in Physical Chemistry**

The study of a subject not otherwise available in physical chemistry courses may be undertaken under the supervision of a faculty member.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

CM 481(3) Course ID:013037 2020-04-03

**Computational Chemistry**

[Cross Listed with CM581] Computational Chemistry is senior undergraduate and graduate course which will discuss theoretical and computational methods in chemistry and their applications. This course will include both lectures and computer lab. The lectures will introduce the fundamental theories and methods in chemistry and their applications in the cutting-edge research. The computer lab will be hands on tutorials on calculating the structures and properties of chemicals, exploring the reaction mechanisms, reactivities, and selectivities. The objectives of this course are: (1) to provide students with the basic background of computational methodologies and their applications. (2) to enhance their experiences with common computational methods by class project. (3) to encourage their creativity, critical thinking and problem-solving ability. Graduate students will have additional course work.

Components: Lecture

Course Equivalents: CM 581

Attributes: Offered Even Falls

Requirement Group: Prerequisites: CM371 and CM372

Req. Designation: Technology

CM 482(3) Course ID:012951 2019-09-05

**Information Processing by Chemistry**

The course is composed of lectures and student presentations on signal-switchable chemical and electrochemical systems. These systems perform Boolean logic operations, memory function and control of bioelectronic devices, e.g., biofuel cells.

Students will gain knowledge on chemical/biochemical systems of various complexity logically processing different input signals. Preparation of sensing switchable interfaces will be explained. Finally, bioelectronic systems processing information and operating as signal-switchable devices will be discussed.

Components: Lecture

Course Equivalents: CM 582

Attributes: Given When Needed

Req. Designation: Technology

CM 483(3) Course ID:010314 2022-02-02

**Introduction to Polymer Science**

[Cross-listed with PH 483] This course is about fundamental aspects of polymer science. It introduces the world of chain molecules from synthesis and properties to applications. Basic knowledge from polymer chemistry and physics are combined in the one course in a form appropriate for undergraduates and graduates in chemistry, physics and engineering to develop the understanding of polymeric behavior in synthetic materials and natures.

Components: Lecture

Course Equivalents: CM 583

Attributes: Offered Fall Term

Requirement Group: Prerequisites: Junior standing or permission of instructor

Req. Designation: Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 485(3) Course ID:007718 2022-02-02

**Nanostructured Materials**

[Cross-listed with PH 585] This course reviews the methods to make nanoscale building blocks and approaches to arrange the building blocks into functional architectures for advanced materials. The list of topics includes: chemical patterning and lithography, layer-by-layer self assembly, synthesis and self assembly of nanoparticles, nanotubes and nanowires, properties of nanoclusters and self assembled structures (photonic crystals, plasmonic effects, quantum dots, porous materials, biomimetics).

**Components:** Lecture**Course Equivalents:** CM 585**Attributes:** Given When Needed**Requirement Group:** Prerequisites: Senior Standing or consent of the instructor.**Req. Designation:** Technology

CM 486(1) Course ID:012837 2022-02-02

**Industrial Chemistry**

[Cross-Listed with CM586/CH486/586] This course will benefit junior and senior undergrads plus grads in chemistry and chemical engineering, and allow them to learn of real ways such talents are used in the professional world. It will involve different industrial chemists and chemical engineers to come to Clarkson University for each of 12 of the 14 weeks of a semester and give two lectures of about 1 hour 15 min each - one on an afternoon and the other following morning. The first lecture will relate the areas of chemistry their company was known for; the second lecture an in-depth discussion on how one project was carried out at the bench and the pitfalls that had to be resolved along the way to achieve success. The intent is to select lecturers from Clarkson Chemistry and Chemical Engineering major alumni at various lengths of time they have been professionals.

**Components:** Lecture**Course Equivalents:** CM 586**Attributes:** Given When Needed**Requirement Group:** Prerequisites: Junior or Senior Standing**Req. Designation:** Technology

CM 487(3) Course ID:012908 2022-02-02

**Applications of Synchrotron and Electron Based Techniques**

The purpose of the course is to familiarize all students with the x-ray and electron based experimental techniques available at Brookhaven National Lab and other similar facilities. Students will be cognizant of the applications of these cutting edge facilities, and well positioned to use them in their own research. This course is suitable for graduate students, postdocs, and advanced undergrads in physical sciences and engineering, as well as students in biological, environmental, and chemical sciences who may have the interest to learn more about the techniques they may use for their research.

**Components:** Lecture**Course Equivalents:** PH 587, CM 587, PH 487, MSE 587, ES 587**Attributes:** Given When Needed**Requirement Group:** Prerequisites: PH132 or consent of the instructor; ES260 and/or PH231 are recommended prerequisites**Req. Designation:** Technology

CM 491(6) Course ID:007719 2017-01-13

**Undergraduate Thesis**

Research work to be arranged with the consent of a staff member who assists the student in the choice of a problem and in the planning and execution of work on it. For senior chemistry majors.

Prerequisite: consent of a department faculty member.

**Components:** Research**Attributes:** Offered Fall Term**Req. Designation:** Technology

CM 492(6) Course ID:007720 2017-01-13

**Undergraduate Thesis**

A continuation of CM 491. A written thesis is required at the end of the course.

Prerequisite: consent of a department faculty member.

**Components:** Research**Attributes:** Two communication units, Offered Spring Term**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 495(1) Course ID:011318 2014-01-01

**Internship/Co-op in Chemistry & Biomolecular Science**

Students will gain practical work experience in chemistry or biomolecular science under direction and supervision of professionals outside their department. Students must submit a formal report describing work performed as well as the Internship/Co-op learning opportunities. Report approval is required for the award of credit. Feedback will be provided by their Internship/Co-op field supervisor. This course will be graded on a pass/no-credit basis.

Components: Independent Study

Req. Designation: Technology

CM 497(1 - 3) Course ID:007721 2015-02-03

**Directed Study**

The study of a subject not otherwise available in formal courses may be undertaken under the supervision of a faculty member.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

CM 499(1 - 3) Course ID:007723 2015-02-03

**Directed Study**

The study of a subject not otherwise available in formal courses may be undertaken under the supervision of a faculty member.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

CM 506(3) Course ID:007725 2022-02-02

**Biomedical Analysis and Instrumentation**

[Cross-listed with BY 506] Biomedical Analysis and Instrumentation is a lecture course designed to provide advanced undergraduates and graduate students in basic sciences, biosciences and bioengineering disciplines with scientific and engineering aspects of instrumentation, sample analysis, measuring and processing signals from living organisms. Functioning and calibration of biomedical transducers and devices actually used in clinical practice for analyzing clinical biomarkers for disease diagnostics will be reviewed. Emerging research in bioinstrumentation, biomedical technologies, stand alone and wearable sensing devices, analytical method development and validation will be also be covered. Special emphasis will be placed on measurement principles of medical instrumentation used in health technologies ranging from laboratory scale to next generation wearables. Training in professional ethics, grant writing, patenting, innovation, entrepreneurial activities and FDA regulation for new device development, laboratory management, as well as communication

Components: Lecture

Course Equivalents: BY 406, CM 406, BY 506

Attributes: Given When Needed

Req. Designation: Technology

CM 513(3) Course ID:007728 2017-09-12

**Carbon Capture and Sequestration**

[Cross-listed with CH 513] Sustainable energy generation is seen as one of the largest challenges of our generation. All long-term solutions rely on the direct or indirect conversion of solar energy, yet these solutions appear to be years from implementation. In the coming decades then, while the relative importance of fossil fuels will decrease, absolute use of fossil fuels will not. Carbon Capture and Sequestration (CCS) employed on a global scale can sustain the world's energy use and help mitigate alarmingly high carbon dioxide levels in the atmosphere. The goal of this course is to provide students with a modern view of current and emerging research in CCS. Topics will include our current understanding of carbon dioxide in and around the planet, the geological storage of carbon dioxide, and the science and technology of capturing carbon dioxide with focus on material chemistry aspects. Development of analytical methods and characterization tools for assessing CCS properties and materials will also be discussed. Through this series

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

CM 520(3) Course ID:007729 2022-04-12

**Separations and Electrochemistry**

This course covers the same topics as CM 320 and includes additional material on the graduate level.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry****CM 522(3)** Course ID:012914 2022-02-02**Advanced Mass Spectrometry: Practical Applications**

Practical Applications will introduce the students to mass spectrometry and its applications within different fields, including pharmaceutical and biotech industry, academia, government, forensics, etc. Various types of instruments will be discussed, as well as their application within different fields. The course will then focus on different types of well-known "omics", such as proteomics, metabolomics, glycomics, or lipidomics, but also on specialized types of "omics" such as peptidomics, post-translational modification-omics (PTM-omics), interactomics, foodomics, microbiomics, venomics, DNA- RNA- & Protein-adductomics, genomics, proteogenomics or transcriptomics. Particular applications of all these kinds of "omics" in biotechnology & pharmaceutical industry, healthcare, biowarfare and forensics will also be discussed.

**Components:** Lecture**Course Equivalents:** CM 422, BY 427, BY 527**Attributes:** Given When Needed**Requirement Group:** Prerequisites: CM/BY460/560, or consent of the instructor**Req. Designation:** Technology**CM 530(3)** Course ID:007732 2019-09-03**Colloid and Interfaces**

Physico-chemical principles and experimental techniques related to the characterization and investigation of colloidal systems and interfaces are covered on an introductory level. From the many areas of application, the emphasis will be on those situations that are encountered in everyday life such as environmental problems (aerosols, water treatment), biological aspects (transport and absorption of fat, biological membranes), foods and cosmetics (emulsions), detergency and various technological processes. This course covers the same topics as CM 430 and includes additional material on the graduate level.

**Components:** Lecture**Course Equivalents:** CM 430**Attributes:** Offered Fall Term**Req. Designation:** Technology**CM 532(3)** Course ID:007951 2019-01-01**Fine Particle Characterization**

This course is intended to familiarize the students with the analytic techniques routinely used to characterize the size, size distribution, shape, composition, structure, and surface properties (composition, charge, topography) of individual particles as well as the properties of dispersion particles. In conjunction with the latter, the course will discuss many concepts covered by colloids and surface science courses. Graduate students will do additional work.

**Components:** Lecture**Course Equivalents:** CM 432**Req. Designation:** Technology**CM 542(3)** Course ID:007737 2019-03-06**Advanced Organic Chemistry**

The course will cover essential topics of organic chemistry including dynamic stereochemistry, conformational analysis, photochemistry, pericyclic reactions, and chemistry of free radicals.

This course covers the same topics as CM 442 and includes additional material on the graduate level.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**CM 544(3)** Course ID:007739 2015-01-23**Medicinal Chemistry**

This course covers the same topics as CM 444 and includes additional material on the graduate level.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**CM 546(3)** Course ID:007741 2015-01-23**Modern Spectroscopic Methods in Organic Chemistry**

No prerequisites. This course covers the same topics as CM 446 and includes additional material on the graduate level.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry****CM 551(3)** Course ID:007744 2014-11-20**Manufacturing Implications of Advanced Materials Processing**

The processing of materials into manufactured goods requires an understanding of the chemical composition of the starting substrates, the nature of intermediates, and the properties of final products. This course focuses on the preparation, modification, characterization, and the applications of fine, ultra-fine, and nanosize metallic particles. The objectives are to: a) provide an overview of the relevant theoretical and practical aspects related to the preparation, characterization, and modification of fine particles in general and metallic particles in particular, b) familiarize students with the industrial approaches for developing and manufacturing fine particles on large scale, and c) teach students how the properties of the resulting particles/colloids can be tailored in order to ensure optimal performance in specific applications. During the semester the students will also participate in several practical sessions in which metal colloids will be prepared and characterized. Graduate students will do additional work, such as a term paper or review.

**Components:** Lecture**Course Equivalents:** CM 451**Req. Designation:** Technology**CM 560(3)** Course ID:007747 2014-11-20**Biochemistry I**

[Cross-listed with BY 650] This course covers the same topics as CM 460 and includes additional material on the graduate level.

**Components:** Lecture**Course Equivalents:** BY 450, BY 650, CM 460**Req. Designation:** Technology**CM 561(3)** Course ID:007748 2014-11-24**Biochemistry II**

[Cross-listed with BY 651] This course covers the same topics as CM 461 and includes additional material on the graduate level.

**Components:** Lecture**Course Equivalents:** BY 651**Req. Designation:** Technology**CM 566(3)** Course ID:010919 2015-01-23**Bioelectronics & Bionanotechnology**

This course covers novel areas in science and technology that have high importance for fundamental science and practical applications. Bioelectronics is a scientific and technological area that includes electronic coupling of biomaterials (enzymes, DNA, recognition proteins, biological cells) with electronic devices. The bioelectronic systems can be used to develop sensing devices (enzyme-based biosensors, DNA sensors, immunosensors, etc.) and to develop biofuel cells (implantable biofuel cells for biomedical applications, self-powered biosensors, autonomously operated devices). New methods and new materials (functionalized nanoparticles, quantum dots, carbon nanotubes, etc.) developed due to the tremendous recent success in nanotechnology pave the way for the novel possibilities to couple biomaterials and electronic transducers, thus resulting in the new technological field named Bionanotechnology. The students will be introduced into the most important areas of Bioelectronics and Bionanotechnology.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 567(1) Course ID:012760

2022-02-02

**Biofuel Cells - Design and Applications**

This is a lecture course designed to provide graduate students with a working knowledge in the highly multidisciplinary research area of biofuel cells (including microbial, enzyme-based and "abiotic" biofuel cells, their construction, operation and various applications). The course will include a brief overview of microbial fuel cells. The "abiotic" biofuel cells based on the use of inorganic catalytic species (mostly catalytic nanoparticles) will be studied in connection with the general information on nanoparticles and their immobilization on electrodes. The main part of the course will be devoted to the enzyme-based biofuel cells and their biomedical applications, particularly as a potential power source for implantable biomedical devices (e.g., pacemakers). The scientific advances and technical problems will be discussed. The course is addressed to graduate students with different backgrounds, including students from chemistry and biomolecular science, biology, chemical engineering and electrical engineering. Since the attending students can have very

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

**Science - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 569(3) Course ID:013122

2022-02-02

**Implantable and Wearable Bioelectronics**

Chemistry CM469/569 is a lecture course designed to provide graduate students and advanced undergraduates with a working knowledge in the multidisciplinary research area of bioelectronics, giving particular information about implantable and wearable bioelectronics. The course will concentrate on concepts, experimental realizations and practical applications. This course covers novel areas in science and technology that have high importance for fundamental science and practical applications. Major science areas covered by the course will be in chemistry, particularly biochemistry and electrochemistry. Minor sub-areas studied in the course will be related to biomedical applications and electrical/electronic engineering. All studies in the course will not require any background knowledge except general chemistry and basics of biochemistry. The major topics covered by the class will be related, but not limited, to biosensors, biofuel cells, bioelectronic devices concentrating on the concepts rather than technical details. The course work for

**Components:** Lecture

**Course Equivalents:** CM 469

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry****CM 570(3)** Course ID:007752 2015-01-20**Biochemistry & Biotechnology Laboratory**

This course is a one semester course in the fundamental laboratory approaches for biochemistry and biotechnology. While largely a hands-on course, laboratory experiments will be supplemented with lectures that integrate the theoretical and practical principals covered in the exercises. Topics include protein purification, characterization and analysis, enzyme kinetics and molecular modeling.

Prerequisites: BY312 or CY450 or CM460 or consent of the instructor.

**Components:** Laboratory

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

**CM 572(3)** Course ID:007753 2022-02-02**Chemistry at Surfaces: Structure and Catalysis**

This senior undergraduate and graduate course will survey the field of surface chemistry, with specific attention dedicated to the structure of solid surfaces and chemical processes at solid interfaces. This course will cover the basics of the structure of periodic solids, relate that understanding to solid interfaces, and finally address how surface structure and reduced dimensionality impact chemical reactions (i.e. heterogeneous catalysis). Analytical techniques common to this discipline will also be discussed. Graduate students will be assessed differently than undergraduates in this course. Graduate students will have the additional responsibility of delivering a presentation discussing one of several primary research articles germane to the field that were selected by the instructor, while undergraduate students will submit a paper describing one of these articles in detail.

**Components:** Lecture

**Course Equivalents:** CM 472

**Attributes:** Given When Needed

**Req. Designation:** Technology

**CM 575(3)** Course ID:007756 2015-10-19**Sustainable Nanotechnology**

[Cross-listed with MSE 575, and ES 575] This course covers the same topics as CM 475 and includes additional coursework on the graduate level.

**Components:** Lecture

**Course Equivalents:** CM 475, MSE 575, ES 575

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

**School of Arts and Sciences - Chemical & Biomolecular Eng - Subject: Chemistry**

CM 576(3)

Course ID:007757

2021-11-09

**Atmospheric Chemistry**

[Cross-listed with CE 577, CH 576] The course will cover the evolution of the atmosphere from its initial formation to its natural background condition to its current state perturbed by human activities; detailed descriptions of the chemistry of the carbon, nitrogen and sulfur cycles; characterization of the atmospheric aerosol and its role in heterogeneous reactions and materials transport; stratospheric ozone and problems with its depletion; airborne radioactivity and its role in atmospheric ion chemistry. This course covers the same topics as CE 477 and includes additional material on the graduate level.

Prerequisite: CM370 or CM371 or ES340.

**Components:** Lecture**Course Equivalents:** CE 477, CE 577, CH 576, CM 476**Attributes:** Offered Odd Springs**Req. Designation:** Technology

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**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 581(3) Course ID:013038 2020-04-03

**Computational Chemistry**

[Cross Listed with CM481] Computational Chemistry is senior undergraduate and graduate course which will discuss theoretical and computational methods in chemistry and their applications. This course will include both lectures and computer lab. The lectures will introduce the fundamental theories and methods in chemistry and their applications in the cutting-edge research. The computer lab will be hands on tutorials on calculating the structures and properties of chemicals, exploring the reaction mechanisms, reactivities, and selectivities. The objectives of this course are: (1) to provide students with the basic background of computational methodologies and their applications. (2) to enhance their experiences with common computational methods by class project. (3) to encourage their creativity, critical thinking and problem-solving ability. Graduate students will have additional course work.

**Components:** Lecture**Course Equivalents:** CM 481**Attributes:** Offered Even Falls**Req. Designation:** Technology

CM 582(3) Course ID:012950 2019-09-05

**Information Processing by Chemistry**

The course is composed of lectures and student presentations on signal-switchable chemical and electrochemical systems. These systems perform Boolean logic operations, memory function and control of bioelectronic devices, e.g., biofuel cells.

Students will gain knowledge on chemical/biochemical systems of various complexity logically processing different input signals. Preparation of sensing switchable interfaces will be explained. Finally, bioelectronic systems processing information and operating as signal-switchable devices will be discussed.

**Components:** Lecture**Course Equivalents:** CM 482**Attributes:** Given When Needed**Req. Designation:** Technology

CM 583(3) Course ID:010315 2022-02-02

**Introduction to Polymer Science**

[Cross-listed with PH 583] This course is about fundamental aspects of polymer science. It introduces the world of chain molecules from synthesis and properties to applications. Basic knowledge from polymer chemistry and physics are combined in the one course in a form appropriate for undergraduates and graduates in chemistry, physics and engineering to develop the understanding of polymeric behavior in synthetic materials and natures.

**Components:** Lecture**Course Equivalents:** CM 483**Attributes:** Given When Needed**Req. Designation:** Technology

CM 585(3) Course ID:011127 2022-02-02

**Nanostructured Materials**

[Cross-listed with PH 585] This course reviews the methods to make nanoscale building blocks and approaches to arrange the building blocks into functional architectures for advanced materials. The list of topics includes: chemical patterning and lithography, layer-by-layer self assembly, synthesis and self assembly of nanoparticles, nanotubes and nanowires, properties of nanoclusters and self assembled structures (photonic crystals, plasmonic effects, quantum dots, porous materials, biomimetics).

**Components:** Lecture**Course Equivalents:** CM 485**Attributes:** Given When Needed**Req. Designation:** Technology

CM 586(1) Course ID:012838 2022-02-02

**Industrial Chemistry**

[Cross-Listed with CM486/CH486/586] This course will benefit junior and senior undergrads plus grads in chemistry and chemical engineering, and allow them to learn of real ways such talents are used in the professional world. It will involve different industrial chemists and chemical engineers to come to Clarkson University for each of 12 of the 14 weeks of a semester and give two lectures of about 1 hour 15 min each - one on an afternoon and the other following morning. The first lecture will relate the areas of chemistry their company was known for; the second lecture an in-depth discussion on how one project was carried out at the bench and the pitfalls that had to be resolved along the way to achieve success. The intent is to select lecturers from Clarkson Chemistry and Chemical Engineering major alumni at various lengths of time they have been professionals.

**Components:** Lecture**Course Equivalents:** CM 486**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 587(3) Course ID:012909 2022-02-02

**Applications of Synchrotron and Electron Based Techniques**

The purpose of the course is to familiarize all students with the x-ray and electron based experimental techniques available at Brookhaven National Lab and other similar facilities. Students will be cognizant of the applications of these cutting edge facilities, and well positioned to use them in their own research. This course is suitable for graduate students, postdocs, and advanced undergrads in physical sciences and engineering, as well as students in biological, environmental, and chemical sciences who may have the interest to learn more about the techniques they may use for their research.

Components: Lecture

Course Equivalents: PH 587, CM 487, PH 487, MSE 587, ES 587

Attributes: Given When Needed

Req. Designation: Technology

CM 735(1 - 3) Course ID:007769 2015-02-03

**Special Topics in Colloid and Surface Chemistry**

Topics in colloid and surface chemistry and related areas selected to meet the needs of the class.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

CM 755(1 - 3) Course ID:007779 2015-02-03

**Special Topics in Polymer Chemistry**

Topics in polymer chemistry and related areas selected to meet the needs of the class.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

CM 765(1 - 3) Course ID:007784 2015-02-03

**Special Topics in Biochemistry**

Topics in biochemistry and related areas selected to meet the needs of the class.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

CM 775(1 - 3) Course ID:007789 2015-02-03

**Special Topics in Physical Chemistry**

Topics in physical chemistry and related areas selected to meet the needs of the class.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

CM 890(1 - 3) Course ID:007800 2015-02-03

**Directed Study**

The study, on the graduate level, of a subject not otherwise available in formal courses may be undertaken under the supervision of a faculty member.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

CM 900(1 - 2) Course ID:007810 2015-02-03

**Seminar**

Reports are made by students on topics from the current literature, or by students, faculty members or outside speakers on their own research.

Components: Seminar

Attributes: Offered Each Term

Req. Designation: Technology

CM 990(1 - 15) Course ID:007811 2015-02-03

**Thesis, Dissertation or Special Project**

Each student does independent, original work on a project under the guidance and supervision of an instructor. A grade on all of the credits for this work presented in satisfaction of the requirements for a degree is given when those requirements are completed.

Components: Thesis Research

Attributes: Offered Each Term

Req. Designation: Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Chemistry**

CM 999(1 - 10) Course ID:011096

2015-02-16

**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Transfer Credit Only**Req. Designation:** Technology

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**School of Arts and Sciences - Communication, Media & Design - Subject: Communication**

**COMM 1(2 - 4)** Course ID:009604 2015-01-13

**Communication Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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**COMM 2(2 - 4)** Course ID:009605 2015-01-13

**Communication Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

This course may be used to satisfy a Foundation Curriculum Humanities Requirement.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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**COMM 100(3)** Course ID:009621 2021-11-03

**Introduction to Digital Art: Time & Image**

[Cross-listed with DA 100] [Formerly COMM 221] This introductory studio course explores many of the key principles, techniques and dialogues governing the creative potential of digital technologies within art and design. Topics of study include bitmap and vector-based digital imaging together with digital approaches to time-based media. The goal of the course is to empower students with an artistic and technological understanding of the subject, while encouraging an experimental approach to digital media.

Components: Lecture

Course Equivalents: DA 100

Attributes: One communication unit, Imaginative Arts, Offered Each Term

Req. Designation: Technology

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**COMM 101(3)** Course ID:011091 2015-01-13

**Introductory Writing**

Credit for this course is awarded only on the basis of an incoming student having taken a college-level introductory writing course at another college or university. The focus of this type of course is the teaching of writing itself, and typical titles include 'Freshman Composition,' 'Composition 1,' 'Expository Writing,' 'Freshman English,' and 'Writing and Critical Thinking,' among others. The two communication points associated with COMM101 can be counted toward the Clarkson Common Experience's communication requirement.

Components: Lecture

Attributes: Two communication units, Transfer Credit Only

Req. Designation: Technology

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**COMM 120(1)** Course ID:013135 2021-10-13

**Making and Communicating Innovation**

This course will provide a high level overview of prototyping digital and physical innovations and will provide instruction on communicating innovations. Making topics covered include but are not limited to 3D modeling/printing, audio and video principles/recording/editing, basic video shooting/editing. Communication topics include but are not limited to context, audience, and purpose analysis, genres in business and technical communication, pitching, writing style, and writing and revision processes. This is a hybrid course that will include in person and virtual sessions.

Components: Lecture

Course Equivalents: IGN 120

Attributes: Given When Needed

Req. Designation: Technology

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**COMM 175(3)** Course ID:013161 2022-03-18

**Introduction to Design**

This course introduces students to key design movements, practices, and innovators in fields such as graphic design, typography, and design thinking.

Components: Lecture

Attributes: One communication unit, Imaginative Arts

Req. Designation: Technology

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**School of Arts and Sciences - Communication, Media & Design - Subject: Communication**

**COMM 190(0)**                   **Course ID:011191**                   **2015-02-26**                   **Department Consent Required**

**Writing Center Tutor**

Students will be introduced to Writing Center theory which includes collaborative learning, the writing process, rhetorical concepts, disciplinary genres, and interpersonal communication skills. Students will also apply these concepts by conducting writing conferences with members of the Clarkson community. In the process, students will deepen their understanding of the dynamics of interpersonal communication, develop their writing skills and their knowledge of writing in the disciplines.

Prerequisite: Admission by invitation from the Director of the Writing Center. Students may enroll in COMM190 only twice.

**Components:**                 Independent Study

**Attributes:**                  One communication unit, Offered Each Term

**Req. Designation:**           Technology

**COMM 210(3)**                   **Course ID:009609**                   **2016-08-29**

**Theory of Rhetoric for Business, Science, and Engineering**

[Formerly TC 210] This course introduces students to a rhetorical perspective of communication. Students will develop their abilities to: identify and analyze communication problems and issues in a given context; develop effective arguments; and communicate with others using various communication media (written, electronic, oral, visual). The course contains a substantial reading component, as well as instruction, practice, and feedback in writing and speaking.

**Components:**                 Lecture

**Attributes:**                  Two communication units, Offered Fall Term

**Req. Designation:**           Technology

**COMM 216(3)**                   **Course ID:013145**                   **2021-11-10**

**Intro to Sports Broadcasting**

Intro to Sports Broadcasting will focus on all aspects of the industry, providing a broad understanding and appreciation of the art of sports broadcasting. Students within the course will discuss sports broadcasting history and origins and debate historical approaches. This course focuses on students' knowledge and intellectual grasp of the industry and culminates with the students beginning to develop their own on-air sports broadcasting talent.

Students will be introduced to a diverse array of techniques and philosophies for sports broadcasting from fundamentals and essentials to advanced learning methods, utilizing a hands-on approach. The course will consist of discussions, critiques, learning exercises, take home assignments and hands-on practice and participation.

**Components:**                 Lecture

**Attributes:**                  Given When Needed

**Req. Designation:**           Technology

**COMM 217(3)**                   **Course ID:009611**                   **2015-02-03**

**Introduction to Public Speaking**

This lecture and laboratory course is designed to enhance the individual's effective public communication by giving him or her a variety of speaking roles in different situations. The objective of the course is to develop an awareness of the speaking potential of each student with emphasis on listening ability, nonverbal behavior, idea organization and effective use of language and visual aids.

**Components:**                 Lecture

**Attributes:**                  Two communication units, Offered Each Term

**Req. Designation:**           Technology

**COMM 219(3)**                   **Course ID:012856**                   **2018-01-16**

**Introduction to Social Media**

This course is geared toward understanding and utilizing the various social media channels for personal, professional and community benefit. In this course we will: Assess a variety of social media channels, examine successful users of new media, construct/refine our social media presence, relate social media attributes to our future paths, understand the social media climate through current articles, case studies, readings, and reports, Skype with industry professionals to gain varied insight, create a social media campaign to help spread awareness on some component of Clarkson University, understand how some component of social media campaigns could impact your future aspirations.

**Components:**                 Lecture

**Attributes:**                  Two communication units, Individual and Group Behavior, Offered Fall Term

**Req. Designation:**           Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Communication**

COMM 226(3) Course ID:012000 2015-03-05

**Short Film Screenwriting**

[Cross-listed with FILM 226] In this course, you will learn the process of writing short screenplays for narrative fiction films of any genre. Short films can be anywhere from 30 seconds to 40 minutes long, though the majority of them fall between seven and fifteen minutes. Each student will complete two short scripts and then revise one of these from the ground up. Since this is a workshop, you are expected to comment thoughtfully on your classmates' work, as they will comment thoughtfully on yours. Though there is some reading in this course, your primary concern should be writing, writing, writing!

**Components:** Lecture**Course Equivalents:** FILM 226**Attributes:** Two communication units, Imaginative Arts, Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Communication, Media & Design - Subject: Communication**

COMM 229(3) Course ID:012826 2017-08-15

**Principles of User-Experience Design**

This course introduces the processes and practices of user experience design (UXD) as it applies to websites, applications, and product development, and includes grounding in theories and techniques for developing websites, user-interfaces, media artifacts, and products. Students think critically about and practice design thinking and iteration, analyze and theorize design choices, communicate ideas in multimedia, collaborate with others, perform research, hypothesize, conduct tests, and report data. By the end of the course, students will have a solid understanding of major user-experience design methodologies.

**Components:** Lecture**Attributes:** Two communication units, Imaginative Arts, Offered Spring Term**Req. Designation:** Technology

COMM 245(3) Course ID:012970 2021-03-25

**Writing for Media**

Writing for Media helps students learn to write for a people in diverse types of media and genres, ranging from traditional areas such as journalism through social media. Students will develop skills at analyzing communication needs in diverse contexts; writing communications that work effectively for readers, viewers, listeners, and users in those contexts. Students will also learn how to adapt their own skills to emerging media in the future.

**Components:** Lecture**Attributes:** Imaginative Arts, Given When Needed**Req. Designation:** Technology

COMM 310(3) Course ID:009612 2022-03-08

**Mass Media and Society**

This course consists of readings in and analysis of modern media communication and its influence. It includes the history of the media, media control, and various media effects on special audiences and on the development of other media. The course centers on an analysis of how society controls the media and how the media controls society. The course is based on discussion of opinion pieces and other readings.

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Science, Technology and Society, University Course, Offered Fall Term**Req. Designation:** Technology

COMM 312(3) Course ID:011664 2015-01-23

**Public Relations**

This course will introduce students to the history, nature, theory and practice of public relations in the United States by examining the activities of public relations professionals and firms. Attention will be given to the communication process and how persuasion is employed to influence various publics via traditional PR strategies and approaches, as well as how emerging media are changing current practice in various fields (e.g., health care, entertainment, government, and non-profits). Frequent practical exercises, communication tasks, and activities could include developing written and/or video press releases, maintaining a blog, running a press conference, planning events for a PR campaign in coordination with a client's goals, creating 'press kits,' developing strategies for building relationships with the media, developing a crisis communication plan for an organization, and associated oral presentations.

**Components:** Lecture**Attributes:** Two communication units, Given When Needed**Req. Designation:** Technology

COMM 313(3) Course ID:009615 2022-03-08

**Professional Communication**

[Cross-listed with EM313] This course presents students opportunities to learn how to design and present effective professional documents. The course emphasizes a rhetorical approach to analyzing the issues and details important to the communication to be produced (e.g., audience, style, format, purpose). Students will practice writing both individually and collaboratively and will be expected to present their work orally on occasion. Students will encounter topics such as, but not limited to, abstracts, email, instructions, letters, memoranda, proposals, and various types of reports. Students of any major may take this course.

**Components:** Lecture**Course Equivalents:** EM 313**Attributes:** Two communication units, Offered Each Term**Req. Designation:** Technology

**School of Arts and Sciences - Communication, Media & Design - Subject: Communication**

COMM 314(3) Course ID:012925

2019-02-07

**Placemaking, Marketing and Promotion**

This course includes a foundational understanding of the construct of Placemaking or the ways in which people in places at various geographic scopes (neighborhood, community, town, or region) explore collaboratively their needs and develop planning and entrepreneurial strategies for more livable, sustainable and productive communities. This exploration interrogates multiple disciplines and fields including physical geography, architecture, community planning, sustainability certification programs (e.g., LEED), civic engagement, entrepreneurship, regulatory frameworks, as well as current trends in the literature and practice. A focus will also be on Creative Placemaking initiatives that put artists and The Arts at the forefront of community development. The course also builds on this foundation to examine the various ways in which communities utilize Placebranding as well as Marketing and Promotional Strategies to reach their goals including tourism, residential growth and sustainable, economic development.

**Components:** Lecture**Attributes:** One communication unit, Economics and Organizations, Imaginative Arts, University Course, Given When Needed**Req. Designation:** Technology

COMM 315(3) Course ID:013059

2020-10-13

**STEAM Journalism**

Writing is one of the most varied fields in the modern workforce. From full-time and freelance journalists covering breaking news – to media writers and PR professionals working in-house to tell organizational stories across multi-media and even technical genres, the role of “writer” is complex and diverse. What has become more evident with advances in technology is that writers in these wide-ranging capacities, whose task is to illuminate stories about science, technology, engineering and math (STEM), have something in common: integration of the “Arts” (the addition of “A”) to deepen and contextualize stories embedded in technical information and data. These approaches take the form of creative practices, elements, design principles, and standards, to foster inquiry, collaboration, and emphasis on process-based writing. This course introduces students to journalism, field and practice, and the ways in which journalism is evidenced in writing roles and functions in organizations and media production. Students will focus experientially on developing and

**Components:** Lecture**Req. Designation:** Technology

COMM 316(3) Course ID:013095

2022-11-09

**Health Communication**

This course explores topics at the intersection of health communication and health promotion. We will explore research, theory, and practice across levels of communication (i.e., interpersonal, organizational, intercultural, mass) and evidence for their influence on health behaviors and outcomes. Relevant topics include health information seeking, patient-provider interactions, social support (i.e., patient-patient & patient-caregiver dyads), and communication within healthcare organizations conducted in-person or through mediated environments (e.g., telehealth, social media, virtual reality). Strong attention will be paid to the role of communication in health disparities relevant to culture, rurality, and literacy.

**Components:** Lecture**Attributes:** One communication unit, Given When Needed**Req. Designation:** Technology

COMM 317(3) Course ID:013150

2022-03-08

**Public Discourse and Dialogue Across Difference**

This course is centered in critical approaches to intersectional human differences across the spectrum of identity. The content, classroom conversations, and texts you produce will focus on issues of race, gender, class, sexuality, and ability differences across multiple discursive contexts. We will consider how we define and constitute identities (both others' and our own) and how our identity is constituted for us. We will consider the ways we write, talk, think, and feel about identity and broader social inequities -- with the intent of getting to a level of comfort where we can readily engage in meaningful conversations on these subjects both in and outside the classroom without resorting to hostility and further division.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Requisites: Must be Sophomore level or higher.**Req. Designation:** Technology

**Science - Communication, Media & Design - Subject: Communication**

COMM 322(3)

Course ID:011374

2022-04-08

**Typography and Design**

This course introduces students to typography as a design discipline. We will discuss the history and current state of typography, analyze the ways that type and design contribute to different meanings, and produce specific designs using type and other graphic elements in print and online forms.

**Components:** Lecture**Attributes:** Two communication units, Imaginative Arts, Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Communication, Media & Design - Subject: Communication**

COMM 326(3) Course ID:011955 2015-03-05

**Feature Film Screenwriting**

In this course, you will learn the process of writing a feature-length screenplay. You will devise an original story idea, craft intermediate documents (i.e. logline, treatment, and beat sheet), and then write a first draft. Our goal is not to complete a polished draft (most screenplays go through at least a dozen revisions), but rather to execute a full draft in proper screenplay format that hits all the dramatic turning points, fleshes out characters and dialog, and leaves you with a document ready for substantive revision - now that you know what you're writing. Since this is a workshop, you are expected to comment thoughtfully on your classmates' work, as they will comment thoughtfully on yours. Along the way, you will read several professional scripts and complete a brief critique of each. We will also learn about the profession of screenwriting, including what to do with finished scripts, how to seek representation, and what the Writers Guild of America is. Though there is a good amount of reading in this course, your primary concern should be

**Components:** Lecture**Same As Offering:** FILM 326**Attributes:** Two communication units, Imaginative Arts, Given When Needed**Req. Designation:** Technology

COMM 327(3) Course ID:009623 2021-03-03

**Digital Video Production I**

This course presents students with a hands-on opportunity to gain knowledge and experience in digital video production. The focus of this course will be on mastering the technical fundamentals of video production: recording high quality video and audio, lighting, editing, and color grading. Students will work alone and in small teams to produce video projects throughout the semester and will have the opportunity to gain experience in the entire video production process from conceptual development through video delivery. Emphasis will be on practical exercises with material presented via lectures, discussions, and hands-on practice.

**Components:** Lecture**Attributes:** One communication unit, Imaginative Arts, Offered Fall Term**Req. Designation:** Technology

COMM 328(3) Course ID:013124 2022-03-18

**Video Production with Impact**

Video production with impact is a hands-on video production course where students learn how to produce high quality scripted and unscripted videos for different professional and creative applications. The class will focus on the creative skills related to communicating ideas clearly and effectively through video. Students will leave the class with a demonstrated ability to write, film, and edit compelling and impactful video content. The class will teach basic technical skills, but the emphasis will be on professional communication and creative problem solving.

**Components:** Lecture**Attributes:** Imaginative Arts, Offered Spring Term**Req. Designation:** Technology

COMM 329(3) Course ID:012862 2021-04-13

**Front-End Development for the Web**

This course focuses on the technical, rhetorical, and critical knowledge necessary to produce web and mobile applications, focusing especially on developing proficiency with the core technologies: HTML5, CSS3, and JavaScript (including frameworks, pre-processors, and script libraries). Students will invent, critique, and develop standards-compliant websites and applications, write and debug code, produce visual and informational designs, collaborate with others, and articulate principles of workflow, user-experience, and design. (COMM 229 recommended but not required.)

**Components:** Lecture**Attributes:** One communication unit, Offered Fall Term**Req. Designation:** Technology

**Liberal Arts - Communication, Media & Design - Subject: Communication**

COMM 330(3)

Course ID:010594

2022-03-08

**Science Journalism**

Popular media has a tremendous influence on the production and reception of modern science. News and magazine articles, television shows, and movie documentaries influence public policy on science, research funding, the general public's interest in and understanding of scientific research, and even young people's willingness to choose a career in science. Drawing on student research experience in undergraduate science, students will learn about reporting science using a range of approaches and media. The class will investigate the influence popular accounts of science have on multiple audiences including specialist and non-specialist groups. Assignments will challenge students to understand the societal implications of scientific research and to identify and address different constituent positions and interests.

**Components:** Lecture**Attributes:** Two communication units, Science, Technology and Society, Given When Needed**Requirement Group:** Prerequisites: COMM210 and six (6) hours of a science, or permission of the Comm & Media department**Req. Designation:** Technology

**School of Arts and Sciences - Communication, Media & Design - Subject: Communication**

**COMM 345(3)** Course ID:009625 2022-03-08

**Information Design**

Information Design explores ways to structure complex data into usable information in genres including websites, computer interfaces, information visualizations, charts, interactive media, and more. Drawing on theories and practices from disciplines including communication theory, cognitive psychology, visual theory, and new media, students will learn to understand users and their contexts, select appropriate media and genres, and design effective and efficient informational texts.

**Components:** Lecture

**Attributes:** Two communication units, Imaginative Arts, Given When Needed

**Req. Designation:** Technology

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**COMM 347(3)** Course ID:013062 2022-03-08

**Design Thinking**

In this practice-based course, students will learn how to apply Design Thinking frameworks, methods, and tools to problems within their discipline(s). They will also learn about Design Thinking's strengths and weaknesses, and how it varies across different industries and cultures.

**Components:** Lecture

**Attributes:** Two communication units, Imaginative Arts, Given When Needed

**Req. Designation:** Technology

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**COMM 360(3)** Course ID:011586 2021-06-23

**Sound Design**

This course covers basic audio production including topics such as acoustics, microphones, speakers, amplification, effects, recording, and editing. Students will learn methods for recording, editing, and mixing music and spoken word as well as basic sound design for movies and video games. The course will include reading about concepts and practices as well as extensive hands-on work in the studio.

**Components:** Lecture

**Attributes:** Two communication units, Imaginative Arts

**Req. Designation:** Technology

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**COMM 375(3)** Course ID:013032 2022-03-08

**Product Design**

Provides students with a framework for developing consumer products ranging from interfaces to physical products. The course covers fundamentals of product design, user needs analysis, competition assessment, ideation, critique, and virtual and physical prototyping.

**Components:** Lecture

**Attributes:** Two communication units, Imaginative Arts, Science, Technology and Society, University Course, Given When Needed

**Req. Designation:** Technology

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**COMM 391(3)** Course ID:010692 2015-01-23 **Instructor Consent Required**

**Special Topics Course**

These courses reflect ongoing developments in communication practice and theory, often related to the particular faculty member's research interests.

Prerequisites: one course in communication or consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**COMM 392(3)** Course ID:010693 2018-08-23

**Special Topics Course**

These courses reflect ongoing developments in communication practice and theory, often related to the particular faculty member's research interests.

Prerequisites: one course in communication or consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**COMM 393(3)** Course ID:010694 2014-10-08

**Special Topics Course**

These courses reflect ongoing developments in communication practice and theory, often related to the particular faculty member's research interests.

**Components:** Lecture

**Req. Designation:** Technology

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**School of Arts and Sciences - Communication, Media & Design - Subject: Communication**

**COMM 394(3)** Course ID:009630 2022-03-08

**Special Topics**

These courses reflect ongoing developments in communication practice and theory, often related to the particular faculty member's research interests.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**COMM 395(3)** Course ID:010695 2015-01-23

**Special Topics**

These courses reflect ongoing developments in communication practice and theory, often related to the particular faculty member's research interests.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**COMM 410(3)** Course ID:009633 2022-03-08

**Theories and Philosophies of Communication**

This course explores a range of approaches to understanding human communication, including work from communication, philosophy, cognitive science, social science, and more. Through extensive reading, discussion, and writing, students investigate how people communicate—and miscommunicate—with each other as individuals and communities.

**Components:** Lecture

**Attributes:** One communication unit, Individual and Group Behavior, Given When Needed

**Req. Designation:** Technology

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**COMM 412(3)** Course ID:009635 2015-01-23

**Organizational Communications and Public Relations Theory**

This course examines the nature of the organization and the strategic communication processes that build relationships between organizations and their publics. Through assigned readings, lectures, and class discussion and analysis, students are exposed to communication theory and trends relevant to the workplace. Students will examine the communicative implications of such topics as organizational structure and goals; corporate culture; managerial schools of thought; leadership styles; superior-subordinate relationships; and communication consulting. In addition, students will address communicative implications in a changing economy; employee loyalty and dissent; gender and the workplace; and corporate image in crisis situations. This course seeks to provide students with insight into the organizational context, not only to make them more effective communicators but also to help them make informed choices in their careers.

**Components:** Lecture

**Attributes:** One communication unit, Individual and Group Behavior, Given When Needed

**Req. Designation:** Technology

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**COMM 415(3)** Course ID:013060 2020-10-13

**STEAM Journalism**

Writing is one of the most varied fields in the modern workforce. From full-time and freelance journalists covering breaking news – to media writers and PR professionals working in-house to tell organizational stories across multi-media and even technical genres, the role of "writer" is complex and diverse. What has become more evident with advances in technology is that writers in these wide-ranging capacities, whose task is to illuminate stories about science, technology, engineering and math (STEM), have something in common: integration of the "Arts" (the addition of "A") to deepen and contextualize stories embedded in technical information and data. These approaches take the form of creative practices, elements, design principles, and standards, to foster inquiry, collaboration, and emphasis on process-based writing. This course introduces students to journalism, field and practice, and the ways in which journalism is evidenced in writing roles and functions in organizations and media production. Students will focus experientially on developing and

**Components:** Lecture

**Req. Designation:** Technology

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**COMM 420(1 - 9)** Course ID:009639 2014-09-23 **Department Consent Required**

**Communication: Independent Study**

Designed primarily for a student who wishes to pursue special interests in communication for one or more semesters, this series of courses allows individual students to define independent study projects.

Prerequisites: one course in communication, consent of the instructor.

**Components:** Independent Study

**Req. Designation:** Technology

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**School of Arts and Sciences - Communication, Media & Design - Subject: Communication**


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COMM 421(1 - 9) Course ID:009640 2015-03-03 Department Consent Required

**Communication: Independent Study**

Designed primarily for a student who wishes to pursue special interests in communication for one or more semesters, this series of courses allows individual students to define independent study projects.

Prerequisites: one course in communication, consent of the instructor.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

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COMM 422(1 - 9) Course ID:009641 2014-09-23 Department Consent Required

**Communication: Independent Study**

Designed primarily for a student who wishes to pursue special interests in communication for one or more semesters, this series of courses allows individual students to define independent study projects.

Prerequisites: one course in communication, consent of the instructor.

Components: Independent Study

Req. Designation: Technology

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COMM 423(1 - 9) Course ID:009642 2015-02-03 Department Consent Required

**Communication: Independent Study**

Designed primarily for a student who wishes to pursue special interests in communication for one or more semesters, this series of courses allows individual students to define independent study projects.

Prerequisites: one course in communication, consent of the instructor.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

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COMM 424(1 - 9) Course ID:009643 2010-06-17 Department Consent Required

**Communication: Independent Study**

Designed primarily for a student who wishes to pursue special interests in communication for one or more semesters, this series of courses allows individual students to define independent study projects.

Prerequisites: one course in communication, consent of the instructor.

Components: Independent Study

Req. Designation: Technology

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COMM 425(1 - 9) Course ID:009644 2022-03-08 Department Consent Required

**Communication: Independent Study**

Designed primarily for a student who wishes to pursue special interests in communication for one or more semesters, this series of courses allows individual students to define independent study projects.

Prerequisites: one course in communication, consent of the instructor.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

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COMM 427(3) Course ID:009646 2022-03-08

**Digital Video Production II**

COMM 427 builds on the concepts and skills learned by students in COMM 327 (Digital Video Production I). This is a hands-on course that will include: conceptual, aesthetic and technical production of the film-style, single-camera, 30-second spot; instructional and training program development; and live multi-camera studio production for interactive video teleconferencing and streaming media on the WWW. Although a text will be used, emphasis will be on practical exercises, with students frequently working in small teams.

Components: Lecture

Attributes: Two communication units, Offered Odd Springs

Requirement Group: Prerequisites: COMM327, or permission of the Comm & Media department

Req. Designation: Technology

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**School of Arts and Sciences - Communication, Media & Design - Subject: Communication**

**COMM 428(3)** Course ID:009647 2022-03-08

**Environmental Communication**

This course focuses on the intersection of theory, environmental challenges and communication; specifically, the ways in which varied people and stakeholders identify, label, frame, shape, and convey these challenges, as well as the ways in which they make decisions and policies in the public sphere at varied scopes and levels of governance, and in the face of risk and uncertainty. Exploration includes historic and contemporary environmental movements, key leaders and figures, environmental law and seminal policy frameworks, including agencies and institutions, and the ways in which we are grappling with current challenges through communication mediums and changing media. Students will engage in critical reading, case studies, discussion, and research, as well as guest speaker presentations and field trips when possible.

**Components:** Lecture

**Attributes:** Contemporary and Global Issues, Science, Technology and Society, University Course, Given When Needed

**Req. Designation:** Technology

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**COMM 429(3)** Course ID:012974 2019-10-21

**Full-stack Development**

This course focuses on systematically developing and deploying web technologies in contexts ranging from the personal to the professional. Students will develop with major back-end technologies and learn the related disciplines of server administration, content management, information architecture, and scalable application development. By the end of the course, students will be able to build and deploy applications, write and debug server-side code, design, implement, and administer content management systems, and plan and manage large-scale development projects. The primary languages students will develop facility with include PHP, SQL, Javascript, and Ruby (as well as HTML5 and CSS3).

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisite: COMM329

**Req. Designation:** Technology

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**COMM 447(3)** Course ID:012992 2021-04-13

**Advanced Design Thinking**

This course focuses on design frameworks, processes, and tools for invention, innovation, and change. With their emphasis on out-of-the-box thinking, creativity, and originality, these frameworks both build on and go beyond the Design Thinking methods taught in COMM347. Examples include Double Diamond Design, Frame Innovation, and Far Field Design. During the semester, you will find and solve several challenges within your chosen area(s) of interest. In keeping with a design orientation, classes will follow a studio format, where studio entails creatively making to learn in hands-on ways.

**Components:** Lecture

**Attributes:** Two communication units, Individual and Group Behavior, Offered Fall Term

**Req. Designation:** Technology

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**COMM 448(3)** Course ID:012991 2022-03-08

**Portraying Innovation**

This practice-based course focuses on how to effectively communicate innovation and invention across disciplines and sectors (e.g., engineering, sciences, the arts, business, creative industries, public sector). Photography, videography, narrative methods, and portrait theory will be used throughout.

**Components:** Lecture

**Attributes:** Two communication units, Offered Spring Term

**Req. Designation:** Technology

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**COMM 449(3)** Course ID:012993 2022-03-08

**Narrating Innovation**

This course focuses on innovation from a design-led perspective. During the semester, you will find and solve several innovation challenges within your chosen area(s) of interest. Relative to "design" we will use a number of design lenses, ranging from easy to difficult, and from incremental to frame-changing. In keeping with a design orientation, classes will follow a studio format, where studio entails "creatively making to learn in hands-on ways." Hands-on means that you will work on challenges using both 2D and 3D methods (e.g., modeling, prototyping, enacting). "Innovation" can be defined in many ways; here we will broadly think of it as both inventive (coming up with original, creative solutions) and potentially generative (creates some kind of good-societal, commercial, or otherwise).

**Components:** Lecture

**Attributes:** Two communication units, Offered Spring Term

**Req. Designation:** Technology

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School of Arts and Sciences - Communication, Media & Design - Subject: Communication

COMM 450(3) Course ID:012924

2022-03-08

**Leading Innovation**

Today's emphasis on 'innovation everywhere' has created a big need for people who can lead others around innovation. The questions around this are many--for example, how to lead innovation efforts within teams, R&D settings, new ventures, organizations of all kinds, and how to enact the role of Chief Innovation Officer. This course assumes that effective innovation leadership requires inspiration, creative direction and vision, finding ways to effectively communicate this, and finding ways to get others on board. With this, the course examines how to artfully create innovation vision, fashion innovation narratives and styles, communicate these through multiple means and media, and effectively design innovation systems. The course uses a studio-based, live-case format where you will take a challenge that an actual innovation leader is facing, creatively work on it using arts-based methods within a studio format, present your solutions to the relevant stakeholders, and get feedback on your ideas. We will work on innovation leadership cases from a

**Components:** Lecture**Attributes:** Two communication units, Imaginative Arts, Individual and Group Behavior, University Course, Offered Fall Term**Req. Designation:** Technology

COMM 470(3) Course ID:011507

2022-03-08

**Department Consent Required****Communication Internship**

These internships are designed to provide practical work experience for the communication major or concentration student. Students work with a professional on communication projects areas such as public relations, publication design, advertising, editing, or digital media design. Students can earn credit for only one course for each internship experience.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology

COMM 480(1 - 3) Course ID:011093

2012-01-06

**Instructor Consent Required****Undergraduate Teaching Assistantship in Communication & Media**

Students assist a faculty member in teaching a Communication & Media course. Students engage insubstantial pedagogical work beyond mastery of the target course material. Such activities might include mentoring students in course work, leading class discussions or demonstrations, designing or assessing course modules.

**Prerequisites:** the student will have already taken the course in a previous semester or receive consent from the instructor.

**Components:** Independent Study**Req. Designation:** Technology

COMM 490(3) Course ID:009652

2021-06-23

**Department Consent Required****Advanced Communication Internship**

These internships are designed to provide practical work experience for the junior or senior communication major or concentration student. Generally, students work with a professional on communication projects in the fields such as web development, public relations, publication design, advertising, editing, or digital media design and production

**Components:** Independent Study**Attributes:** Offered Each Term**Requirement Group:** Prerequisites: Junior or Senior Standing**Req. Designation:** Technology

COMM 499(3) Course ID:013033

2022-03-08

**Senior Project**

Students will plan and complete a complex, large communication project over the course of a full semester with ongoing feedback from peers and faculty. The course culminates in an exhibition during commencement week.

**Components:** Lecture**Attributes:** Offered Each Term**Requirement Group:** Prerequisites: Senior Standing**Req. Designation:** Technology

COMM 999(1 - 10) Course ID:011097

2015-01-13

**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Transfer Credit Only**Req. Designation:** Technology

**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 1(2 - 4) Course ID:008062 2015-08-15

**Computer Science Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. Check with major department to determine whether credits count toward graduation.

**Components:** Lecture

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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CS 2(2 - 4) Course ID:008063 2015-08-15

**Computer Science Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Programming Foundation Curriculum Requirement.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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CS 141(4) Course ID:007813 2015-08-15

**Introduction to Computer Science I**

This course is an introduction to basic concepts of computer science, with emphasis on programming. Computer programming is to the study of computer science what writing is to the study of literature. It is a primary tool for implementing algorithms in computer science. Fundamental techniques for software design and implementation will be covered and these concepts demonstrated in a programming language like C++. Additional topics include top-down modular design, developing general-purpose software tools, procedural and data abstraction, algorithms, and an introduction to recursion and dynamic data structures. The course consists of three hours of lecture and a one hour computer laboratory session per week.

**Components:** Laboratory, Lecture

**Course Equivalents:** EE 261

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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CS 142(3) Course ID:007814 2015-08-15

**Introduction to Computer Science II**

This course will further develop and expand upon the topics introduced in CS 141. Advanced programming techniques will be covered, with extensive use of recursion and dynamic data structures. Abstract data types, including lists, queues, trees and graphs, will be studied. Specific emphasis will be given to tree traversals and binary search trees. Algorithms for searching and sorting will be explored along with methods of comparative analysis. The topics in this course provide an essential foundation for the further study of computer science.

**Components:** Lecture

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisites: CS 141 or equivalent

**Req. Designation:** Technology

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CS 241(3) Course ID:007815 2015-08-15

**Computer Organization**

An introduction to computer organization and assembly language programming. Topics include the functional organization of computer hardware; data representation, and computer arithmetic; instruction sets, addressing modes and low-level I/O. Introduces machine and assembly language, and systems programming techniques in the programming language C. This course serves as a foundation for courses on operating systems, compilers, networks, and computer architecture.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: CS 142 or equivalent

**Req. Designation:** Technology

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CS 242(3) Course ID:007816 2019-04-03

**Advanced Programming Concepts in Java**

This course builds upon the foundation topics covered in CS 142, and covers concepts and skills required for real-life, modern programming. Topics will include basic object-oriented programming design, graphical user interfaces (GUIs), exception handling, multithreading and synchronization, networking, and client/server applications. The programming language Java with its companion OOP/GUI libraries will be used to illustrate these topics. This course will emphasize team programming on a large-scale project with a realistic deadline.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: CS142, EE262, or EE361

**Req. Designation:** Technology

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**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 341(3) Course ID:007818 2019-04-03

**Programming Languages**

This course examines the major paradigms underlying modern programming languages. The course currently focuses on object-oriented and logic programming. The rationale of the paradigms is discussed along with typical programming idioms used with them. Programming exercises are used to illustrate concepts--the course does not aim to make students proficient programmers in all the languages that will be studied.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: CS142, EE262, or EE361**Req. Designation:** Technology

CS 344(3) Course ID:007819 2018-11-12

**Algorithms and Data Structures**

The primary goal of this course is to build on the programming skills gained in CS 141 and 142 to introduce students to more sophisticated algorithms and data structures and the notion of algorithm design. The course also introduces the basic formalism and concepts used in the analysis of algorithms. The relative efficiency of the algorithms studied is estimated by informal application of these ideas. The algorithms and data structures discussed include those for sorting and searching, pattern matching, set representation, graph problems, dynamic programming and others. Programming exercises based on 'realistic' applications help students to understand the often difficult process of reducing a real-world problem to a standard algorithmic question.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: CS142 or EE262 or EE363, and MA132**Req. Designation:** Technology

CS 345(3) Course ID:007820 2019-04-03

**Automata Theory and Formal Languages**

[Cross-listed with MA 345] This course gives an introduction to formal languages and their relation to automata. Topics include deterministic and non-deterministic finite automata, regular expressions and languages, closure properties and decision procedures for context-free languages, recursive and recursively enumerable sets, Turing machines, and decidability. Some aspects of computational complexity may also be explored.

**Components:** Lecture**Course Equivalents:** CS 541, MA 345**Requirement Group:** Prerequisites: CS 142, EE262, or EE361, and MA211**Req. Designation:** Technology

CS 350(3) Course ID:007831 2021-10-29

**Software Design and Development**

Working in teams, students will learn tools and strategies for designing and implementing medium/large software projects. Suitable project ideas will be solicited from the community in order to match student teams with real users where possible. Students will learn to elicit requirements from users and to work in an effective team. Students will learn and practice techniques for software testing including black-box testing, stress testing, performance testing, code reviews, and code coverage tools. Students will produce documentation that is appropriate at various stages in the software life cycle including for example, requirements documents, project plans and user manuals. The work will include oral presentations and written reports.

**Components:** Lecture**Attributes:** Two communication units, Offered Spring Term**Requirement Group:** Prerequisite: CS242**Req. Designation:** Technology

CS 407(1 - 15) Course ID:007821 2017-01-13 Instructor Consent Required

**Directed Study in Computer Science**

This is a directed study course that will allow the student the opportunity to pursue special interests in Computer Science.

**Components:** Research**Attributes:** Given When Needed**Req. Designation:** Technology

CS 408(1 - 15) Course ID:007822 2017-01-13 Instructor Consent Required

**Directed Study in Computer Science**

This is a directed study course that will allow the student the opportunity to pursue special interests in Computer Science.

**Components:** Research**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Computer Science - Subject: Computer Science**

**CS 411(1 - 15)** Course ID:007823 2015-08-15 **Instructor Consent Required**

**Directed Study in Applied Computer Science**

This is a directed study course that will allow the student the opportunity to pursue special interests in Applied Computer Science.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**CS 412(1 - 15)** Course ID:007824 2020-04-10 **Instructor Consent Required**

**Directed Study in Applied Computer Science**

This is a directed study course that will allow the student the opportunity to pursue special interests in Computer Science.

**Components:** Research

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**CS 442(3)** Course ID:007826 2019-04-24

**Computational Complexity**

The complexity of a computational problem is the amount of computer resources it requires. Computational complexity theory studies the complexity of computational problems as well as relationships between different types of resources. This course will cover both classical and research-related topics in computational complexity, such as: complexity measures and complexity classes for sequential machines and Boolean circuits, reductions and completeness, hierarchy theorems, relativization, circuit complexity, and proof complexity.

**Components:** Lecture

**Course Equivalents:** MA 442

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: CS345 or equivalent MA345.

**Req. Designation:** Technology

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**CS 444(3)** Course ID:007827 2015-08-15

**Operating Systems**

This course is an introduction to the concepts of operating systems, their structures and organization. Major topics include process management (asynchronous processes, interprocess communication and synchronization, multithreading, deadlock and starvation, scheduling), storage management (paging/segmentation, virtual memory, file systems), protection and security issues, and an introduction to distributed systems. To demonstrate these concepts, case studies of operating systems will be presented, and a programming project will be an integral part of the course.

**Components:** Laboratory, Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: CS 344; and CS241 or EE360 or EE264

**Req. Designation:** Technology

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**CS 445(3)** Course ID:007828 2021-11-30

**Compiler Construction**

A study of compiler design. Overview of the compilation process. Formal definition of syntax, lexical scanning, parsing including LL and LR grammars, run-time structures, intermediate code generation, and storage allocation. Students are expected to develop a compiler for a substantial subset of a high-level language using compiler tools such as lex and a compiler yacc.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: CS344, CS345, CS241 and CS341

**Req. Designation:** Technology

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**CS 447(3)** Course ID:007829 2019-04-03

**Computer Algorithms**

[Cross-listed with MA 447] This course will study and contrast a variety of computational algorithms and develop tools for algorithm analysis. Methods and topics such as dynamic programming, greedy algorithms, graph algorithms, circuits, parallel algorithms, matrix and polynomial algorithms, string matching, and geometrical algorithms will be explored. The theory of NP-completeness and methods of managing NP-complete problems will also be covered.

**Components:** Lecture

**Course Equivalents:** MA 447

**Requirement Group:** Prerequisites: CS344 and MA211

**Req. Designation:** Technology

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**School of Arts and Sciences - Computer Science - Subject: Computer Science**

**CS 449(3)**                   **Course ID:010886**                   **2015-08-15**

**Computational Learning**

[Cross-listed as MA 449] Computational learning studies algorithmic problems for inferring patterns and relations from data. This course describes the mathematical foundations of learning and explores the important connections and applications to areas such as artificial intelligence, cryptography, statistics, and bioinformatics. A list of relevant topics may include perceptron and online learning, graphical models and probabilistic inference, decision tree induction and boosting, analysis of Boolean functions, sample complexity bounds, cryptographic and complexity hardness, and reinforcement learning. Basic ideas from computer science and mathematics are employed to describe the main ideas and major developments in computational learning.

**Components:** Lecture

**Course Equivalents:** MA 449

**Requirement Group:** Prerequisites: CS344 and CS345, or consent of the instructor.

**Req. Designation:** Technology

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**CS 451(3)**                   **Course ID:007832**                   **2021-11-30**

**Artificial Intelligence**

This course is a comprehensive introduction to core concepts in artificial intelligence and surveys active research areas. Fundamental ideas in knowledge representation and search will be emphasized. Methods for encoding knowledge will include predicate logic, production rules, semantic networks, frames and other schemata. Data-driven and goal-driven search strategies will be covered, along with heuristic search algorithms. Additional topics will be drawn from knowledge-based systems, reasoning under uncertainty, planning, natural language understanding, neural networks and learning. Throughout the course, students will learn AI programming techniques and applications using languages such as LISP or Prolog.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: CS344 (CS250 and CS341 recommended)

**Req. Designation:** Technology

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**CS 452(3)**                   **Course ID:007833**                   **2021-11-30**

**Computer Graphics**

[Cross-listed with EE 465] An introduction to computer graphics. Graphics hardware, algorithms for generating and displaying two and three-dimensional geometric figures, animation, interactive displays. Programming projects using OpenGL will be assigned.

**Components:** Lecture

**Course Equivalents:** EE 465

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: CS142 or EE361, and MA232 or MA239 (or MA339 as a corequisite)

**Req. Designation:** Technology

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**CS 455(3)**                   **Course ID:007835**                   **2015-08-15**

**Computer Networks**

[Cross-listed with EE 407] This course covers layered networking protocols with an emphasis on common Internet protocols such as TCP, IP, HTTP, and SMTP. It also covers local area networking, focusing on link layer standards such as the IEEE standards for Ethernet and wireless. Additional topics such as security and congestion control will also be covered. EE407 and CS455 are offered each fall as one course with multiple listings.

**Components:** Laboratory, Lecture

**Course Equivalents:** EE 407

**Requirement Group:** Prerequisites: One of course in computer architecture (EE264, CS241 or IT502 or equivalent). One course

**Req. Designation:** Technology

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**CS 456(3)**                   **Course ID:007836**                   **2021-11-30**

**Cryptography**

[Cross-listed with MA 456] Cryptography is the discipline which studies the making of 'secret' codes. This course will examine some of the methods of cryptography together with many surprising applications. The language of modern cryptography is primarily number theory, and various tools of number theory will be developed as needed. No background in number theory or cryptography will be necessary, but some mathematical sophistication and familiarity with proofs will be assumed. Topics will include: one-way functions, public-key cryptosystems, digital signatures, probabilistic encryption, primality testing, interactive proof systems, and methods of secret sharing.

**Components:** Lecture

**Course Equivalents:** MA 456

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: CS142, EE262, or EE361, and MA211 (CS 344 recommended)

**Req. Designation:** Technology

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**School of Arts and Sciences - Computer Science - Subject: Computer Science****CS 457(3)** Course ID:010599 2015-08-15**Computer and Network Security**

[Cross-listed with EE 410] Attacks on networked computer systems are an increasingly important problem. This course covers the types of vulnerabilities that are present in modern computer systems and the types of malicious software that exploit these vulnerabilities. It also covers best practices for preventing, detecting and responding to such attacks including anti-virus software, defensive programming techniques, intrusion detection systems, honeypots and firewalls.

Prerequisites: A general course in computer networking such as CS455/555 or EE407/507. Programming experience to the level of CS142 or EE361.

**Components:** Lecture**Course Equivalents:** CS 557, EE 410, EE 510**Req. Designation:** Technology**CS 458(3)** Course ID:007837 2015-08-15**Formal Methods for Program Verification**

Formal methods are algorithms and techniques that actually prove that a program meets its design criteria, and are the only way to guarantee that a program works correctly. As computer software increases in size and complexity, formal methods are becoming an essential part of software engineering. This is especially true of safety critical and life critical systems, where software errors can have life threatening consequences. Until recently, formal methods have had limited application because they were difficult to use. This is changing, and they are receiving greater acceptance from software engineers in industry and government. This course introduces students to the basic concepts and methods of program verification. A variety of techniques and tools will be covered, and students will gain experience in applying the tools to actual programs. After completing the course, students will have sufficient expertise to learn new methods as they become available.

**Components:** Lecture**Course Equivalents:** CS 558**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: MA211 or MA346; and CS344**Req. Designation:** Technology**CS 459(3)** Course ID:010238 2021-11-30**Human-Computer Interaction**

This course provides an introduction to the field of human-computer interaction (HCI). This discipline focuses on the design, evaluation and implementation of interactive computing systems from a user's point of view. The course will give a broad overview of the ideas, techniques, and tools in the subject, with a systematic approach to designing visual interfaces and evaluating their effectiveness. Case studies of existing interfaces, technologies, and data display methods will be discussed and critiqued. Topics include: programming and command languages; menus and forms graphical user interfaces, computer-supported cooperative work, information search and visualization; input/output devices; and display design. A collaborative course project will explore issues in HCI and design.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: CS242 or EE408**Req. Designation:** Technology

**School of Arts and Sciences - Electrical & Computer Eng - Subject: Computer Science**

CS 460(3) Course ID:007838

2014-11-20

**Database Systems**

[Cross-listed with EE 468] An introduction to database systems. The entity-relationship and relational models are presented and applied to the design of typical databases. New developments in object-oriented and multimedia databases are presented. Emphasis will be placed on database design for applications in the context of an existing database management system such as ORACLE or ACCESS.

**Components:** Lecture**Course Equivalents:** EE 468**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: Programming experience in a high-level language**Req. Designation:** Technology

**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 461(3) Course ID:010465 2021-11-30

**Mixed Reality**

[Cross-Listed with CS561] This course provides an introduction to the mathematics and computing underlying virtual (VR) and augmented reality (AR). Students will learn stereo camera geometry for VR, recovery of 3D scene structure from images for content manipulation in AR, acquiring of illumination maps for photorealistic AR, and capture of human interaction for virtual environments. Students will perform several short and long projects as part of the course.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisites: CS142/EE361, and MA232/MA239 or corequisite of MA339.

Req. Designation: Technology

CS 466(3) Course ID:012867 2018-03-19

**Blockchain Technologies**

Blockchain technologies are the underlying technological foundation of almost all digital currencies, such as Bitcoin and Ethereum. Without the need of a trusted authority or central server, Blockchain technologies can securely archive and are inherently resistant to modification of data. The course will cover the basics and advanced topics of Blockchain technologies. The basics include public key cryptography and cryptocurrency, hashing algorithms, mining process, proof of work, block structures, transactions and wallets. Advanced topics may include consensus algorithms, smart contracts, blockchain network security and applications. We will discuss the limitations of current applications and explore new systems and proposals that overcome them. The course will offer many hands-on lab components and a blockchain-based course project. Students should already have had solid programming skills, such as C, C++ or Python, to take the course.

Components: Lecture

Course Equivalents: CS 566

Attributes: Given When Needed

Requirement Group: Prerequisites: CS344

Req. Designation: Technology

CS 469(3) Course ID:012898 2019-04-24

**Quantum Information and Computation**

[Cross-listed with CS569 and MA469] This course studies information and computation based on quantum mechanical laws. The first part of the course will cover the relevant background in quantum information theory. A brief discussion of several universal quantum computational models will be given. The second part will cover algorithmic techniques important for developing quantum algorithms. Topics to be covered include amplitude amplification, quantum walks, phase estimation, hidden subgroup problems, and quantum protocols. Background in physics would be helpful but is not required.

Components: Lecture

Course Equivalents: CS 569

Attributes: Given When Needed

Requirement Group: Prerequisites: CS344 and MA232 or MA339

Req. Designation: Technology

CS 470(3) Course ID:012938 2019-04-03

**Deep Learning**

This course will cover the principles of modern deep learning architectures from a theoretical and practical perspective. Course topics covered will include an introduction to machine learning and basic neural network architectures, and in-depth discussions on convolutional neural networks, recurrent neural networks based on units such as LSTMs and GRUs, and, if time permits, GANs. Students will be required to implement programming assignments and projects that apply deep learning architectures to solve classification and regression problems.

Components: Lecture

Attributes: Given When Needed

Requirement Group: CS470 Prerequisites: CS142, EE262, or EE361, and MA339.

Req. Designation: Technology

CS 471(3) Course ID:012896 2018-10-12

**System Administration and Network Operations**

This course is designed to give students the basic skills and knowledge to administer Unix/Linux machines as standalone workstations or in a network environment. For example, students will learn to install and configure the Linux operating system, create and maintain system users and groups, maintain and administer a file system, configure and maintain network services, troubleshoot system and network problems, and secure the system and network environment. Comprehensive hands-on labs throughout the course will reinforce learning and develop skills and competency.

Components: Lecture

Course Equivalents: CS 571

Attributes: Given When Needed

Requirement Group: Prerequisites: CS241, EE260, or EE264

Req. Designation: Technology

**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 472(3) Course ID:013009 2020-01-06

**Image Understanding**

This course is an introduction to image processing and computer vision algorithms. Students will learn concepts such as image formation, how to store a digital image on a computer, how to use it in a program, different image features and their importance in computer vision, as well as some advanced computer vision topics such as object classification. Students will implement these concepts as part of the programming assignments. They will also do some theoretical assignments and a project.

**Components:** Lecture**Course Equivalents:** CS 572**Attributes:** Given When Needed**Requirement Group:** Prerequisites: CS142 or EE262 or EE361, and MA232 or MA239 (or MA339 as a corequisite)**Req. Designation:** Technology

CS 473(3) Course ID:013057 2020-11-04

**Computer Vision**

[Cross-Listed CS573/EE473] This course will cover an overview of basic theoretical underpinnings and practical applications of computer vision, with particular emphasis on geometrical techniques underlying 2D and 3D vision. Topics covered include, but are not restricted to, estimation of image transformations, image formation, pose estimation, camera calibration, epipolar geometry, structure-from-motion, stereo reconstruction, filtering, interest point detection, motion estimation, image segmentation, and object recognition.

**Components:** Lecture**Course Equivalents:** CS 573, EE 573**Attributes:** Given When Needed**Requirement Group:** Prerequisites: CS142 or EE262, and MA339.**Req. Designation:** Technology

CS 475(3) Course ID:013066 2020-10-23

**Computing, Ethics and Society**

[Cross-Listed CS575] This course focuses on the increasing ubiquitous nature of computing, its impact on society and the ethical issues related to the design, implementation and deployment of computing technologies. We will examine case studies of the impact of computing technology on society and reflect on issues such as privacy, equality, justice, security, accountability, transparency, safety and reliability.

**Components:** Lecture**Course Equivalents:** CS 575**Attributes:** Given When Needed**Requirement Group:** Prerequisite: CS141**Req. Designation:** Technology

CS 497(1 - 3) Course ID:007839 2022-05-20 Instructor Consent Required

**Undergraduate Research I**

Students engage in computer science research with a faculty member. The topic will be determined by student interest and faculty research programs. This course may be repeated for credit.

Prerequisites: consent of the instructor.

**Components:** Research**Attributes:** Given When Needed**Req. Designation:** Technology

CS 498(1 - 3) Course ID:007840 2022-05-22 Instructor Consent Required

**Undergraduate Research II**

A continuation of CS 497.

Prerequisites: consent of the instructor.

**Components:** Research**Req. Designation:** Technology

CS 499(0) Course ID:010168 2015-08-15

**Professional Experience**

This course records successful completion of an approved professional experience meeting the requirements of the Clarkson Common Experience. Typical activities include internships and co-ops, directed research, and suitable semester-long class projects.

**Components:** Independent Study**Req. Designation:** Technology

**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 500(3)

Course ID:012269

2016-07-01

**Network and Security Systems**

[Formerly CSC 560] This course explores critical business challenges: how to protect an organization's computer networks, systems, applications and information. Students learn how to design procedures, protocols, and policies that address both engineering and human issues. Engineered security is examined through the application or cryptography, digital signatures and certificates, authentication protocol, firewalls, and intrusion detection. Also considered are security issues related to people's use of organization's networks and systems including policies and practices for password management and protecting privacy rights. Students also study options for maintaining business continuity in the event of a disruption of business operations. Specific case studies are used to highlight the choices that must be made to balance operational efficiency of business functions with protecting the business from the onslaught of security threats. Prerequisite expertise: Networking protocols. The student should have taken a course in computer communications/networking

Components: Lecture

Req. Designation: Technology

CS 501(3)

Course ID:012270

2018-11-02

**Software Quality Management**

[Formerly CSC 561] This course prepares students to apply a quality mindset to both the development process and the developed software. Students learn the theory and practice of quality assurance and testing computer software. Topics of study include the use of metrics to measure quality, software quality standards as a baseline for establishing and assessing quality, the effects of the economics on product reliability, and software testing practices (including test design, coverage, and tools). Students will study specific cases that highlight practical techniques and reveal the relationship between software quality management and meeting an organization's business objectives

Components: Lecture

Same As Offering: CS 501

Req. Designation: Technology

CS 501(3)

Course ID:012270

2018-11-02

**Software Quality Management**

[Formerly CSC 561] This course prepares students to apply a quality mindset to both the development process and the developed software. Students learn the theory and practice of quality assurance and testing computer software. Topics of study include the use of metrics to measure quality, software quality standards as a baseline for establishing and assessing quality, the effects of the economics on product reliability, and software testing practices (including test design, coverage, and tools). Students will study specific cases that highlight practical techniques and reveal the relationship between software quality management and meeting an organization's business objectives

Components: Lecture

Same As Offering: CS 501

Req. Designation: Technology

CS 502(3)

Course ID:012271

2016-07-01

**Business Intelligence**

[Formerly CSC 562] This course offers an interdisciplinary look at computing technologies in support of forming valuable business insights and making effective decisions. Students acquire knowledge of the conceptual basis for data warehousing (collection and organization of data in database management systems) and data mining (detecting of patterns in business data). Students then build the skills to extract business intelligence from collected and analyzed data and present it for use in business decision-making activities. Various practical applications are studied such as customer segmentation, Customer Relationship Management (CRM), Group Decision Support Systems (GDSS), and Executive Information Systems (EIS). Students will learn about trends in the use of business intelligence software and techniques and examine specific case studies. There will be an opportunity for students to develop their own application project. Prerequisite expertise: database management systems.

Components: Lecture

Req. Designation: Technology

CS 503(3)

Course ID:012273

2016-07-01

**Systems Analysis and Design Methods**

[Formerly CSC 564] The application of information technology has extended to all quarters of the business world. While the nature and the scope of information systems vary widely depending on the business context, the fundamental knowledge underlying their development remains the same. This course aims to provide technology students with a solid understanding of the important methodologies and tools & techniques related to the development of information systems in a variety of contexts.

Components: Lecture

Req. Designation: Technology

**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 504(3) Course ID:012274 2016-07-01

**Enterprise Architecture**

[Formerly CSC 570] This course provides students with an understanding of the basic concepts and practices of Enterprise Architecture (EA). This is not a course on information systems development, web/application programming, database development, or network design. The course focuses on understanding how information technology resources can best be leveraged to support an organization's strategic goals and business requirements. Basic proficiency is developed in the understanding of several EA methodologies, number of governments and major corporations around the world, as well as the U.S. Federal Government's approach to EA. Students learn the theory and practice of EA through a combination of lectures, student-led class instructions, analysis papers, exams, and a written project with a verbal presentation.

**Components:** Lecture**Req. Designation:** Technology

CS 505(3) Course ID:012278 2016-07-01

**Business Data & Communications & Networking**

[Formerly CSC 583B] This course is designed to convey the essentials of data communication networks. It will cover concepts, technologies and architectures. There will be practical lessons built into the semester's topics and assignments whenever possible. A single course cannot cover all possible networking topics and issues, so we will cover the major conceptual areas balanced with practical discussions and exercises. We will also discuss important network management topics such as domain management and security. Specifically, the following topics will be covered: Fundamentals of Networking Technologies, OSI Model, Physical Layer, Data Link Layer, Local Area Networks, Wireless Local Area Networks, Network/Transport Layers TCP/IP, Backbone Networks, Wide Area Networks, Application Layer, The Internet, Network Design, Network Management and Network Troubleshooting, Network Security, Voice over IP.

**Components:** Lecture**Req. Designation:** Technology

CS 506(3) Course ID:012275 2016-07-01

**Engineering Statistics**

[Cross-listed with EE 602, ME 577] [Formerly CSC 572] Modern engineering practice makes extensive use of statistical methods for the efficient collection and analysis of engineering data, and to support data-based decision making. This course will introduce the statistical tools that are of greatest importance for practicing engineers. Core topics to be covered will include probability and distribution theory, the construction and interpretation of statistical intervals, statistical hypothesis testing, regression analysis and empirical modeling, statistical experimental design, and statistical quality/process control. Additional specialized topics may also be covered, depending upon the interests of the class; possible topics include system reliability analysis, measurement system analysis, process capability analysis (and "six-sigma"), accelerated life testing, and acceptance sampling.

**Components:** Lecture**Course Equivalents:** EE 602, ME 577**Req. Designation:** Technology

CS 511(3) Course ID:007841 2021-11-30

**Foundations of Computer Science**

This course covers a variety of topics fundamental to Computer Science. Topics will vary from year to year to accommodate the background and interests of the participants. Possible topics include: mathematical foundations, analysis of algorithms, data abstraction, elementary data structures and algorithms such as lists, stacks and sorting, advanced data structures and algorithms such as heaps, hashing, dynamic programming, and graph algorithms, object-oriented programming, and basic automata theory.

Prerequisites: programming experience.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

CS 541(3) Course ID:007843 2015-08-15

**Introduction to Automata Theory and Formal Languages**

This course covers an introduction to formal languages and their relation to automata. Topics include: regular languages, deterministic and nondeterministic finite automata, closure properties for regular sets, context free grammars, normal forms, ambiguity, pushdown automata, a treatment of closure properties and decision algorithms for context free languages. Also included are a treatment of recursive and recursively enumerable sets, Turing machines, decidability and undecidability.

Prerequisites: MA211, MA346 or equivalent.

**Components:** Lecture**Course Equivalents:** CS 345, MA 345**Req. Designation:** Technology

**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 542(3) Course ID:007844 2015-08-15

**Computational Complexity**

The complexity of a computational problem is the amount of computer resources it requires. Computational complexity theory studies the complexity of computational problems as well as relationships between different types of resources. This course will cover both classical and research-related topics in computational complexity, such as: complexity measures and complexity classes for sequential machines and Boolean circuits, reductions and completeness, hierarchy theorems, relativization, circuit complexity, and proof complexity. Students will be expected to independently explore some of the course material.

Prerequisites: CS345 or CS541, or consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 544(3) Course ID:007845 2015-08-15

**Operating Systems**

This course is an introduction to the concepts of operating systems, their structures and organization. Major topics include process management (asynchronous processes, interprocess communication and synchronization, multithreading), storage management (paging/segmentation, virtual memory, file systems), protection and security issues, and distributed systems. To demonstrate these concepts, case studies of operating systems will be presented, and a programming project will be an integral part of the course.

Prerequisites: CS344, EE264 or equivalent, or consent of the instructor.

**Components:** Laboratory, Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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CS 545(3) Course ID:007846 2021-11-30

**Compiler Construction I**

A graduate-level study of compiler design. Overview of the compilation process. Formal definition of syntax, lexical scanning, parsing including LL and LR grammars, run-time structures, intermediate code generation, and storage allocation. Students develop a compiler for a substantial subset of a high-level language using compiler tools such as lex and yacc.

Prerequisites: CS241, CS341, or consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 547(3) Course ID:007861 2018-01-15

**Computer Algorithms**

[Cross-listed with EE 667] This course will study and contrast a variety of computational algorithms and develop tools for algorithm analysis. Methods and topics such as dynamic programming, greedy algorithms, graph algorithms, circuits, parallel algorithms, matrix and polynomial algorithms, string matching, and geometrical algorithms will be explored. The theory of NP-completeness and methods of managing NP-complete problems will also be covered.

Prerequisites: CS344, MA211 or MA346.

**Components:** Lecture

**Course Equivalents:** EE 667

**Req. Designation:** Technology

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CS 549(3) Course ID:010887 2020-06-09

**Computational Learning**

Computational learning studies algorithmic problems for inferring patterns and relations from data. This course describes the mathematical foundations of learning and explores the important connections and applications to areas such as artificial intelligence, cryptography, statistics, and bioinformatics. A list of relevant topics may include perceptron and online learning, graphical models and probabilistic inference, decision tree induction and boosting, analysis of Boolean functions, sample complexity bounds, cryptographic and complexity hardness, and reinforcement learning. Basic ideas from computer science and mathematics are employed to describe the main ideas and major developments in computational learning. Students are expected to learn and explore recent research ideas in the area. Prerequisite: CS 345 or consent of instructor; Corequisite: CS 547 or consent of instructor

**Components:** Lecture

**Requirement Group:** Corequisite: CS547 or consent of the instructor.

**Req. Designation:** Technology

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**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 550(3) Course ID:007847

2021-10-29

**Software Design and Development**

Working in teams, students will learn tools and strategies for designing and implementing medium/large software projects. Suitable project ideas will be solicited from the community in order to match student teams with real users where possible. Students will learn to elicit requirements from users and to work in an effective team. Students will learn and practice techniques for software testing including black-box testing, stress testing, performance testing, code reviews, and code coverage tools. Students will produce documentation that is appropriate at various stages in the software life cycle including for example, requirements documents, project plans and user manuals. The work will include oral presentations and written reports. Students enrolled in CS550 will be expected to independently explore some aspects of the course material. Students are expected to have taken introductory software development courses similar to CS141, CS142 and CS242.

**Components:** Lecture**Same As Offering:** CS 550**Attributes:** Offered Spring Term**Req. Designation:** Technology

CS 550(3) Course ID:007847

2021-10-29

**Software Design and Development**

Working in teams, students will learn tools and strategies for designing and implementing medium/large software projects. Suitable project ideas will be solicited from the community in order to match student teams with real users where possible. Students will learn to elicit requirements from users and to work in an effective team. Students will learn and practice techniques for software testing including black-box testing, stress testing, performance testing, code reviews, and code coverage tools. Students will produce documentation that is appropriate at various stages in the software life cycle including for example, requirements documents, project plans and user manuals. The work will include oral presentations and written reports. Students enrolled in CS550 will be expected to independently explore some aspects of the course material. Students are expected to have taken introductory software development courses similar to CS141, CS142 and CS242.

**Components:** Lecture**Same As Offering:** CS 550**Attributes:** Offered Spring Term**Req. Designation:** Technology

CS 551(3) Course ID:007848

2021-11-30

**Artificial Intelligence**

[Cross-listed with EE 565] This course is an introduction to the computational study of intelligent systems. Topics include heuristic search, knowledge representation, automated reasoning, knowledge-based systems, reasoning under uncertainty, planning, and intelligent agents. Additional topics may be drawn from machine learning, neural networks, computer vision, and natural language understanding. AI programming techniques and methods will also be covered throughout the course.

Prerequisites: CS344 or equivalent or consent of the instructor.

**Components:** Lecture**Course Equivalents:** EE 565**Attributes:** Given When Needed**Req. Designation:** Technology

CS 552(3) Course ID:007849

2015-08-15

**Computer Graphics**

[Cross-listed with EE 505] An introduction to computer graphics. Graphics hardware, algorithms for generating and displaying two and three-dimensional geometric figures, animation, interactive displays. Programming projects using OpenGL will be assigned. Students will be expected to independently explore some aspects of the course material. Prerequisites: Programming experience in C/C++ family language, basic concepts in linear algebra and matrices.

**Components:** Lecture**Course Equivalents:** EE 505**Attributes:** Offered Spring Term**Req. Designation:** Technology

**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 555(3) Course ID:007851 2016-07-21

**Computer Networks**

[Cross-listed with EE 507] This course covers layered protocols, network architectures, OSI, digital networks, local area networks, metropolitan networks, wide area networks, and interconnection of local area networks and non-uniform networks. Students will be expected to explore independently advanced aspects of the subject area. Prerequisites: One of course in computer architecture (EE264, CS241 or IT502 or equivalent). One course in computer programming (EE261, CS141 or equivalent.) Note: IT501 also satisfies the programming requirement.

**Components:** Laboratory, Lecture

**Course Equivalents:** EE 507

**Req. Designation:** Technology

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CS 556(3) Course ID:007863 2018-01-15

**Cryptography**

Cryptography is the discipline which studies the making of 'secret' codes. This course will examine some of the methods of cryptography together with many surprising applications. The language of modern cryptography is primarily number theory, and various tools of number theory will be developed as needed. No background in number theory or cryptography will be necessary, but some mathematical sophistication and familiarity with proofs will be assumed. Topics will include: one-way functions, public-key cryptosystems, digital signatures, probabilistic encryption, primality testing, interactive proof systems, and methods of secret sharing. Prerequisites: MA211, MA346, or equivalent.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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CS 557(3) Course ID:010600 2015-08-15

**Computer and Network Security**

[Cross-listed with EE 510] Attacks on networked computer systems are an increasingly important problem. This course covers the types of vulnerabilities that are present in modern computer systems and the types of malicious software that exploit these vulnerabilities. It also covers best practices for preventing, detecting and responding to such attacks including anti-virus software, defensive programming techniques, intrusion detection systems, honeypots and firewalls.

Prerequisites: A general course in computer networking such as CS455/555 or EE407/507. Programming experience to the level of CS142 or EE361.

**Components:** Lecture

**Course Equivalents:** CS 457, EE 410, EE 510

**Req. Designation:** Technology

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CS 558(3) Course ID:007852 2015-08-15

**Formal Methods for Program Verification**

Formal methods are algorithms and techniques that actually prove that a program meets its design criteria, and are the only way to guarantee that a program works correctly. As computer software increases in size and complexity, formal methods are becoming an essential part of software engineering. This is especially true of safety critical and life critical systems, where software errors can have life threatening consequences. Until recently, formal methods have had limited application because they were difficult to use. This is changing, and they are receiving greater acceptance from software engineers in industry and government. This course introduces students to the basic concepts and methods of program verification. A variety of techniques and tools will be covered, and students will gain experience in applying the tools to actual programs. After completing the course, students will have sufficient expertise to learn new methods as they become available.

**Components:** Lecture

**Course Equivalents:** CS 458

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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CS 559(3) Course ID:010239 2021-11-30

**Human-Computer Interaction**

This course provides an introduction to the field of human-computer interaction (HCI). This discipline focuses on the design, evaluation and implementation of interactive computing systems from a user's point of view. The course will give a broad overview of the ideas, techniques, and tools in the subject, with a systematic approach to designing visual interfaces and evaluating their effectiveness. Case studies of existing interfaces, technologies, and data display methods will be discussed and critiqued. Topics include: programming and command languages; menus and forms graphical user interfaces, computer-supported cooperative work, information search and visualization; input/output devices; and display design. A collaborative course project will explore issues in HCI and design. Prerequisites: proficiency in C++, Java or C.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: CS242 or EE408

**Req. Designation:** Technology

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**School of Arts and Sciences - Electrical & Computer Eng - Subject: Computer Science**

CS 560(3) Course ID:007853

2014-11-18

**Database Systems**

[Cross-listed with EE 568] An introduction to database systems. The entity-relationship and relational models are presented and applied to the design of typical databases. New developments in object-oriented and multimedia databases are presented. Emphasis will be placed on database design for applications in the context of an existing database management system such as ORACLE or ACCESS. Substantial independent investigation of advanced topics will be required.

Prerequisites: programming experience in a high level language.

**Components:** Lecture

**Course Equivalents:** EE 568

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 561(3) Course ID:010466

2021-11-30

**Mixed Reality**

[Cross-Listed with CS461] This course provides an introduction to the mathematics and computing underlying virtual (VR) and augmented reality (AR). Students will learn stereo camera geometry for VR, recovery of 3D scene structure from images for content manipulation in AR, acquiring of illumination maps for photorealistic AR, and capture of human interaction for virtual environments. Students will perform several short and long projects as part of the course. Students will also analyze seminal papers in supporting fields such as graphics, vision, and computational photography.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 566(3) Course ID:012868

2018-03-19

**Blockchain Technologies**

Blockchain technologies are the underlying technological foundation of almost all digital currencies, such as Bitcoin and Ethereum. Without the need of a trusted authority or central server, Blockchain technologies can securely archive and are inherently resistant to modification of data. The course will cover the basics and advanced topics of Blockchain technologies. The basics include public key cryptography and cryptocurrency, hashing algorithms, mining process, proof of work, block structures, transactions and wallets. Advanced topics may include consensus algorithms, smart contracts, blockchain network security and applications. We will discuss the limitations of current applications and explore new systems and proposals that overcome them. The course will offer many hands-on lab components and a blockchain-based course project. Students should already have had solid programming skills, such as C, C++ or Python, to take the course. Students will be expected to independently explore some of the course material.

**Components:** Lecture

**Course Equivalents:** CS 466

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 569(3) Course ID:012899

2019-04-24

**Quantum Information and Computation**

[Cross-listed with CS469 and MA469] This course studies information and computation based on quantum mechanical laws. The first part of the course will cover the relevant background in quantum information theory. A brief discussion of several universal quantum computational models will be given. The second part will cover algorithmic techniques important for developing quantum algorithms. Topics to be covered include amplitude amplification, quantum walks, phase estimation, hidden subgroup problems, and quantum protocols. Background in physics would be helpful but is not required. As part of a research project, students are expected to explore topics of interest from the literature.

Prerequisites: CS344, and MA232 or MA339, or consent of the instructor.

**Components:** Lecture

**Course Equivalents:** CS 469

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 570(3) Course ID:012939

2019-04-03

**Deep Learning**

This course will cover the principles of modern deep learning architectures from a theoretical and practical perspective. Course topics covered will include an introduction to machine learning and basic neural network architectures, and in-depth discussions on convolutional neural networks, recurrent neural networks based on units such as LSTMs and GRUs, and, if time permits, GANs. Students will be required to implement programming assignments and projects that apply deep learning architectures to solve classification and regression problems. Students will read and assess papers on current evolutions to these architectures. Graduate students will do additional work.

Prerequisites: CS142, EE262 or EE361, and MA339, or consent of instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 571(3) Course ID:012897 2018-10-24

**System Administration and Network Operations**

This course is designed to give students the basic skills and knowledge to administer Unix/Linux machines as standalone workstations or in a network environment. For example, students will learn to install and configure the Linux operating system, create and maintain system users and groups, maintain and administer a file system, configure and maintain network services, troubleshoot system and network problems, and secure the system and network environment. Comprehensive hands-on labs throughout the course will reinforce learning and develop skills and competency. Graduate students will be expected to explore independently advanced aspects of the subject area.

Prerequisite: CS241 or equivalent

**Components:** Lecture

**Course Equivalents:** CS 471

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 572(3) Course ID:013010 2020-01-06

**Image Understanding**

This course is an introduction to image processing and computer vision algorithms. Students will learn concepts such as image formation, how to store a digital image on a computer, how to use it in a program, different image features and their importance in computer vision, as well as some advanced computer vision topics such as object classification. Students will implement these concepts as part of the programming assignments. They will also do some theoretical assignments and a project. Students enrolled in CS572 will study a research paper on related topics and present it to the class. Prerequisites: CS142 or EE262 or EE361, and MA232 or MA239 or MA339, or equivalent.

**Components:** Lecture

**Course Equivalents:** CS 472

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 573(3) Course ID:013058 2020-11-04

**Computer Vision**

[Cross-Listed CS473/EE573] This course will cover an overview of basic theoretical underpinnings and practical applications of computer vision, with particular emphasis on geometrical techniques underlying 2D and 3D vision. Topics covered include, but are not restricted to, estimation of image transformations, image formation, pose estimation, camera calibration, epipolar geometry, structure-from-motion, stereo reconstruction, filtering, interest point detection, motion estimation, image segmentation, and object recognition. Students enrolled in CS573 will be expected to read and implement research papers on seminal and modern techniques in computer vision. Prerequisites: CS142 or EE262, and MA339 (or equivalent, with consent from the instructor).

**Components:** Lecture

**Course Equivalents:** CS 473, EE 573

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 575(3) Course ID:013067 2020-10-23

**Computing, Ethics and Society**

[Cross-Listed CS475] This course focuses on the increasing ubiquitous nature of computing, its impact on society and the ethical issues related to the design, implementation and deployment of computing technologies. We will examine case studies of the impact of computing technology on society and reflect on issues such as privacy, equality, justice, security, accountability, transparency, safety and reliability. Students enrolled in CS575 will become familiar with venues where computer science research regarding fairness, accountability, transparency and ethics is published and the types of topics and themes commonly covered in this literature today. They will gain skills in reading research literature and apply this to some pieces of recently published work. Prerequisites: CS141, or equivalent.

**Components:** Lecture

**Course Equivalents:** CS 475

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 607(1 - 15) Course ID:007854 2020-04-10 Instructor Consent Required

**Topics in Computer Science**

A graduate course in the field of Computer Science. Areas of coverage will be selected to conform to the mutual interests and needs of students and faculty.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Computer Science - Subject: Computer Science**

**CS 608(1 - 15)** Course ID:007855 2020-04-10 Instructor Consent Required

**Topics in Computer Science**

A graduate course in the field of Computer Science. Areas of coverage will be selected to conform to the mutual interests and needs of students and faculty.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**CS 611(1 - 15)** Course ID:007856 2020-04-10 Instructor Consent Required

**Topics in Applied Computer Science**

A graduate course in the field of Applied Computer Science. Areas of coverage will be selected to conform to the mutual interests and needs of students and faculty.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**CS 612(1 - 15)** Course ID:007857 2020-04-10 Instructor Consent Required

**Topics in Applied Computer Science**

A graduate course in the field of Applied Computer Science. Areas of coverage will be selected to conform to the mutual interests and needs of students and faculty.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**CS 634(1 - 15)** Course ID:007859 2015-08-15

**Thesis**

Each student does independent, original work on a project under the guidance and supervision of an instructor. A grade on all of the credits for this work presented in satisfaction of the requirements for a degree is given when those requirements are completed.

MS in Computer Science.

**Components:** Thesis Research

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**CS 647(3)** Course ID:011388 2015-08-15

**Advanced Algorithms**

This course covers advanced topics in computer algorithms. Topics covered include, but are not restricted to, linear programming and combinatorial optimization, randomized algorithms and probabilistic methods, competitive analysis and online algorithms, algorithms for algebraic and geometric problems, and space-efficient algorithms. The emphasis will be on methods and techniques instead of specific applications. As part of a research project, students are to explore specific topics of interest from the literature.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisite: CS 547

**Req. Designation:** Technology

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**CS 649(3)** Course ID:012763 2016-10-03

**Current Issues In Machine Learning**

In this course, we will read current publications of machine learning research. Students will gain experience reading and critiquing research papers. Class times will be devoted to discussing the papers and possible extensions of the work. Projects may consist of a small piece of research.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**CS 653(3)** Course ID:010888 2018-01-15

**Automated Reasoning**

This course will cover advanced topics in Automated Reasoning research. Students will gain experience reading and discussing research papers. Students will be expected to conduct research-related work in Automated Reasoning.

Prerequisites: CS541 and CS547, or consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 654(3) Course ID:010375 2018-01-15

**Current Issues in Computer Networking Research**

In this course we will read both classic and current publications of networking research. Students will gain experience reading and critiquing research papers. Class times will be devoted to discussing the papers and possible extensions of the work. Projects will consist of a small piece of research.

Prerequisites: CS454/554 or consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 657(3) Course ID:010464 2018-01-15

**Advanced Topics in Computer Security**

This course will cover advanced topics in computer security research. Students will gain experience reading and discussing research papers. Students will be expected to conduct research-related work in computer security.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 662(3) Course ID:013105 2021-04-23

**Advanced Techniques in Virtual Reality and 3D User Interfaces**

Topics taught will include, but are not limited to, the design of human subject studies for virtual reality (VR)/augmented reality (AR), statistical and learning-based techniques for evaluating VR/AR human subject studies, shared and multi-person VR/AR spaces, cognition in VR/AR, emotion in VR/AR, simulating physical characteristics of everyday objects in VR/AR, attention and engagement in VR/AR. In addition to material related to advanced topics, students will be engaged in understanding the evolution of modern VR through the assessment of relevant research literature, and will work on a comprehensive research project on an advanced VR topic.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: CS552,CS559,CS561,CS572,or CS573 or permission from the instructor

**Req. Designation:** Technology

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CS 668(3) Course ID:012792 2018-01-15

**Natural Language Processing**

This course introduces students to the fundamental concepts and ideas in natural language processing (NLP). In this course students will learn how to create systems that are able to understand and produce language for applications ranging from plagiarism detection to information extraction to automated summarization. The course will focus on four key areas: understanding and recognizing words; syntax (i.e. structure of language); semantics (i.e. meaning of language); pragmatics/discourse (i.e. interpretation of language in context). Students will be introduced to document similarity techniques using frequency and sequence based techniques; n-gram models; parts of speech tagging; named entity recognition; word sense disambiguation; machine translation; use of deep learning in NLP. Students will work with large scale datasets spanning from open source repositories to news articles. As part of the course students will read the latest literature in NLP and provide oral and written summaries.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CS 670(3) Course ID:013134 2021-10-12

**Advanced Topics in Deep Learning**

This course is designed to provide fundamental and specialized knowledge on various deep learning topics and, in the process, prepare students for independent research on real-world problems that require machine learning solutions. The course will cover fundamental topics in learning theory such as Hoeffding's Inequality, Vapnik-Chervonenkis (VC) Dimension, and bias-variance tradeoff. The course will also cover specialized deep learning topics such as instance segmentation, image caption generation, and multi-task learning. The course assessment will include programming assignments that will require the students to implement deep learning models using a programming language such as Python and libraries such as Keras and TensorFlow. Students will also be required to study and present academic papers on related topics and complete a research project.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 673(3) Course ID:013096

2021-03-17

**Advanced Techniques in Computer Vision**

Topics taught will include, but are not limited to, linear and non-linear optimization techniques in computer vision, bundle adjustment, non-rigid structure from motion, multi-view sparse and dense reconstruction, and advanced techniques in image synthesis and representation using deep generative models. In addition to material related to advanced topics, students will be engaged in understanding the evolution of modern computer vision through the assessment of relevant research papers, and will work on a comprehensive research project on an advanced computer vision topic.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisite: CS573

Req. Designation: Technology

CS 675(3) Course ID:013068

2020-10-23

**Fairness, Accountability and Transparency in AI and Automated Systems**

This course focuses on the important and emerging area of Fairness, Accountability and Transparency across all areas of computing with a focus on applications in Artificial Intelligence, Machine Learning and Automated Decision Making Systems. Lectures and class discussions will draw on classic and current research literature. Students are expected to complete a research project and present the results of their work. Prerequisites: CS475 or CS575, or permission of instructor.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisite: CS575, or instructor permission.

Req. Designation: Technology

CS 676(3) Course ID:013168

2022-05-13

**Advanced Topics in Multimodal System Design**

The course will cover topics on advanced methods in multimodal systems, with a focus on understanding the techniques involved in capture, temporal synchronization, calibration, data acquisition, networking, and data analysis from dense multi-viewpoint systems consisting of multiple modalities of cameras at varying spatial and temporal resolutions. Students will review literature on approaches used to perform cross-sensor temporal registration, calibration, data acquisition, and analysis using machine learning to perform tasks such as pose detection and action recognition for a variety of applications. Students will also do a project and perform presentations on their work.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisites: CS 550

Req. Designation: Technology

CS 677(3) Course ID:013167

2022-05-13

**Advanced Topics in Human-Robot Interaction**

The course will cover current research in human-robot interaction (HRI), i.e., what it takes for robots to be seamlessly integrated into human environments, while being aware of human needs. The course will cover interdisciplinary work that integrates topics in robotics, artificial intelligence, computer vision, language understanding, human-computer interaction, and psychology. Through collaborative instructor and student-led discussions of HRI literature, students will receive an understanding of mathematical techniques, study design methods, and societal impact of research in HRI. To demonstrate their understanding of material and dedication toward contributing toward societally impactful HRI, students will perform an end-to-end project with research outcomes of interest to HRI.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisites: CS 573, or CS 570, or CS 552

Req. Designation: Technology

CS 707(1 - 0) Course ID:007864

2022-03-30

**Seminar in Computer Science**

Components: Seminar

Attributes: Given When Needed

Req. Designation: Technology

CS 708(1 - 0) Course ID:007865

2022-03-30

**Seminar in Computer Science**

Components: Seminar

Attributes: Given When Needed

Req. Designation: Technology

**School of Arts and Sciences - Computer Science - Subject: Computer Science**

CS 999(1 - 10) Course ID:011763 2015-08-15

**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Computer Science Teaching**

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CST 528(3) Course ID:013000 2022-04-08

**Current Topics in Computer Science I**

Students will investigate topics central to computer science for the preK-12 learner. Computer science principles will be aligned to industry standards and New York state teaching and learning standards. This course is designed for MAT, Computer Science students.

**Components:** Seminar

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CST 563(3) Course ID:012999 2020-01-15

**Current Topics in Computer Science II**

Current topics in the field of computer science will be explored with attention paid to fundamental concepts as well as future trends. This course is designed for MAT, Computer Science students.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program

**Req. Designation:** Technology

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CST 575(3) Course ID:013210 2023-05-05

**Computer Technology**

This course explores the role of computer technology in modeling, programming and prototyping, as well as the various roles computers play as technology tools in different fields (communications, power and energy, manufacturing, etc.). The NYS Technology Learning Standards guide the curriculum and student learning outcomes.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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CST 580(3) Course ID:012998 2021-10-08

**MAT Project in Computer Science**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, and include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program

**Req. Designation:** Technology

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**School of Arts and Sciences - Digital Arts & Science - Subject: Digital Arts**

**DA 1(2 - 4)** Course ID:010697 2019-07-08

**Digital Arts Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Req. Designation:** Technology

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**DA 2(2 - 4)** Course ID:011608 2019-07-08

**Digital Arts Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Common Experience Requirement.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**DA 100(3)** Course ID:010525 2021-03-31

**Introduction to Digital Art: Time & Image**

[Cross-listed with COMM 100] This introductory studio course explores many of the key principles, techniques and dialogues governing the creative potential of digital technologies within art and design. Topics of study include bitmap and vector-based digital imaging together with digital approaches to time-based media. The goal of the course is to empower students with an artistic and technological understanding of the subject, while encouraging an experimental approach to digital media.

**Components:** Lecture

**Course Equivalents:** COMM 100

**Attributes:** One communication unit, Imaginative Arts, Offered Spring Term

**Req. Designation:** Technology

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**DA 110(3)** Course ID:008565 2021-03-31

**Drawing**

This perceptually based studio course serves as one of the foundations for the DA&S major. Students will learn the importance of line, value, perspective, and human anatomy through the use of media such as graphite, charcoal, and ink. The translation of the 3D world to the 2D world through drawing will be emphasized.

**Components:** Lecture

**Attributes:** One communication unit, Imaginative Arts, Offered Fall Term

**Req. Designation:** Technology

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**DA 120(3)** Course ID:011147 2021-03-31

**Elements of Design**

In this traditional studio art course, the foundations of visual design will be studied, particularly in the fields of color theory and two and three dimensional design. Students create projects with a strong focus on basic elements such as: line, shape, texture, value, color, composition, plane, volume, and space. Other concepts, such as form vs. function and conceptual vs. perceptual creativity will also be studied.

**Components:** Lecture

**Attributes:** One communication unit, Imaginative Arts, Offered Fall Term

**Req. Designation:** Technology

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**DA 140(3)** Course ID:011884 2022-03-08

**Introduction to Digital Art: Form & Code**

This course introduces the key principles of computer programming. Through workshops, presentations, quizzes, readings, and project-based exercises and assignments, the course embarks on an investigation into the creative possibilities of computer programming within the digital arts. The skills and concepts taught in this course set a foundation for higher level DA&S courses within e.g. game design, web programming, and computational arts.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**DA 200(3)** Course ID:010526 2021-03-31

**3D Digital Modeling & Imagery**

This studio course introduces the creation of 3D imagery through the use of the computer. Students will gain experience through the creation and rendering of polygonal models, textures, and lights. This course will demonstrate the importance this medium has in fine art, film, advertising, and video games. Recommended to take DA/COMM 100 prior to taking DA 200, but not required.

**Components:** Lecture

**Attributes:** Imaginative Arts, Offered Fall Term

**Req. Designation:** Technology

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**School of Arts and Sciences - Digital Arts & Science - Subject: Digital Arts****DA 207(1)** Course ID:011818 2021-03-31**Media Landscapes I**

Students will watch, discuss, and critique media objects such as movies and other forms of popular culture. The course focuses on historical and contemporary examples of work that offer ongoing cultural legacies and represent significant achievements within their genre.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**DA 212(3)** Course ID:011820 2021-03-31**Art in Context**

This course offers a critical exploration of the key themes, ideas, and dialogues that inform and guide contemporary art practices. Through readings, writings, and discussions, students will analyze artists and art movements through both historical and theoretical perspectives with a special emphasis on the position of new media technologies in contemporary art and culture.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**DA 225(3)** Course ID:011590 2022-03-08**Digital Painting and Illustration**

This studio course teaches painting and illustration through the use of digital tools such as the computer and pen tablet. Building on the student's previous knowledge of color theory, drawing, and design, this course will introduce a raster-based media that facilitates the digital creation of concept art, comics, paintings, and 3D textures.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: DA100/COMM100, and DA110 or DA120 (or permission of the Communications & Media department)**Req. Designation:** Technology**DA 250(3)** Course ID:011115 2021-03-31**Interactive & Algorithmic Art**

In this course, students will be introduced to artistic expressions unique to digital art. They will experiment with creating forms, motions, and interactions through the design of algorithms and the manipulation of math functions. They will learn to conceive and design art works as a dynamic process and as an inseparable combination of audience participation and its visual manifestation. Through this course, students will garner an appreciation of contemporary and technological forms of artistic expression through the understanding of code-based art making. Students will also garner experience in deconstruction code-based digital art to garner a deeper appreciation of the art form. Throughout the course, students will be introduced to various examples of the application of code-based and interactive methods from artists who have a human-centered and critical approach to the role of technology in society.

**Components:** Lecture**Attributes:** Imaginative Arts, Offered Fall Term**Requirement Group:** Prerequisite: CS 141 or DA 140, or permission of the Comm & Media department**Req. Designation:** Technology**DA 300(3)** Course ID:010527 2019-07-08**3D Imagery & Animation**

An advanced studio course in which students apply their 3D modeling knowledge to camera and object animations. Students will explore advanced procedures while incorporating their experience with digital video and sound editing into each project. Projects will include both digital still imagery and 3D animation shorts.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: DA200 or permission of the Comm & Media department**Req. Designation:** Technology

**School of Arts and Sciences - Digital Arts & Science - Subject: Digital Arts**

DA 320(3) Course ID:011817 2021-03-31

**Moving Images: Motion Graphics & Animation**

Focusing predominantly on the software applications Adobe After Effects and Flash, this course explores creative and experimental uses of time-based media as both a form of artistic expression and as a vehicle for presenting data and information. While primarily a studio course, techniques and skills will be taught within a wider critical framework that explores the historical and theoretical precedents and contexts surrounding motion graphics and time-based art practices.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: DA100 or COMM100, or permission of the department**Req. Designation:** Technology

DA 321(3) Course ID:013151 2022-03-18

**Video Art**

With an emphasis on creative experimentation and artistic expression, DA321 offers a hands-on exploration of video and time-based media as an artistic medium. Focusing on hands-on project development, the course combines the acquisition of technical proficiencies in experimental and interdisciplinary approaches to video, with an exploration of the historical themes and theoretical frameworks informing contemporary time-based art practices. It is recommended to take DA 320 prior to taking this course.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: DA100 or COMM 100. DA320 Recommended**Req. Designation:** Technology

DA 322(3) Course ID:013174 2022-07-22

**Digital Imaging and Photography**

While offering an introduction to the technical workflows and principles governing digital photography, the main focus of this course concerns engaging with photography as a medium for artistic expression and exploration. This studio course involves hands-on creative projects, readings, and presentations.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

DA 340(3) Course ID:012926 2019-07-08

**Virtual Reality (VR) and Mixed Reality**

This exploratory class will delve into the use of virtual reality devices such as the Oculus Rift and HTC Vive for interactive content creation. Students will explore a mix between real-time, 360 video, and pre-rendered methods in order to produce challenging content which will explore the potential of what can be achieved with these exciting new platforms. Emphasis will be placed on the experimental application of techniques towards innovative content.

**Components:** Lecture**Attributes:** Imaginative Arts, Given When Needed**Requirement Group:** Prerequisite: CS141 or DA100**Req. Designation:** Technology

DA 341(3) Course ID:013065 2022-03-08

**Animating and Visualizing Data**

This studio course involves utilizing data as a means of linear and non-linear storytelling. Students will learn how to incorporate flat, time-series, and other types of data into moving images. Various methods will be introduced, but all will involve creating a data reader and the aspects of aesthetically displaying said data.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisite: DA140 or CS141**Req. Designation:** Technology

DA 342(3) Course ID:013099 2021-03-25

**3D Character Design, Sculpting and Rigging**

Students will conceptualize, design and digitally paint 2D characters and realize them as high polygon sculpted models. Methods for sculpting, baking and retopology will be covered for high-fidelity characters in preparation for rigging. Advanced rigging methods will be introduced for full character dialogue and expressive movement. Students will be required to purchase a small digital Wacom tablet to realize their designs.

**Components:** Lecture**Requirement Group:** Prerequisite: DA200 or permission of the department if you have a basic knowledge of 3D modeling softw**Req. Designation:** Technology

**School of Arts and Sciences - Digital Arts & Science - Subject: Digital Arts**

DA 343(3) Course ID:013132 2021-10-12

**3D Digital Character Animation**

This studio course covers principles of character animation and visual storytelling in relation to topics such as character acting, lip syncing, and game character cycles. With a focus on narrative-driven animation, the course engages with storyboarding, virtual camera cinematography and staging, as well as an exploration of narrative structures in relation to time-based media. With the emphasis on character animation rather than character creation, the course relies predominantly on pre-built assets as the starting point for animations.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisites: DA/COMM 100, or permission of the instructor.

Req. Designation: Technology

DA 391(3) Course ID:011076 2019-07-08 Department Consent Required

**Special Topics: Digital Arts & Science**

In DA&S Special Topics courses, students study topics not otherwise available in formal courses under the supervision of a faculty member. The specific topic and the course description for a special topics course are listed when it is offered. These courses reflect ongoing developments in digital art media and practice, which often are related to the particular faculty member's research interests. These courses are intended primarily for advanced students who wish to pursue special interests in the field.

Components: Lecture

Req. Designation: Technology

DA 392(3) Course ID:011077 2019-07-08 Department Consent Required

**Special Topics: Digital Arts & Science**

In DA&S Special Topics courses, students study topics not otherwise available in formal courses under the supervision of a faculty member. The specific topic and the course description for a special topics course are listed when it is offered. These courses reflect ongoing developments in digital art media and practice, which often are related to the particular faculty member's research interests. These courses are intended primarily for advanced students who wish to pursue special interests in the field.

Components: Lecture

Req. Designation: Technology

DA 394(3) Course ID:011079 2019-07-08 Instructor Consent Required

**Special Topics in Digital Arts & Sciences**

In DA&S Special Topics courses, students study topics not otherwise available in formal courses under the supervision of a faculty member. The specific topic and the course description for a special topics course are listed when it is offered. These courses reflect ongoing developments in digital art media and practice, which often are related to the particular faculty member's research interests. These courses are intended primarily for advanced students who wish to pursue special interests in the field.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

DA 400(3) Course ID:011121 2019-07-08 Department Consent Required

**Directed & Collaborative Study**

A studio course available to advanced students wishing to pursue further research in a specific area of interest. Meeting at the same time as DA300, this course provides an opportunity for collaboration & directed research in the specified area. This optional course gives the student a chance to expand their portfolio in preparation for a career in the digital arts.

Components: Independent Study

Attributes: Offered Each Term

Requirement Group: Prerequisites: A 300-level DA course, DA&amp;S major, and permission of the Comm &amp; Media department

Req. Designation: Technology

DA 410(1 - 3) Course ID:011122 2021-08-30 Department Consent Required

**Directed & Collaborative Study**

A studio course available to advanced students wishing to pursue further research in a specific area of interest. Meeting at the same time as DA310, this course provides an opportunity for collaboration & directed research in the specified area. This optional course gives the student a chance to expand their portfolio in preparation for a career in the digital arts.

Components: Independent Study

Attributes: Offered Each Term

Requirement Group: Prerequisites: A 300 level DA course, DA&amp;S majors only, and permission of the Comm &amp; Media department

Req. Designation: Technology

**School of Arts and Sciences - Digital Arts & Science - Subject: Digital Arts**

**DA 420(1 - 3)** Course ID:011324 2019-07-08 Department Consent Required

**Digital Arts Independent Study**

Designed primarily for a student who wishes to pursue special interests in Digital Arts for one or more semesters, this series of courses allows individual students to define independent study projects.

**Components:** Independent Study

**Requirement Group:** Prerequisites: One course in Digital Arts and permission of the Comm & Media department

**Req. Designation:** Technology

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**DA 421(1 - 3)** Course ID:011325 2019-07-08 Department Consent Required

**Digital Arts Independent Study**

Designed primarily for a student who wishes to pursue special interests in Digital Arts for one or more semesters, this series of courses allows individual students to define independent study projects.

**Components:** Independent Study

**Requirement Group:** Prerequisites: One course in Digital Arts and permission of the Comm & Media department

**Req. Designation:** Technology

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**DA 423(1 - 3)** Course ID:011707 2019-07-08 Department Consent Required

**Digital Arts Independent Study**

Designed primarily for a student who wishes to pursue special interests in Digital Arts for one or more semesters, this series of courses allows individual students to define independent study projects.

**Components:** Independent Study

**Requirement Group:** Prerequisites: One course in Digital Arts and permission of the Comm & Media department

**Req. Designation:** Technology

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**DA 480(3)** Course ID:011125 2022-03-08

**Internship in Digital Arts**

These internships are designed to provide practical work or research experience for the Digital Arts & Sciences majors. Generally, students work with a professional on projects in the field of digital arts, interactive design, advertising, and/or digital media design and production.

**Components:** Independent Study

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisites: DA&S Majors, DA Minor, or permission of the Comm & Media department

**Req. Designation:** Technology

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**DA 490(1 - 3)** Course ID:011206 2022-03-08 Department Consent Required

**Undergraduate Teaching Assistantship in Digital Arts & Science**

Students assist a faculty member in teaching a Digital Arts & Science course. Students engage in substantial pedagogical work beyond mastery of the target course material. Such activities might include mentoring students in course work, leading class discussions or demonstrations, designing or assessing course modules. Prerequisites: the student will have already taken the course in a previous semester or receive consent from the instructor.

**Components:** Independent Study

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**DA 491(3)** Course ID:010528 2019-07-08

**Professional Practice**

This is the first semester in the advanced studio sequence in which the DA&S major applies the knowledge and skills developed in the program to design a visual portfolio under the directed study of a specific faculty member. Each student should choose the proper section which correlates with the faculty member who they wish to work with for the semester.

**Components:** Lecture

**Attributes:** Two communication units, Offered Fall Term

**Requirement Group:** Prerequisites: Any 300 Level DA course and open to DA&S Majors only (or by permission of the Comm & Me

**Req. Designation:** Technology

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**DA 492(3)** Course ID:010529 2019-07-08

**Senior Studies**

The capstone of the advanced studio sequence in which DA&S seniors integrate the knowledge and skills developed in the program to complete their portfolios by working independently on a large-scale project. Each student should choose the proper section which correlates with the faculty member who they wish to work with for the semester.

**Components:** Lecture

**Attributes:** One communication unit, Offered Spring Term

**Requirement Group:** Prerequisites: DA491 and Senior standing in DA&S

**Req. Designation:** Technology

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**School of Arts and Sciences - Digital Arts & Science - Subject: Digital Arts****DA 499(0)** Course ID:013042 2020-06-01**Digital Art Minor Portfolio**

Under the guidance of Digital Arts faculty advisers from within the Department of Communication, Media & Design, students will compile a portfolio that functions as a way of showcasing and reflecting upon their achievements within the minor. The portfolio will be completed within this course. Students must receive a P (pass) in the minor portfolio in order to complete the requirements for the minor.

**Components:** Independent Study  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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**DA 500(3)** Course ID:012785 2019-07-08**Directed Study & Collaborative Projects**

DA500 will involve the creation of advanced projects under the guidance of the instructor. Topics may include but are not limited to: data visualization, scientific visualization, UI/UX interface design & app development, outreach projects structured around STEM Education, and STEM based virtual reality experiences.

**Components:** Independent Study  
**Attributes:** Offered Fall and Spring  
**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Data Science****DS 241(3)** Course ID:012919 2021-05-14**Introduction to Data Science**

[Cross listed as MA 241] This course introduces the basics of data manipulation and pre-processing to analyze data for statistical decision-making, building the skills required to organize, visualize, and communicate using data. The course seeks to help students address this question: given data from the world of science, engineering, medicine, etc., collected from multitude of sensors and sources, how do you begin to make sense of that data - and how do you use it? The primary tool for coding will be R/RStudio, but supporting Python syntax and libraries may also be introduced. The course emphasizes not only the low-level coding skills, but also the higher-level critical and quantitative reasoning skills required to analyze real-world datasets. Topics introduce key concepts such as descriptive statistics and sampling distribution (as a means to view large and very large data sets) and the basic analysis tools of Linear Regression and Data Mining. Additional topics may include social network data, unstructured data, and natural language text processing.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Corequisite: STAT282, or STAT383, or STAT318, or STAT389**Req. Designation:** Technology**DS 392(3)** Course ID:012892 2018-10-08**Ethics in Data Science and Applied Mathematics**

This course will consider real situations in which computational or data science delivers capabilities that may conflict with societal values. Students will analyze frameworks for promoting ethical decision making, such as audits, codes of conducts, and legal regulations. They will discuss how data-driven decision making can be aligned with societal values. (Discussion topics may include things like data stewardship, secondary-effect analysis, political and legal roles of mathematical professionals, and representative workforce.) Guest speakers from both physical and social sciences will introduce relevant, real-world examples, with a portion of course time dedicated to discussion of daily news items that relate to the topics of this course.

**Components:** Lecture**Attributes:** One communication unit, Offered Spring Term**Requirement Group:** DS392 Restrictions: Any STAT or DS Course**Req. Designation:** Technology

School of Arts and Sciences - Communication, Media & Design - Subject: English for Academic Purposes**EAP 250(3)** Course ID:011340 2015-02-19**Academic Writing for Undergraduates I**

[Formerly ESL250] This course, designed for non-native speakers of English at a low-advanced level of proficiency in written English, focuses on reading and writing for the academic context. Students read material from a variety of fields and develop their writing skills in definition, description, comparison and contrast, and analysis. The course also includes vocabulary-building techniques and a review of grammatical structures needed for effective writing.

Prerequisite: placement test.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**EAP 255(3)** Course ID:011627 2014-11-20**Academic Spoken Communication Skills for TAs and other International Undergraduate Students**

The course focuses on development of effective communication skills (including appropriate grammar and vocabulary) for various academic purposes (e.g., making presentations on a variety of academic themes, answering audience questions). As a group and individually, students also work on pronunciation, intonation patterns, and other features of fluent American English.

**Components:** Lecture

**Course Equivalents:** EAP 555

**Req. Designation:** Technology

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**EAP 350(3)** Course ID:011341 2015-01-23**Academic Writing for Undergraduates II**

[Formerly ESL350] This course integrates academic reading, writing, and critical thinking for non-native speakers of English who are at an advanced level of proficiency in written English. Students read short academic articles on various topics by a variety of authors, discuss and evaluate ideas, and write a number of analytical and argumentative papers, including a documented paper based on outside sources. Attention is given to key academic writing skills, e.g., summary, paraphrase, use of citations, and effective support of ideas.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: Placement test or grade of C or better in EAP250.

**Req. Designation:** Technology

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**EAP 354(2)** Course ID:011336 2015-02-03**Advanced Academic Writing for Undergraduates**

[Formerly ESL354] This writing seminar will provide high advanced non-native speakers of English with tools and teacher feedback to shape their writing skills for university level writing requirements. This seminar will focus primarily on the American cultural expectations/conventional structures for successful academic writing courses; students will enhance their tone, form, and structure of texts.

Prerequisites: Placement exam or completion of EAP250 with a grade of C or better.

**Components:** Lecture

**Attributes:** One communication unit, Offered Each Term

**Req. Designation:** Technology

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**EAP 380(1 - 3)** Course ID:013133 2021-10-12 Instructor Consent Required**Independent Study in EAP**

ESL for undergraduates whose needs don't fit into a conventional course.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**EAP 550(3)** Course ID:011343 2015-02-19**Academic Writing for Graduates I**

[Formerly ESL550] This course, designed for non-native speakers of English at a low-advanced level of proficiency in written English, focuses on reading and writing for the academic context. Students read material from a variety of fields and develop their writing skills in definition, description, comparison and contrast, and analysis. The course also includes vocabulary-building techniques and a review of grammatical structures needed for effective writing.

Prerequisite: placement test.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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School of Arts and Sciences - Communication, Media & Design - Subject: English for Academic Purposes

**EAP 552(3)** Course ID:011344 2015-01-20

**Academic Writing for Graduates II**

[Formerly ESL552] This course integrates academic reading, writing, and critical thinking for non-native speakers of English who are at an advanced level of proficiency in written English. Students read short academic articles on various topics by a variety of authors, discuss and evaluate ideas, and write a number of analytical and argumentative papers, including a documented paper based on outside sources. Attention is given to key academic writing skills, e.g., summary, paraphrase, use of citations, and effective support of ideas.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**EAP 554(2)** Course ID:011345 2015-01-20 **Instructor Consent Required**

**Academic Writing Seminar for Graduates II**

[Formerly ESL554] This writing seminar will provide high advanced non-native speakers of English with tools and teacher feedback to shape their writing skills for university level writing requirements. This seminar will focus primarily on the American cultural expectations/conventional structures for successful academic writing courses; students will enhance their tone, form, and structure of texts.

Prerequisites: Placement test or permission of the instructor

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**EAP 555(3)** Course ID:011342 2014-11-20

**Academic Spoken Communication Skills for TAs and other International Graduate Students**

[Formerly ESL555] This course is intended for international TAs and other international graduate students who need to improve their spoken English skills in order to interact effectively with students and faculty. The course focuses on development of effective communication skills (including appropriate grammar and vocabulary) for various academic purposes (e.g., leading discussions, making presentations, answering questions). As a group and individually, students also work on pronunciation, intonation patterns, and other features of fluent American English.

**Components:** Lecture

**Course Equivalents:** EAP 255

**Req. Designation:** Technology

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**EAP 580(1 - 3)** Course ID:012954 2019-09-02 **Instructor Consent Required**

**Independent Study in EAP**

For EAP interest or need. Consent of Instructor required.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Business - School of Business - Subject: Economics**

**EC 1(2 - 4)** Course ID:008068 2015-06-30

**Economics Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**EC 2(2 - 4)** Course ID:008069 2015-06-30

**Economics Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**EC 150(3)** Course ID:008070 2015-06-30

**Principles of Microeconomics**

(May be used with EC 151 to satisfy a CUSB M.B.A. or M.S. foundation requirement.) An introduction to microeconomics covering the role of the price system in and public policies toward the allocation of resources and the distribution of income. Included are the basic concepts of industry, supply and demand, technological change, private and social costs, market structures, analysis of firm behavior, household behavior and the gains from international trade. Students will be expected to use personal computers.

**Components:** Lecture

**Attributes:** Economics and Organizations, Offered Fall and Summer

**Requirement Group:** Restriction: Not open to Chemical, Civil, or Environmental Engineering majors. Students may not be gr

**Req. Designation:** Technology

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**EC 151(3)** Course ID:008071 2015-06-30

**Principles of Macroeconomics**

(May be used with EC 150 to satisfy a CUSB (Clarkson School of Business) M.B.A. or M.S. foundation requirement.) An introduction to macroeconomics including the analysis of national income determination, monetary and fiscal policy, aggregate economic growth and international economics. Price stability, balance of international payments and economic growth and development will also be examined. Students will be expected to use personal computers and prerequisite software.

**Components:** Lecture

**Attributes:** Economics and Organizations, Offered Spring and Summer

**Requirement Group:** Restriction: Not open to Chemical, Civil, or Environmental Engineering majors. Students may not be gr

**Req. Designation:** Technology

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**EC 200(1)** Course ID:011236 2022-02-10

**Engineering Economics**

A course to supplement EC150 for those students who are required to complete EC350 or its equivalent. The course will cover the topic of engineering economic analysis and provides preparation for the Fundamentals of Engineering Exam and the Professional Engineering Exam. Requisite: The course will only be offered to those students who have completed EC150.

**Components:** Lecture

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisite: EC150 or EC151

**Req. Designation:** Technology

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**EC 311(3)** Course ID:008073 2015-06-30

**Introduction to Econometrics**

Introduction to econometric techniques and statistical procedures required in analysis of economic problems. The course focuses on problems in estimation and inference of linear regression models. Topics include estimation and hypothesis testing using simple and multiple linear regression models under classical assumptions, binary variables, estimation and inference when the classical assumptions are violated, and basic time series analysis. This course requires the use of computers.

**Components:** Lecture

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisites: MA181 or equivalent and STAT282 or equivalent.

**Req. Designation:** Technology

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**Business - School of Business - Subject: Economics**

EC 313(3) Course ID:012872 2018-12-11

**Mathematical Economics**

This course aims to have students be able to understand and apply mathematical concepts in the context of a wide range of fields in economics, including microeconomics, macroeconomics, finance, economics of risk and uncertainty, economic development, international trade, environmental economics, and industrial organization. The course will build upon basic economic theory and mathematical concepts to focus on topics such as: comparative statics, financial mathematics, unconstrained and constrained optimization, dynamic optimization, and applications in contexts of uncertainty and strategic behavior.

**Components:** Lecture**Attributes:** Two communication units, Offered Fall Term**Requirement Group:** Prerequisites: EC150, EC151, MA131, and MA132**Req. Designation:** Technology

EC 350(3) Course ID:008074 2015-06-30

**Economic Principles and Engineering Economics**

An introduction to microeconomic concepts in a market type economy. Some of the issues covered are the role of supply, demand, market price determination, consumer behavior, production theory and cost, and market structure. An introduction to macroeconomic concepts including the analysis of national income determination, monetary and fiscal policy, aggregate economic growth, international economics and inflation. This course also includes a segment on engineering economic analysis. Engineering students should take this course rather than EC150 and EC151 because it provides preparation for the Professional Engineering exam.

**Components:** Lecture**Attributes:** Economics and Organizations, Offered Each Term**Requirement Group:** Prerequisite: Sophomore Standing, and Engineering or Engineering and Management majors only. Students**Req. Designation:** Technology

EC 357(3) Course ID:008077 2018-01-29

**Intermediate Microeconomics**

The study of how producers and consumers, acting through the market, determine the prices and outputs of goods and the allocation and income of productive resources. Empirical materials are used, and emphasis is placed on the uses and limitations of economic reasoning.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: EC/EM150 or EC350.**Req. Designation:** Technology

EC 358(3) Course ID:008078 2018-03-26

**Intermediate Macroeconomics**

Macroeconomics is the study of the economy as a whole and is concerned with some of the most important questions in economics such as: Why is there unemployment? What are the sources of rapid inflation? What causes recessions? Why are some nations rich while others are poor? Why do some economies grow faster than others do? Can policymakers "fine-tune" the economy? This course analyzes the economy in a "general equilibrium" framework, where the performance of the economy in terms of output, employment and unemployment, inflation and international capital flows is determined by the simultaneous interaction of the goods, labor, money, and international markets. The course will highlight the critical difference between the economy in the short and long run, the important role that expectations about the future play in macroeconomic analysis, and the role, limits, and transmission mechanisms of fiscal and monetary policy in efforts at economic stabilization.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: EC150, EC151, and EC313**Req. Designation:** Technology

EC 360(3) Course ID:008079 2016-09-23

**Environmental Economics**

[Cross-listed with EV 360] Economic analysis of problems caused by the impact of economic activities of society on the environment, and of the public and private policies that could be used for environmental improvement.

**Components:** Lecture**Attributes:** Economics and Organizations, Individual and Group Behavior, University Course, Offered Spring Term**Requirement Group:** Prerequisites: EC/EM150 or EC350.**Req. Designation:** Technology

**Business - School of Business - Subject: Economics**

EC 367(3) Course ID:008082 2017-11-07

**International Economics**

A survey of current theory and practice of international trade and finance. Topics covered include international trade theory, tariffs and quotas, international commodity agreements, balance of payments, foreign exchange markets, adjustment mechanisms and the international monetary system. Attention is given to the role of multinational corporations in the international economy.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisite: At least one course in Economics (EC)**Req. Designation:** Technology

EC 370(3) Course ID:010978 2015-07-08

**Economics of Innovation**

This course is designed to introduce students to microeconomic concepts relating to innovation, learning, technology adoption, and intellectual property protection. Various economic models of innovation are addressed. Topics include: incentives to innovate, market effects of innovation, and models of firm behavior and investment in innovation under conditions of uncertainty, and the importance of network effects/externalities and standardization in technology adoption. Throughout the course, students will be exposed both to economic theory as well as existing real-world case studies.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: Sophomore Standing and EC150.**Req. Designation:** Technology

EC 384(3) Course ID:008085 2017-04-05

**Game Theory and Economic Strategy**

This course is designed to introduce students to the various rudimentary elements of game theory with the goal of providing the student with the tools and the ability to enhance their capabilities for strategic thinking. Applications are drawn from a wide variety of areas such as business, politics, international relations, and biology. Cases can incorporate entry and deterrence strategies, advertising, pricing and product quality, auctions, issues of technology standards, and problems of compatibility. The course will include the main elements of games and their structure, decision analysis, solution concepts, uncertainty and information, cooperation, and bargaining.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: EC/EM150 or EC350 and MA181 or MA131**Req. Designation:** Technology

EC 451(3) Course ID:010979 2022-02-10

**Industrial & Supply Chain Economics**

This course studies the economics of industrial organization within the framework of supply chain management. Models of industry structures are covered along with the study of business clusters and networks. Material includes horizontal and vertical integration, transaction costs and outsourcing, incentive contracting, product differentiation, and pricing strategies. Topics are illustrated through selected industry case studies.

**Components:** Lecture**Attributes:** Offered Fall and Spring**Requirement Group:** Prerequisites: EC150 or EC350 and MA181 or MA131.**Req. Designation:** Technology

EC 468(3) Course ID:010387 2022-02-10

**Financial Markets and Institutions**

[Cross-listed with FN 468] Emphasis is placed on understanding the basics of managing financial institutions, such as banks, the flow of funds, markets, and regulatory agencies that affect the institutions. The course addresses risk management, term structure of interest rates, international and domestic market operations and policy questions about financial markets and related topics.

**Components:** Lecture**Course Equivalents:** FN 468**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: FN361.**Req. Designation:** Technology

**Business - School of Business - Subject: Economics**

**EC 475(3)** Course ID:011764 2022-02-10

**Personnel Economics**

This course makes use of economic theory and empirical evidence concerning personnel issues and the way incentives are structured within an organization. Topics include issues such as hiring standards, learning of worker productivity, compensation mechanisms, labor turnover, layoffs and buyouts, and various other personnel issues.

**Components:** Lecture

**Attributes:** Offered Odd Springs

**Requirement Group:** Prerequisite: EC150.

**Req. Designation:** Technology

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**EC 487(1 - 3)** Course ID:008090 2017-01-12 **Instructor Consent Required**

**Special Projects in Economics**

An investigation of a problem or in-depth topic undertaken by the student under the guidance of a faculty member.

Prerequisites: permission of the instructor

**Components:** Research

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**EC 604(2)** Course ID:008091 2015-08-06

**Applied Economics (MBA Module)**

[Cross-listed with EC 605] A graduate course in applied economics. An investigation of economic concepts and models likely to be useful for managers involved in financial, economic and strategic decision-making at various levels. Quantitative techniques and selected econometric procedures are emphasized. This course is designed for MBA students and meets five hours per week for five weeks.

**Components:** Lecture

**Course Equivalents:** EC 605, EC 605, HC 620

**Requirement Group:** Restriction: Admission to the MBA program required

**Req. Designation:** Technology

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**EC 605(3)** Course ID:008092 2022-10-13

**Managerial Economics**

[Cross-listed with EC 604, HC 620] This is an advanced and applied course in managerial economics, with introductory material in microeconomic principles. The course starts with selected principles topics such as demand and supply analysis, market equilibrium, household behavior, production and costs, and firm behavior. We then move on to more sophisticated theories of consumption and production such as demand elasticity measures, profit maximization and sensitivity analysis, price discrimination, demand estimation, theories of risk and uncertainty, market structures, and game theory. Students participate in economics games and experiments throughout the course, and examples drawn from the business and financial worlds are used to illustrate the key concepts.

**Components:** Lecture

**Same As Offering:** EC 605

**Course Equivalents:** EC 604, HC 620

**Req. Designation:** Technology

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**Business - CRC Business - Subject: Economics****EC 605(3)****Course ID:008092****2022-10-13****Managerial Economics**

[Cross-listed with EC 604, HC 620] This is an advanced and applied course in managerial economics, with introductory material in microeconomic principles. The course starts with selected principles topics such as demand and supply analysis, market equilibrium, household behavior, production and costs, and firm behavior. We then move on to more sophisticated theories of consumption and production such as demand elasticity measures, profit maximization and sensitivity analysis, price discrimination, demand estimation, theories of risk and uncertainty, market structures, and game theory. Students participate in economics games and experiments throughout the course, and examples drawn from the business and financial worlds are used to illustrate the key concepts.

**Components:** Lecture**Same As Offering:** EC 605**Course Equivalents:** EC 604, HC 620**Req. Designation:** Technology

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**Business - School of Business - Subject: Economics****EC 611(3)  
Econometrics****Course ID:011986****2019-11-01**

This course is an introductory-level graduate econometrics course, focusing mainly on time-series and panel data techniques. It is entry-level in the sense that students are not presumed to have any prior acquaintance with econometrics, although they should have sufficient statistical and computing background and coursework in calculus including some optimization. Students also need to be somewhat familiar with some statistical software such as R or SAS or Python. The course attempts to serve two types of audiences. For those who wish to pursue applied data analysis in the real world, it presents a wide array of problem instances and tools appropriate for those instances. The course also serves as a stepping stone for those interested in knowing the field more intimately, introducing them to a fair amount of theory and a selection of classic and contemporary econometrics papers.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Business - CRC Business - Subject: Economics**

EC 652(3) Course ID:012007

2018-11-08

**Industrial Organization in the Supply Chain**

[Cross-listed with EC 651] This is an industrial organization course that focuses on the strategic interactions within the supply chain under various market conditions. Models of industry structures are explored along with the discussion of business clusters and networks. Starting with a review of basic microeconomics principles: other topics include horizontal and vertical integration, outsourcing, contract negotiations and incentives, logistics issues, capacity constraints, pricing strategies and network issues all from the perspective of the supply chain. Students apply the models covered in class through several case studies to evolve in the art of strategic thinking.

**Components:** Lecture**Req. Designation:** Technology

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**Business - School of Business - Subject: Economics****EC 660(3)** Course ID:008095 2015-06-30**Environmental Economics**

This course considers environmental problems from an economic perspective. Topics include the theoretical foundations of environmental economics, measuring the costs and benefits of environmental policies, environmental policy issues, and special topics including risk and uncertainty in environmental regulation, sustainable development, and issues in natural resource damage assessment.

Prerequisites: EC150 or EC350 or EC151 or equivalent.

Components: Lecture

Req. Designation: Technology

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**EC 687(1 - 6)** Course ID:008100 2015-06-30 **Instructor Consent Required****Special Projects in Economics**

An investigation of a problem undertaken by the student which is acceptable to and under the guidance of the faculty member and chairperson. The course provides an opportunity for the student to investigate and analyze a problem area of economics in depth on an independent study basis.

Prerequisites: permission of the Department of Economics Chair, and the faculty member involved.

Components: Independent Study

Req. Designation: Technology

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**Institute for STEM Education - Inst for STEM Education - Subject: Education**

ED 300(1) Course ID:012778

2020-07-16

**Field Experience**

(Minimum of 20 hours) Candidates are observers in a variety of education and education-related settings. Apart from community and after-school programs, there must also be a range of school and classroom experiences (e.g., urban, suburban, rural; high-and low-performing schools)-all taking place at the secondary level-so that candidates have a broad experience and learn as much as possible about secondary learners and secondary education philosophy.

**Components:** Field Studies  
**Attributes:** Offered Fall and Spring  
**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Education**

**ED 440(1)** Course ID:012996 2019-11-20 Instructor Consent Required

**Seminar in Cultural Competency and Teaching in the STEM Classroom**

This seminar focuses on how culture, gender, race, and class impact the nature of STEM Education in secondary schools. Content will include a mix of reading, invited speakers, and panel discussions chosen to introduce participants to teaching and learning issues of diversity, poverty, and social justice. Students will provide written responses each week and submit a self-assessment on their own cultural sensitivity and sense of educational equity and describe how it evolved over the semester in terms of being influenced and informed by the course content. Requires permission of instructor or department.

**Components:** Seminar

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**ED 501(1)** Course ID:012289 2018-01-03

**Teaching Practicum**

Formerly EDS 500F] MAT interns must complete 75 hours total (12 full school days) of observation and/or teaching either before the residency or at the beginning of the residency. 30 hours of the practicum should be completed with the mentor and with other department members assigned by the mentor and/or supervisor. The Practicum must include at least 15 hours in each of the following settings: students with disabilities, low socio-economic, and English as a New Language (ENL). Half of the total Practicum must be in grades 7-9, and the other half in grades 10-12. Residency supervisors must meet with the intern and mentor during the first weeks of school to review the Practicum requirements for the individual intern. The supervisor will help facilitate each intern's Practicum in collaboration with the mentor and intern and arrange observations in other schools, if needed. During the Practicum, the intern will understand the differences in adolescents' learning challenges, cognitive abilities, emotional and physical needs (CAEP InTASC 1.1); interpret students'

**Components:** Practicum

**Attributes:** Offered Fall Term

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program

**Req. Designation:** Technology

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**ED 502(0)** Course ID:012290 2020-05-13

**NYS Requirements**

[Formerly EDS 500G] This course provides the NYS requirements for teacher certification. This course covers the prevention and intervention of school violence, child abuse identification and reporting, prevention of child abduction, drug, alcohol and tobacco abuse prevention and dignity for all students.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program

**Req. Designation:** Technology

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**ED 503(1)** Course ID:012813 2022-04-08

**Professionalism in Teaching I**

Coursework in diversity and inclusion, career preparation, New York State Certification Exam preparation, and residency seminar.

**Components:** Seminar

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**ED 504(1)** Course ID:012947 2022-08-10

**Professionalism in Teaching II**

Coursework in diversity and inclusion, career preparation, New York State Certification Exam preparation, and residency seminar. This is a continuation of ED 503 Professionalism in Teaching I.

**Components:** Seminar

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**ED 511(3)** Course ID:012291 2017-07-13

**Curriculum and Methods of Teaching English**

[Formerly EDS 511] Curricular Planning and Instruction for the Teaching of English at the secondary level includes an analysis of secondary language arts curricula including New York State Frameworks for language arts, the Common Core State Standards, instructional techniques and strategies, designing and locating instructional materials, planning, implementing, and evaluating lessons and units.

**Components:** Lecture

**Attributes:** Offered Summer Term

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program

**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Education****ED 512(3)** Course ID:012292 2017-07-13**Curriculum and Methods of Teaching Mathematics**

[Formerly EDS 512] Curricular Planning and Instruction for the Teaching of Mathematics at the secondary school level will include an analysis of classic and current secondary mathematics curricula including New York State Frameworks for mathematics, the Common Core State Standards, instructional techniques and strategies, designing and locating instructional materials, planning, implementing, and evaluating lessons and units.

**Components:** Lecture**Attributes:** Offered Summer Term**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology**ED 513(3)** Course ID:012293 2017-07-13**Curriculum and Methods of Teaching Languages**

[Formerly EDS 513] Curricular Planning and Instruction for the Teaching of Second Languages at the secondary school level will include an analysis of secondary language curricula including New York State Frameworks for languages; instructional techniques; the teaching of speaking, listening, reading, and writing; designing and locating instructional materials; planning, implementing, and evaluating lessons and units. This course is based on a view of teaching and learning as facilitated by social interaction and that each individual brings unique background knowledge and beliefs to their learning.

**Components:** Lecture**Attributes:** Offered Summer Term**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology**ED 514(3)** Course ID:012294 2017-07-13**Curriculum and Methods of Teaching Sciences**

[Formerly EDS 514] Curricular Planning and Instruction for the Teaching of Science at the secondary school level will include an analysis of secondary science curricula including New York State Frameworks for sciences; instructional techniques and strategies for teaching scientific concepts; laboratory methods and safety, designing and locating instructional materials; planning, implementing, and evaluating lessons and units.

**Components:** Laboratory, Lecture**Attributes:** Offered Summer Term**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology**ED 515(3)** Course ID:012295 2017-07-13**Curriculum and Methods of Teaching Social Studies**

[Formerly EDS 515] Curricular Planning and Instruction for the Teaching of Social Studies at the secondary school level will include an analysis of secondary social studies curricula including the New York State Frameworks for social studies; models and techniques for teaching and integrating the various social sciences; designing and locating instructional materials; planning, implementing, and evaluating lessons and units. This course is required for MAT social studies candidates.

**Components:** Lecture**Attributes:** Offered Summer Term**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology**ED 516(3)** Course ID:012296 2017-07-01**Curriculum and Methods of Teaching Technology**

[Formerly EDS 516] Designed for those with a technology or engineering background, this course will help prepare technology educators to promote students' learning by the use of multiple instructional models. The course builds teacher skills in lesson planning, content organization, and hard and software evaluation and use. New York State Standards for technology and evolving approaches to integration of technology in the teaching/learning process will also be explored.

**Components:** Lecture**Attributes:** Offered Summer Term**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: Education**

**ED 517(3)** Course ID:012927 2019-02-11

**Curriculum and Methods of Teaching Business and Marketing**

The primary objective of this class is to prepare you to teach business and marketing subjects at the 7th - 12th grade levels. This field includes, but is not limited to, accounting, marketing, finance, information systems, data analysis, and keyboarding. The class emphasizes methodology, curriculum planning, unit and lesson planning, and classroom management. It is assumed that students will be able to apply business and marketing subject matter knowledge to their new learning in the field of pedagogy.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**ED 518(3)** Course ID:013013 2020-01-15

**Curriculum and Methods of Teaching Computer Science**

Designed for those with a computer science background, this course will help prepare computer science educators to promote students' learning by the use of multiple instructional models. The course builds teacher skills in lesson planning, content organization, and hard and software evaluation and use. New York State Standards for technology and evolving approaches to integration of technology in the teaching/learning process will also be explored.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**ED 526(3)** Course ID:013111 2022-04-08

**Teaching in American Schools**

Students will become familiar with American public secondary education through reading, discussion, writing, and on-site school observation. A strong emphasis will be on professional writing, reading, and professional communication skills as required by American teachers. Students will be prepared professionally and culturally to enter the public school classroom.

**Components:** Seminar

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**ED 540(3)** Course ID:012301 2017-07-13

**Psychology of Teaching**

[Formerly EDS 540] The Psychology of Teaching is a foundational introduction to teaching: audience, planning, instruction, basic concepts, standards, classroom management, assessment, motivation, discipline, and ethical and professional considerations. Theories of learning and memory applied to instruction; models and research on teaching in secondary schools. Includes thematic analysis of relevant teaching topics such as special needs, differentiated instruction, human development, and foundations of education.

In Psychology of Teaching Microteaching Laboratory graduate students prepare and present several lessons using a variety of instructional models. Models include anticipatory sets, discussion concepts, skills and inquiry with attention paid to themes such as special needs, differentiated instruction, literacy, second language, learners and service learning. Lessons are digitally recorded and critiqued by peer-coaches and

**Components:** Laboratory, Lecture

**Attributes:** Offered Summer Term

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program

**Req. Designation:** Technology

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**ED 541(3)** Course ID:012303 2017-07-13

**Essential Reading Literacy**

[Formerly EDS 541] Essential Reading Literacy focuses on a teacher-centered exposure to the basic concepts, skills, and contexts for teaching reading in secondary classrooms. Teachers of the 21st century face many challenges, including the large spectrum of reading abilities in their classrooms. Graduate students will be exposed to the concept of adolescent literacy and basic principles of teaching it, including reading habits, skills, extensive knowledge of the reading process, and the development of a repertoire of strategies and skills to help influence and improve the teaching of reading in all classrooms across all disciplines.

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Education****ED 542(3)****Course ID:013128****2021-09-28****MAT Preservice Seminar**

This course is designed for students who have completed ED 540/41 and are preparing to enter fall teaching residencies in a subsequent school year. In this course, students will gain an understanding of standards-based instruction and best practices in the classroom. Topics including backward design, learning objectives, assessment and differentiation will be reviewed in the framework of modern pedagogical theory. Students will design and peer-review lesson plans for upcoming teaching lab enactments, as well as debrief and revise plans for future instruction. Students will be introduced to academic writing styles employed in reflective journaling and EdTPA writing.

**Components:** Lecture**Req. Designation:** Technology**ED 544(3)****Course ID:012304****2022-04-08****Literacy for the Content Classroom**

[Formerly EDS 544] This course familiarizes MAT students with the necessity for and techniques of increasing student literacy (skills, attitudes, and dispositions) in each content area. Participants read background information, explore their own literacy skills, and practice applying reading and writing activities in lesson plans. Students will recognize the importance of literacy in all content areas; expand their definitions of literacy, exploring the skills and dispositions which make it possible for students to read and write for meaning for a wide variety of academic and personal purposes; explore and develop their own skills as proficient readers and writers in general and in their chosen content areas; become aware of issues of literacy through readings and discussions; become aware of how the kinds of writing assigned to students shape their thinking; develop, analyze, and integrate literacy skills in classroom lessons; integrate writing into classroom lessons in a variety of ways to stimulate and shape thinking; address NYS standards and CCSS

**Components:** Seminar**Attributes:** Offered Fall Term**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program**Req. Designation:** Technology**ED 550(3)****Course ID:012305****2021-11-17****Effective Teaching for All Learners**

[Formerly EDS 550A] Effective Teaching for All Learners at the secondary level will explore teaching and assessment for the full range of students a teacher encounters: at-risk students, special needs populations, English as a new language learners, struggling readers, disaffected learners, etc. The resources and strategies available to assist classroom teachers will be discussed and implemented. Graduate students will learn how to evaluate the effectiveness of their teaching as it relates to all their students' progress. In order to gain this understanding, graduate students will evaluate various learning assessments through the lens of different student populations, and design and evaluate a range of assessments. Awareness, empathy, and empowerment are the goals for both teachers and their students.

**Components:** Seminar**Attributes:** Offered Fall Term**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program**Req. Designation:** Technology**ED 551(4)****Course ID:012309****2023-05-04****Internship/Residency I**

During the 4-credit internship/residency the candidate will first observe and co-teach with their mentor at the beginning of the school year. The candidate is expected to gradually assume responsibility for two classes, at first co-teaching with the mentor, but independently teaching within the first semester. Note, it is the MAT program expectation that candidates continue in their internships/residencies until the end of the P-12 school academic year. Candidates who are on the internship track must remain in their placements for 1/2 day, every day. Candidates on the residency track must remain in their placements for 6 hours, every day.

**Components:** Field Studies**Attributes:** Offered Each Term**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: Education**


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**ED 552(4)** Course ID:012310 2023-05-04

**Internship/Residency II**

The 4-credit internship/residency follows ED 551. The candidate is expected to be primarily responsible for two of the mentor's classes, independently teaching throughout the second semester with mentor support. Note, it is the MAT program expectation that candidates continue their internships/residencies until the end of the P-12 school academic year. Candidates who are on the internship track must remain in their placements for a 1/2 day, every day. Candidates on the residency track must remain in their placements for 6 hours, every day.

**Components:** Field Studies

**Attributes:** Offered Spring Term

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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**ED 553(4)** Course ID:013118 2023-05-04

**Internship/Residency Supplemental**

This 4-credit residency is intended for an MAT student seeking additional certification. The candidate will observe and co-teach with their mentor for half of a school year to fulfill the requirements of the internship. The candidate is expected to gradually assume responsibility for two of the mentor's classes, and will be evaluated using the internship/residency pre-service assessment (RPA).

**Components:** Field Studies

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**ED 560(3)** Course ID:012307 2021-10-08

**The Modern Teacher**

[Formerly EDS 550C] This course is designed to acquaint students with current school reform issues while exposing students to the large number of digital resources, websites, strategies, software and hardware that will help them in their classroom today.

Students will be able to:

- Analyze and evaluate the school reform movement from a historical perspective.
- Communicate more productively with students, parents and colleagues and streamline their digital workflow.
- Differentiate instruction within their class using digital means and modern pedagogy.
- Work cooperatively to teach their classmates about school reform and technology.
- Design a school reform proposal using digital means.

**Components:** Seminar

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**ED 570(3)** Course ID:012313 2017-07-13

**Middle School Students, Structures and Standards**

[Formerly EDS 570] This course is designed to prepare students for the teaching of grades 5 and 6. It is designed to offer students a chance to explore topics and methodology that are most appropriate for the teaching of students at the middle adolescence level. It is a course based on the theoretical and practical aspects of the teaching experience and on helping develop students into what we need today: competent, energetic and dedicated teachers at the middle level. This is a professional course which demands professional responsibility, a regular commitment, initiative and attentiveness. It is not in any way an exploratory course but one in which a commitment to teaching is assumed. This course and ED 571 qualify students with a grade 7-12 teaching certificate to be also certified to teach grades 5 and 6 in New York State.

Prerequisites: Adolescent 7 - 12 Teacher Certification in a content area.

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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**ED 571(3)** Course ID:012314 2017-07-13

**Middle Adolescence Literacy**

[Formerly EDS 571] This course is designed to prepare you to teach and develop literacy skills across the curriculum in grades 5 and 6. Completion of this course and ED 570 will qualify you with a grade 7-12 teaching certificate for additional certification in your content area in grades 5-6 in New York state. This course is based on both theoretical and practical aspects of the teaching experience. Students will review research, policy briefs and position statements on developing reading, writings, listening, speaking, viewing, and thinking as it applies to the middle adolescent level. The overall goals of this course will require you to connect, collaborate, and create to expand your concept of literacy; to understand the elements of effective literacy instructions in your content area for grades 5 and 6; and to acknowledge your role as a "reading teacher" no matter what your content area specialty is.

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Education**

ED 572(3) Course ID:012797 2017-07-01

**Teaching Foreign Language to Elementary School Children**

This course aims to prepare participating teachers for elementary school foreign language classrooms in light of the ACTFL National Foreign Language Standards. Through discussion, practice and the development of thematic units, participants will become familiar with the process of curriculum development and lesson planning, and will develop strategies for instruction and assessment. Participants will also gain understanding of the working environment and classroom culture of the elementary school setting and build up skills for effective teaching. Multiple modes of learning, methods, instructional strategies, language and literacy development, and resources for teaching foreign languages to elementary school children will be covered. Emphasis is on the development of literacy and communicative skills. Participants will build knowledge and understanding of this grade range through the viewing and analysis of classroom video.

Components: Lecture

Attributes: Offered Summer Term

Req. Designation: Technology

ED 573(3) Course ID:013036 2020-04-01

**Virtual Learning in the P-12 Classroom**

In this online class, educators will learn how to shift course interaction and materials from the classroom to an online setting. We will explore elements that create quality online instruction including personalization, communication options and processes, student interactions, and a variety of learning experiences. The course will empower educators to build opportunities for their students to actively interact with each other, with their teacher(s), and with the content of the course.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

ED 580(3) Course ID:012715 2021-07-28

**Action Research Project**

The MAT Action Research Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

ED 590(1) Course ID:012853 2017-11-15

**Inquiry Research and Methods**

Students will engage in inquiry through the investigation of documents and research-based methodologies. Focus will be placed on practical applications of materials in the full-year residency.

Components: Lecture

Attributes: Offered Each Term

Req. Designation: Technology

ED 610(3) Course ID:012316 2020-04-07

**Reflective Teaching Practices**

Reflective Teaching Practices is designed to teach participants how to become reflective practitioners of their own teaching. Participants will be immersed in an exercise in evaluating their own professional practice with the goal of improving student learning. This will be accomplished by creating a supportive learning environment with teacher colleagues who wish to accomplish the same goal. Participants will critically discuss their teaching practice, and critique each other's practice through the use of videotapes.

Participants will demonstrate an embodiment of the National Board for Professional Teaching Standards through the work they bring to the seminar and the manner in which they critique their own and other participants' work.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

**Institute for STEM Education - CRC Education Program - Subject: Education****ED 624(3)****Course ID:012321****2020-06-05****School Law**

This course is designed to teach the basic tenets of education law - state and federal. Constitutional principles will be explored and debated. The Socratic Method will engage students, creating a learning community in each class. Given the seminar nature of the class, it is expected the professor will explain a concept and engage students in-depth discussions every day. Real life experiences will bring the law to a practical, manageable level. This culture will allow students to challenge presumptions, question reasoning and debate ideas to grasp longstanding and newly formed legal concepts. Students will hone critical thinking and writing skills completing the course equipped to analyze problems and synthesize solutions in practical ways, with the law as their guide.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**ED 649(3)****Course ID:013108****2021-04-27****Research in Curriculum & Instruction**

This course is an introductory course on research methods, designed to prepare students for graduate level research. The course examines the full scope of the research process from the literature review, to research questions, and writing a research proposal. Different data collection methods will be discussed including qualitative, quantitative, mixed-method, meta-analysis, ethnography, case study, survey, interview and focus group, and document analysis. The course culminates with presentations by students which demonstrate an understanding of the research proposal process.

**Components:** Seminar**Attributes:** Given When Needed**Req. Designation:** Technology**ED 650(3)****Course ID:013109****2021-08-06****Master's Thesis I**

Candidates will work toward completing a master's thesis in the Spring semester, individually with guidance from a thesis advisor. The thesis will include an Introduction (Chapter I) and Literature Review (Chapter II). This course will provide guidance to complete a systematic exploration. Candidates will produce Chapters I and II by developing a research question, investigating current research, developing an informed hypothesis in response to their question, and reviewing and synthesizing related research. Candidates will begin to draft their Methodology or Application Plan (Chapter III) by creating a plan to test their hypothesis or engage in further inquiry into their topic.

**Components:** Thesis Research**Attributes:** Given When Needed**Req. Designation:** Technology**ED 651(3)****Course ID:013110****2021-08-06****Master's Thesis II**

In this course and its predecessor, ED 650, candidates will work toward completing a master's thesis. Work will be completed individually with guidance from a thesis advisor. Candidates will continue work begun in ED 650 by creating the final chapters of their thesis and presenting their completed work to their advisors/thesis committee. Coursework will focus on creating a Methodology or Methods of Inquiry (Chapter III), Results (Chapter IV), Discussion and Conclusion (Chapter V) and preparing a presentation of the Master's thesis.

**Components:** Thesis Research**Attributes:** Given When Needed**Req. Designation:** Technology**ED 988(2)****Course ID:013120****2022-01-03****Independent Study in Education**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology**ED 989(2)****Course ID:013121****2022-03-18****Independent Study in Education II**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: Education**

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ED 990(3) Course ID:013178 2022-08-10

**Independent Study in Curriculum I**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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ED 991(3) Course ID:013179 2023-01-10

**Independent Study in Curriculum II**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

EE 1(2 - 4) Course ID:008103 2015-01-13

**Electrical and Computer Engineering Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology

EE 2(2 - 4) Course ID:009665 2016-07-01

**Electrical and Computer Engineering Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology

EE 211(3) Course ID:008104 2020-06-01

**ECE Laboratory I**

An introductory course that presents the fundamentals of electrical instrumentation while developing laboratory skills. Experiments explore basic electrical properties of analog and digital circuits. The development of sound techniques for circuit construction and troubleshooting are emphasized, as is the role of the computer in a laboratory environment. Use of CAD/CAE tools such as Pspice and LabView is integrated into the course. Lab safety and the documentation and reporting of laboratory results are covered.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Offered Spring Term**Requirement Group:** Corequisite: EE221. Prerequisites: ES250 and EE264.**Req. Designation:** Technology

EE 221(3) Course ID:008105 2019-11-19

**Linear Circuits**

Steady state response of linear circuits to both sinusoidal and periodic inputs. AC steady-state power.

Magnetically coupled circuits. Network functions, transfer functions, gain and phase shift. Bode plots.

Fourier series. Laplace transform. The relationship between the time and frequency domain solutions.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: ES250.**Req. Designation:** Technology

EE 260(3) Course ID:008108 2020-09-03

**Embedded Systems**

An introductory course covering the fundamentals of microcontroller hardware and software. Topics include microcontroller systems, input/output (I/O) standards and data communication protocols, interfacing with memory systems and sensors, data collection, display, and control of peripheral modules and actuators. The microcontroller will be programmed in the C programming language. Interfacing assembly language to high level language code will be treated as well. A comprehensive term project will allow student teams to apply the theoretical concepts for solving a practical problem using a microcontroller and peripheral devices.

**Components:** Laboratory, Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: CS141**Req. Designation:** Technology

EE 261(3) Course ID:008109 2014-11-19

**Introduction to Programming and Software Design**

A first course in programming and software design. Assumes no prior programming experience. The focus is upon the design of well-structured programs using problems selected from engineering applications. Topics include: fundamentals of software engineering design; elements of modern C-family programming language (such as Java, C, or C++); object oriented programming; the specification, design and implementation of numerical algorithms.

**Components:** Laboratory, Lecture**Course Equivalents:** CS 141**Attributes:** Offered Fall Term**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

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**EE 262(3)** Course ID:008110 2018-01-29**Intro to Object-Oriented Programming and Software Design**

A thorough introduction to Object Oriented Programming, including classes, inheritance and subtyping, overloading, and overriding. Dynamic memory management. Debugging. Introduction to Testing Driven Development. Introduction to fundamental data structures.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: CS141**Req. Designation:** Technology

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**EE 264(3)** Course ID:008111 2023-01-30**Introduction to Digital Design**

An introductory course covering the fundamentals of computer system hardware. Topics include data representation using number systems and codes, Boolean algebra and logic, digital logic devices, combinational and sequential circuits, arithmetic logic units and simple processor organization including registers, memory, addressing and processing of machine instructions.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Offered Fall Term**Req. Designation:** Technology

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**EE 291(1 - 3)** Course ID:008112 2015-02-03**Special Project in Electrical and Computer Engineering**

Students are involved, individually or working in groups on a special project under the direction of a faculty member. Topics are ordinarily suggested by the faculty member. These projects are limited in scope, ordinarily not requiring a degree of expertise beyond the sophomore year. Not to be used as a professional elective in the Electrical Engineering program or in the Computer Engineering program.

Prerequisites: consent of the department chair.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology

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**EE 301(2 - 4)** Course ID:008113 2015-08-18**ECE Area Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy an Area Elective.

**Components:** Independent Study**Attributes:** Transfer Credit Only**Req. Designation:** Technology

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**EE 311(3)** Course ID:008114 2015-02-19**Electrical Engineering Laboratory II**

This laboratory course provides students with a series of experiments based on material in required sophomore and junior level courses. The experiments are designed to emphasize model identification, validation, and use. The course includes one or more design projects which include team oriented design, development, testing, and documentation components.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Offered Fall Term**Req. Designation:** Technology

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**EE 316(3)** Course ID:008115 2019-11-20**Computer Engineering Junior Laboratory**

A design laboratory in computer engineering emphasizing the fundamentals of designing and testing computer system components. Sub-system level digital circuits are designed, constructed, and tested using standard small- and medium-scale integrated circuits and programmable logic devices. Software components which interface with hardware and operating systems are also designed, written and tested. All design projects employ a team based approach.

**Components:** Laboratory, Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: EE365. Corequisite: EE211.**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng****EE 321(3)** Course ID:008116 2019-06-07**Systems and Signal Processing**

Characterization, classification and representation of signals and systems. Convolution. Fourier transforms. Discrete time systems and z transforms. Sampling theorem. Stability.

**Components:** Lecture**Attributes:** One communication unit, Offered Fall Term**Req. Designation:** Technology**EE 324(3)** Course ID:008107 2021-10-13**Dynamical Systems**

[Cross-listed with AE/ME 324] Dynamic systems classification, mathematical modeling of mechanical, electrical and mixed dynamic systems, state space representation, equilibrium points and linearization, solution of linear input/output and state equations, Laplace transforms, transfer functions and block diagrams, first and second order systems, stability, frequency response and simulation techniques.

**Components:** Lecture**Course Equivalents:** ME 324**Attributes:** Offered Fall and Spring**Requirement Group:** Prerequisites: MA232.**Req. Designation:** Technology**EE 331(3)** Course ID:008118 2015-02-19**Energy Conversion**

Properties of magnetic materials. Magnetic circuits and transformers. Fundamentals of rotating magnetic-field machines. Synchronous machines. Induction machines. Phasor diagrams and equivalent circuits of transformers, induction machines and transformers. DC machines.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: ES250.**Req. Designation:** Technology**EE 333(3)** Course ID:008119 2015-01-20**Power System Engineering**

Transmission line and transformer models. Per unit. Power transfer equations and their solution and interpretation. Maximum power transfer. Symmetrical components and fault current calculation. Computer analysis methods for power systems.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: EE221.**Req. Designation:** Technology**EE 341(3)** Course ID:008121 2015-02-19**Microelectronics**

Theory of semiconductor materials, p-n junctions, bipolar and field effect transistors. Analysis of device characteristics, device modeling and equivalent-circuits. PSpice simulation of electronic circuits. Applications including study of biasing, low frequency amplifiers, switching circuits and digital logic operations.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: ES250.**Req. Designation:** Technology**EE 360(3)** Course ID:008126 2015-01-20**Microprocessors**

An introductory course covering the fundamentals of microcomputer hardware and software. Topics include microprocessor system hardware, assembly language programming, input/output devices and bus discipline. Memory systems, serial interfacing, and interfacing assembly language to high level language code will be treated as well.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: EE264.**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

EE 361(3) Course ID:008127 2018-12-12

**Fundamentals of Software Engineering**

This is a foundation course in the design of computer software. It covers fundamental techniques and methodologies for software design and implementation. Topics include the software engineering life cycle, object-oriented design, data and procedural abstraction, recursion, iteration, file I/O, and elementary data structures.

**Components:** Lecture  
**Attributes:** Offered Spring Term  
**Requirement Group:** Prerequisite:EE262 Introduction to Object Oriented Programming and Software Design  
**Req. Designation:** Technology

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EE 363(3) Course ID:008128 2018-12-11

**Software Components and Generic Programming**

This course is concerned with software design principles that foster creation of reusable software components. Topics include abstract data types, behavioral inheritance and subtyping, generics, interface design, dependency injection, and analysis of algorithmic behavior. Students will gain experience with software development best practices including design of test scenarios, unit testing, code reviews, refactoring and version control in the context of a modern integrated development environment.

**Components:** Lecture  
**Attributes:** Offered Fall Term  
**Requirement Group:** Prerequisites: EE262 Introduction to Object Oriented Programming & Software Design  
**Req. Designation:** Technology

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EE 365(3) Course ID:008130 2015-02-19

**Advanced Digital Circuit Design**

An advanced course in digital circuit design. This course begins with an overview of electrical characteristics of logic gates, various standards for I/O buses and communication interfaces. Topics include hierarchical and modular design of digital logic circuits, simulation and synthesis of digital systems on programmable logic devices using computer-aided design software, and debug and verification of design using embedded and standalone logic analyzers.

**Components:** Lecture  
**Attributes:** One communication unit, Offered Fall Term  
**Requirement Group:** Prerequisites: EE264 or equivalent.  
**Req. Designation:** Technology

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EE 368(3) Course ID:008131 2015-01-20

**Software Engineering**

Study of the principles and practices of software engineering. Topics include software quality concepts, process models, software requirements analysis, design methodologies, software testing, and software maintenance. Hands-on experience building a software system using the waterfall life cycle model and CASE tools. Students working in teams develop all life cycle deliverables: requirements document, specification and design documents, system codes, and user manuals.

**Components:** Lecture  
**Attributes:** Offered Spring Term  
**Requirement Group:** Prerequisites: CS344 or EE363 and CS242 or EE408.  
**Req. Designation:** Technology

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EE 381(3) Course ID:008133 2014-12-05

**Electromagnetic Fields and Waves**

Review of electrostatics and the steady magnetic field. Stokes' theorem and the divergence theorem. Time varying fields and Maxwell's equations. Uniform plane wave propagation; reflection and refraction of plane waves. Transmission lines. Introduction to radiation theory.

**Components:** Lecture  
**Requirement Group:** Prerequisites: MA231 and PH132.  
**Req. Designation:** Technology

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EE 400(3) Course ID:013072 2020-11-03

**Biomedical Engineering Fundamentals**

Cross-listed with BR 400, BY 440, ES 402] This interdisciplinary course will introduce students to basic principles of biomedical rehabilitation engineering. The course will present principles of disability and the diverse roles of engineering in medicine and rehabilitation. Students will use engineering methods to study anatomical and physiological systems including applications in rehabilitation engineering, bioinstrumentation, biosignal and image processing, biomechanics, and biomaterials.

**Components:** Lecture  
**Requirement Group:** Prerequisites: MA131/132, PH131/132, BR 200, MA 232 Corequisites: BY 471/473 or BY 472/474  
**Req. Designation:** Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng****EE 401(3)** Course ID:008134 2016-09-23**Digital Signal Processing**

An introduction to discrete-time signal processing. Topics include: A review of orthogonality, Fourier series, Fourier transforms and sampling theory. Smoothing, interpolation, D/A conversion. Digital filters, windows. Design of nonrecursive filters, recursive filters. Correlation and spectra of random signals, spectral estimation.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: EE321.**Req. Designation:** Technology**EE 402(3)** Course ID:013100 2023-02-20**Machine Learning on Biomedical Signals**

[Crosslisted with EE502] Machine learning methods and their application to the analysis and processing of biomedical signals. Topics include a review of ECG, EMG, EEG, and other biomedical signals. Acquisition of biomedical signals and filtering, spectral analysis, characteristic feature extraction and selection, and dimensionality reduction. In addition, basic classification methods such as LDA, Decision tree, Naïve Bayes, KNN and Support Vector Machines will be studied. Basic regression analysis on biomedical signals for the prediction task will be covered. (Odd Fall)

**Components:** Lecture**Attributes:** Offered Odd Falls**Requirement Group:** Prerequisites: MA132, EE321, and BR400 or equivalent or instructor approval**Req. Designation:** Technology

**Engineering - Computer Science - Subject: Electrical & Computer Eng****EE 407(3)**                           **Course ID:**008136**2015-08-15****Computer Networks**

[Cross-listed with CS 455] This course covers layered networking protocols with an emphasis on common Internet protocols such as TCP, IP, HTTP, and SMTP. It also covers local area networking, focusing on link layer standards such as the IEEE standards for Ethernet and wireless. Additional topics such as security and congestion control will also be covered. EE407 and CS455 are offered each fall as one course with multiple listings.

**Components:** Laboratory, Lecture**Course Equivalents:** CS 455**Requirement Group:** Prerequisites: One of course in computer architecture (EE264, CS241 or IT502 or equivalent). One cours**Req. Designation:** Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

EE 408(3) Course ID:008137

2019-04-09

**Software Design For Visual Environments**

This course is an introduction to object-oriented, event-driven windowing environments. The primary focus will be interface design and development, with an emphasis placed on the event-driven paradigm. Topics will include: a thorough investigation of the underlying windowing framework selected, an examination of static and dynamic control objects used for system input and output, virtual functions, multithread programming, code synchronization and locking, and resource sharing. Several programming projects will be assigned throughout the semester.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: EE262.**Req. Designation:** Technology

**Engineering - Computer Science - Subject: Electrical & Computer Eng****EE 410(3)** Course ID:010603

2016-01-13

**Computer and Network Security**

[Cross-listed with CS 457] Attacks on networked computer systems are an increasingly important problem. This course covers the types of vulnerabilities that are present in modern computer systems and the types of malicious software that exploit these vulnerabilities. It also covers best practices for preventing, detecting and responding to such attacks including anti-virus software, defensive programming techniques, intrusion detection systems, honeypots and firewalls.

Prerequisites: A general course in computer networking such as CS455/555 or EE407/507. Programming experience to the level of CS142 or EE361.

**Components:** Lecture**Course Equivalents:** CS 457, CS 557, EE 510**Req. Designation:** Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng****EE 412(3)** Course ID:008138 2015-02-03**Senior Design**

A series of one or more design projects. Projects typically involve planning, analysis, preliminary design, simulation, construction, testing and evaluation, documentation, class demonstrations and oral presentations. The thrust of this course is to provide the student with an opportunity to develop a complete solution to one or more design problems and to develop broad engineering skills, including communication skills.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Offered Each Term**Requirement Group:** Prerequisite: EE311.**Req. Designation:** Technology**EE 416(3)** Course ID:008139 2020-04-20**Computer Engineering Senior Laboratory**

In conjunction with EE464, students develop specifications for design, build, test, debug and document a complete digital system based on an embedded microcomputer and supporting integrated circuits.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Offered Fall Term**Requirement Group:** Prerequisite: EE316 and EE260 Corequisite: EE464**Req. Designation:** Technology**EE 418(3)** Course ID:008140 2015-02-19**Software Engineering Senior Design**

Working in a team environment, students will design and develop a complex software system. Using sound software engineering techniques, the students will take a conceptual idea for a software system and turn it into a well-engineered product.

**Components:** Lecture**Attributes:** Two communication units, Offered Fall Term**Requirement Group:** Prerequisites: EE368 and EE462. Corequisite: EE408.**Req. Designation:** Technology**EE 422(3)** Course ID:012876 2018-04-11**Signal Processing and Applications**

This project-driven course involves qualitative and quantitative descriptions of DSP algorithms, software and applications. The class covers applications in engineering, computing, music, and the arts, with MATLAB, Java and mobile simulations.

**Components:** Lecture**Course Equivalents:** ES 522, ES 422**Attributes:** Offered Even Falls**Requirement Group:** Prerequisites: MA132 or equivalent, or instructor approval.**Req. Designation:** Technology**EE 423(3)** Course ID:012121 2015-10-08**Introduction to Biometrics**

Biometrics is the automated recognition of an individual based on their physiological or behavioral characteristics. This course is an introduction of fingerprint, face, voice, and iris recognition, as well as related aspects of system design, security, privacy, performance evaluation, and novel biometric modalities.

**Components:** Discussion, Lecture**Course Equivalents:** EE 523**Attributes:** Offered Spring Term**Req. Designation:** Technology**EE 430(3)** Course ID:008141 2014-12-05**High-Voltage Techniques and Measurements**

Generation of high-voltage AC, DC and impulse. High-voltage dielectric loss measurements. Discharge measurements. High-voltage insulation problems.

**Components:** Lecture**Req. Designation:** Technology**EE 431(3)** Course ID:008142 2015-02-19**Power Transmission and Distribution**

Unbalanced fault current calculation, current and voltage transformer characteristics. Distribution system protection, transmission line protection. Generator, bus and transformer protection. Power system controls. Transient stability.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: EE331**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

**EE 438(3)** Course ID:010410 2015-02-23

**Alternate Energy Systems**

[Cross-listed with ES 438] The basic technology of emerging renewable or non-carbon based energy sources will be considered, and contrasted with traditional sources of energy. Topics will include photovoltaic, wind and others. The impacts of energy storage and electrified transportation will be discussed. The capability of these technologies will be assessed, and barriers to implementation will be explored. The role of the electric power grid in enabling alternate energy technologies will be covered.

**Components:** Lecture

**Course Equivalents:** EE 538, ES 438

**Attributes:** One Design Credit, Offered Even Springs

**Requirement Group:** Prerequisite: ES250 or permission of the instructor.

**Req. Designation:** Technology

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**EE 439(3)** Course ID:008147 2015-01-29

**Dielectrics**

Dielectric properties of materials and polarization models. Complex permittivity and relaxation spectra. Electric breakdown in gases, liquids and solids.

**Components:** Lecture

**Attributes:** Offered Odd Falls

**Req. Designation:** Technology

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**EE 441(3)** Course ID:008148 2020-03-20

**Electronic Devices**

[Cross listed with EE541] Study of modern electronic devices, p-n junctions, bipolar junction transistors (BJTs) and metal-oxide-semiconductor field-effect transistors (MOSFETs), for integrated circuit applications. SPICE device models are introduced, and several SPICE simulation projects are given for integrated circuit design and analysis. This course provides a foundation for understanding SPICE device models and the basics of the microelectronic technology.

**Components:** Lecture

**Course Equivalents:** EE 541

**Attributes:** Offered Even Falls

**Requirement Group:** Corequisites: ES241 or EE341 or equivalent.

**Req. Designation:** Technology

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**EE 442(3)** Course ID:011145 2020-03-20

**CMOS IC Design**

An introduction to CMOS integrated circuit design and simulation. Students will learn CMOS device models and study design, simulation and layout of digital CMOS integrated circuit blocks.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisite: EE264. Corequisite: EE341.

**Req. Designation:** Technology

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**EE 443(3)** Course ID:012754 2016-09-23

**Semiconductor Material and Devices for Engineers**

[Cross-listed with EE544] Fundamentals of quantum mechanics, energy band concept in crystalline materials, band structure modeling, band structure modification, semiconductor device physics, carrier recombination processes, carrier transport phenomena, lattice vibrations, advanced concepts in quantum device technology.

**Components:** Lecture

**Course Equivalents:** EE 544

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**EE 450(3)** Course ID:008152 2014-11-19

**Control Systems**

[Cross-listed with ME 450] Introduction to the analysis and design of continuous-time feedback control systems. Topics include: mathematical representation of physical systems with linear differential equations, Laplace transforms, transfer functions, block diagrams and signal flow graphs, feedback, sensitivity, transient specifications, steady-state tracking errors, stability, root locus plots, compensator design, simulation.

**Components:** Lecture

**Course Equivalents:** ME 450

**Requirement Group:** Prerequisites: AE/EE/ME324 or Corequisite: EE321.

**Req. Designation:** Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng****EE 451(3)** Course ID:008153

2015-01-20

**Digital Control**

Introduction to the analysis and design of discrete-time feedback control systems. Topics include: mathematical representation of physical systems with linear difference equations, z-transforms, transfer functions, sampling, A/D and D/A converters, sampled-data systems, discrete equivalent systems, transient specifications, steady-state tracking errors, stability, controller design, quantization effects.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: EE321.**Req. Designation:** Technology**EE 452(3)** Course ID:011741

2015-02-19

**Optimization Techniques in Engineering**

Introduction to optimization techniques in engineering. Topics include: engineering applications of optimization, types of optimization problems, linear programming and the simplex method, one-dimensional optimization, unconstrained nonlinear programming, nonlinear programming with equality and inequality constraints, advanced optimization techniques, practical aspects of optimization.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: MA339 or equivalent or consent of instructor.**Req. Designation:** Technology**EE 455(3)** Course ID:012847

2018-01-01

**Robotics I**

[Cross-Listed EE555] The course presents an introduction to the fundamentals of mobile robotic systems including common mechanical configurations with sensors and actuators, as well as the typical sensory, perceptual, and cognitive layers that comprise the field of study. Topics explored will include: Mobile Robot Locomotion (e.g., Legged, Wheeled, and Aerial), Mobile Robot Kinematics (e.g., Models and Constraints, Maneuverability, Workspace Analysis, and Motion Control), Mobile Robot Perception (e.g., Exploration of Sensors, Fundamentals of Computer Vision, Fundamentals of Image Processing, Feature Extraction, and Place Recognition), Mobile Robot Localization (e.g., Noise and Aliasing, Localization-Based Navigation, Map Representations, Probabilistic Map-Based Localization and Autonomous Map Building), and Planning and Navigation (Path Planning, Obstacle Avoidance, and Navigation Architectures). Throughout the course, students will work in teams with a supplied robotics kit of parts to design and implement a mobile robot

**Components:** Lecture**Course Equivalents:** EE 555**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: EE321, EE/ME324, or MA339; or instructor permission**Req. Designation:** Technology**EE 456(3)** Course ID:012863

2018-02-26

**Robotics II**

The course presents an introduction to the fundamentals of industrial robotics. Topics explored will include: Robotic manipulation, direct kinematics, inverse kinematics, workspace analysis and trajectory planning, differential motion and statics, manipulator dynamics, robot control, robot vision and task planning. Throughout the course, students will work in teams with a supplied robotics kit of parts and appropriate software tools to design and implement a robot manipulator that demonstrates various aspects of the course applied to a real-world problem.

**Components:** Lecture**Course Equivalents:** EE 556**Attributes:** Offered Fall Term**Req. Designation:** Technology**EE 462(3)** Course ID:008155

2023-06-12

**Software System Architecture**

A study of system software components in the context of a modern operating system such as UNIX, together with the necessary tools and utilities for software development. Topics will include software development tools, operating system interfaces and utilities, and network access methods. Emphasis will be placed on conceptual understanding and practical use of system software components rather than on detailed implementation.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng****EE 464(3)** Course ID:008156

2020-04-20

**Digital Systems Design**

A study of embedded microcomputer system design. Topics include CPU architecture, memory organization, interrupts, real-time operation, and interfacing with a wide range of external devices. Practical problems in digital design, testability, hardware and software trade-off analysis are covered. In addition to the technical topics, students develop teamwork skills, learn project management, system specification and documentation. Each student does both significant written documentation and oral presentations of his or her work. This course and the senior lab (EE 416) together provide both the conceptual knowledge and practical skills necessary to design application-oriented digital systems.

**Components:** Lecture**Attributes:** One communication unit, Offered Fall Term**Requirement Group:** Prerequisites: EE316 and EE260 Corequisites: EE416**Req. Designation:** Technology

**Engineering - Computer Science - Subject: Electrical & Computer Eng****EE 465(3)**                   **Course ID:**008157**2017-01-24****Computer Graphics**

[Cross-listed with CS 452] An introduction to computer graphics. Graphics hardware, algorithms for generating and displaying two and three-dimensional geometric figures, animation, interactive displays. Programming projects using OpenGL will be assigned.

Prerequisites: Programming experience in C/C++ family language, basic concepts in linear algebra and matrices.

**Components:** Lecture

**Course Equivalents:** CS 452

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: CS142 or EE361, and MA232 or MA239 (or MA339 as a corequisite)

**Req. Designation:** Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**


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**EE 466(3)** Course ID:008158 2019-11-19

**Computer Architecture**

A study of modern processor system architecture including set design and performance enhancement of computer systems will be discussed. Topics include pipelining, cache organization, memory management, and multiprocessors. Tradeoffs in system design and the impact of hardware/software interactions will be discussed.

**Components:** Lecture  
**Attributes:** Offered Spring Term  
**Requirement Group:** Prerequisite: EE264.  
**Req. Designation:** Technology

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**EE 468(3)** Course ID:008159 2014-11-20

**Database Systems**

[Cross-listed with CS 460] An introduction to database systems. The entity-relationship and relational models are presented and applied to the design of typical databases. New developments in object-oriented and multimedia databases are presented. Emphasis will be placed on database design for applications in the context of an existing database management system such as ORACLE or ACCESS.

**Components:** Lecture  
**Course Equivalents:** CS 460  
**Attributes:** Offered Spring Term  
**Requirement Group:** Prerequisites: Programming experience in a high-level language  
**Req. Designation:** Technology

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**EE 469(3)** Course ID:012932 2019-03-05

**High Performance Computing**

Principles and practices of high-performance computing (HPC) programming, associated computer architectures, and techniques for computing performance optimization. Topics include concepts of parallel and distributed computing, multicore CPU architecture, POSIX threads programming, OpenMP (Open Multi-Processing), GPGPU (General purpose GPU) architecture, NVIDIA CUDA programming, computer cluster management system, MPI (Message Passing Interface) programming, and case studies regarding large-scale engineering applications through HPC and computing performance improvement. Hands-on assignments utilizing Linux based open source tools and compilers will be assigned. Students must have basic C/C++ programming skills to enroll. Suitable for junior and senior undergraduate and graduate students in all engineering and computer science majors.

**Components:** Lecture  
**Course Equivalents:** EE 561, EE 519  
**Attributes:** Given When Needed  
**Requirement Group:** Prerequisites: EE262 or CS142, or consent of instructor.  
**Req. Designation:** Technology

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**EE 470(3)** Course ID:008132 2021-12-28

**Coding and Info Transmission**

Error detecting and error correcting codes. Encoding of signals and data compression. Huffman codes. Concepts of information. Limits on attainable data compression. Limits on data rates for reliable or errorless transmission.

**Components:** Lecture  
**Attributes:** Offered Fall Term  
**Requirement Group:** Corequisite: STAT383 or 389  
**Req. Designation:** Technology

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**EE 471(3)** Course ID:008161 2021-12-28

**Principles of Digital and Data Communications**

Amplitude modulation, double and single sideband, quadrature AM. Frequency and phase modulation. Stationary and ergodic random processes, correlation and spectral density. Noise models, filtering of random signals. Data transmission, frequency and phase shift keying, pulse amplitude modulation, pulse shaping, partial response signaling, channel equalization. Threshold decision receivers. Pulse code modulation, quantization, digital transmission lines.

**Components:** Lecture  
**Attributes:** Offered Spring Term  
**Requirement Group:** Corequisite: STAT389  
**Req. Designation:** Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

**EE 485(3)** Course ID:011169 2014-11-20

**Neural Engineering**

[Cross-listed with BY 485, ES 485, EE 585] This course applies engineering principles to the study of neuroscience and to the design of devices or techniques intended to replace missing or augment existing functions such as seeing, hearing, speaking, and walking. The course provides a detailed overview of sensorimotor systems, neurophysiology, neuroanatomy, neuropathology and clinical neurology. The class sequences through the various sensory and movement systems, providing a quantitative basis for how the nervous systems works for these systems, for how it dysfunctions, for the disability produced, and finally for how function can be restored by neuroprostheses. Students will prepare and present a paper on a neural engineering topic.

**Components:** Lecture

**Course Equivalents:** EE 585, BY 485, ES 485

**Requirement Group:** Prerequisites: MA132 and PH132 or PH142.

**Req. Designation:** Technology

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**EE 491(1 - 3)** Course ID:008164 2015-02-03 Department Consent Required

**Directed Study in Electrical and Computer Engineering**

Investigation of a special topic in consultation with a designated faculty member.

**Components:** Independent Study

**Req. Designation:** Technology

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**EE 501(3)** Course ID:008166 2017-08-18

**Digital Signal Processing**

An introduction to discrete-time signal processing. Topics include: A review of orthogonality, Fourier series, Fourier transforms and sampling theory. Smoothing, interpolation, D/A conversion. Digital filters, windows. Design of nonrecursive filters, recursive filters. Correlation and spectra of random signals, spectral estimation. Substantial in depth investigation of advanced topics will be required.

Prerequisite: EE321.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**EE 502(3)** Course ID:008167 2022-02-02

**Machine Learning on Biomedical Signals**

[Cross listed with EE402] Machine learning methods and their application to the analysis and processing of biomedical signals. Topics include a review of ECG, EMG, EEG, and other biomedical signals. Acquisition of biomedical signals and filtering, spectral analysis, characteristic feature extraction and selection, and dimensionality reduction. In addition, basic classification methods such as LDA, Decision tree, Naïve Bayes, KNN and Support Vector Machines will be studied. Basic regression analysis on biomedical signals for the prediction task will be covered. (Odd Fall)

**Components:** Lecture

**Attributes:** Offered Odd Falls

**Req. Designation:** Technology

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**EE 503(3)** Course ID:012901 2019-01-14

**Advanced Topics in Neuromorphic Computing**

Neuromorphic Computing was originally referred to as the hardware that mimics neuro-biological architectures, and was then extended to the computing systems that can run bio-inspired computing models such as neural networks and deep learning networks. In this course, students will learn the basic knowledge of artificial neural networks and the advanced hardware architectures/systems for efficient neural network computing. We will emphasize both the basic knowledge and practical tricks through a series of hand-on practices including paper readings and projects.

**Components:** Lecture

**Req. Designation:** Technology

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**Engineering - Computer Science - Subject: Electrical & Computer Eng****EE 505(3)**                   **Course ID:**008168**2016-01-13****Computer Graphics**

[Cross-listed with CS 552] An introduction to computer graphics. Graphics hardware, algorithms for generating and displaying two and three-dimensional geometric figures, animation, interactive displays. Programming projects using OpenGL will be assigned. Students will be expected to independently explore some aspects of the course material.

Prerequisites: Programming experience in C/C++ family language, basic concepts in linear algebra and matrices.

**Components:** Lecture

**Course Equivalents:** CS 552

**Req. Designation:** Technology

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**School of Arts and Sciences - Computer Science - Subject: Electrical & Computer Eng****EE 507(3)** Course ID:008170 2015-08-15**Computer Networks**

[Cross-listed with CS 555] This course covers layered networking protocols with an emphasis on common Internet protocols such as TCP, IP, HTTP, and SMTP. It also covers local area networking, focusing on link layer standards such as the IEEE standards for Ethernet and wireless. Additional topics such as security and congestion control will also be covered. EE407 and CS455 are offered each fall as one course with multiple listings.

Prerequisites: One of course in computer architecture (EE264, CS241 or IT502 or equivalent). One course in computer programming (EE261, CS141 or equivalent.) Note: IT501 also satisfies the programming requirement.

**Components:** Laboratory, Lecture

**Course Equivalents:** CS 555

**Req. Designation:** Technology

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**Engineering - Computer Science - Subject: Electrical & Computer Eng****EE 510(3)** Course ID:010604

2015-08-15

**Computer and Network Security**

[Cross-listed with CS 557] Attacks on networked computer systems are an increasingly important problem. This course covers the types of vulnerabilities that are present in modern computer systems and the types of malicious software that exploit these vulnerabilities. It also covers best practices for preventing, detecting and responding to such attacks including anti-virus software, defensive programming techniques, intrusion detection systems, honeypots and firewalls.

Prerequisites: A general course in computer networking such as CS455/555 or EE407/507. Programming experience to the level of CS142 or EE361.

**Components:** Lecture

**Course Equivalents:** CS 457, CS 557, EE 410

**Req. Designation:** Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

**EE 511(3)** Course ID:012016 2014-12-05

**Wireless Sensor Networks**

This course will present state-of-the-art wireless sensor networks. Both hardware and operating system considerations based on the OSI protocol stack will be covered. Clustering and localization techniques will be presented along with security threats and solutions. Various wireless sensor network applications will be presented.

Prerequisites: EE408/CS455 Computer Networks or permission of the instructor.

Components: Lecture

Req. Designation: Technology

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**EE 519(3)** Course ID:012948 2019-06-07

**High Performance Computing**

Principles and practices of high-performance computing (HPC) programming, associated computer architectures, and techniques for computing performance optimization. Topics include concepts of parallel and distributed computing, multicore CPU architecture, POSIX threads programming, OpenMP (Open Multi-Processing), GPGPU (General purpose GPU) architecture, NVIDIA CUDA programming, computer cluster management system, MPI (Message Passing Interface) programming, and case studies regarding large-scale engineering applications through HPC and computing performance improvement. Hands-on assignments utilizing Linux based open source tools and compilers will be assigned. Students must have basic C/C++ programming skills to enroll. Suitable for junior and senior undergraduate and graduate students in all engineering and computer science majors.

Components: Lecture

Course Equivalents: EE 561, EE 469

Attributes: Given When Needed

Requirement Group: Prerequisites: EE262 or CS142, or consent of instructor.

Req. Designation: Technology

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**EE 520(3)** Course ID:012790 2017-02-06

**Data Driven Analysis of Complex Systems**

The goal of this course will be an integration of concepts of complex systems with big data analysis. Methodology will be drawn from statistical and Bayesian analysis, time-frequency analysis, image processing, linear algebra and principal component analysis, machine learning and image recognition, dimensionality reduction for dynamical systems, system identification, data assimilation, compressed sensing, and equation free modeling. Applications may include PDEs such as advection diffusion from atmospheric data and also steady flow, networked and social data-sets, feature identification in neurological applications, music analysis and identification, and image denoising.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

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**EE 522(3)** Course ID:011059 2016-09-23

**Advanced Signal Processing with Biomedical and Other Applications**

Statistical aspects of signal processing that includes such topics as: autocorrelation/crosscorrelation, autoregressive, moving average models, linear prediction, power spectral density, adaptive filters. Each student will utilize real data for an application from his/her research or data from a biomedical application can be provided. Each subject will be approached in three states: fundamental, advanced, and application. Class participation is critical through presentations which include: (1) journal papers for Advanced section, (2) results from their data for Application section, and (3) semester project results.

Prerequisites: Programming experience in C/C++ or Matlab, basic understanding of signal processing and probability.

Components: Lecture

Attributes: Offered Odd Falls

Requirement Group: Prerequisites: EE529 Recommended: EE401 or EE501

Req. Designation: Technology

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**EE 523(3)** Course ID:012122 2015-10-08

**Introduction to Biometrics**

Biometrics is the automated recognition of an individual based on their physiological or behavioral characteristics. This course is an introduction of fingerprint, face, voice, and iris recognition, as well as related aspects of system design, security, privacy, performance evaluation, and novel biometric modalities.

Components: Discussion, Lecture

Course Equivalents: EE 423

Attributes: Offered Spring Term

Req. Designation: Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

**EE 525(3)** Course ID:013093 2023-01-30

**Data Analytics for Power System Applications**

A graduate level course on data analytics for power system applications with selected topics covering: 1) remote terminal unit data and its application for state estimation; 2) PMU data and its application for event detection and linear state estimation; 3) Electricity data for load forecasting (including multi-variable linear regression & Artificial Neural Network (ANN) methodology, Singular Value Machine based load forecasting, and recent development of probabilistic load forecasting technologies); 4) Wind generation forecasting and wind resource assessment; 5) Solar generation forecasting.

**Components:** Lecture

**Same As Offering:** EE 630

**Attributes:** Given When Needed

**Requirement Group:** Prerequisite: EE333 or Equivalent

**Req. Designation:** Technology

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**EE 526(3)** Course ID:012096 2016-09-23

**Detection and Estimation Theory**

Combines the classical techniques of statistical inference and the random process characterization of communication, radar, and other modern data processing systems.

**Components:** Lecture

**Attributes:** Offered Even Springs

**Requirement Group:** Prerequisites: EE529 or equivalent, or instructor approval Restriction: Admission to the graduate Elec

**Req. Designation:** Technology

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**EE 529(3)** Course ID:012090 2015-04-29

**Stochastic Processes in Engineering**

[Cross-listed as ME 529] Review of the theory of probability. Single and multiple random variables topics, such as distributions, moments, conditioning, central limit theorem, and Laws of Large Numbers. Stochastic processes. Stationary and nonstationary processes. Time averaging and ergodicity. Correlation and power spectrum. Langevin's equation and Markov processes. Poisson and Gaussian processes. Response of linear systems. Approximate methods for analysis of nonlinear stochastic equations Application to engineering problems, such as random vibrations, turbulence, estimation theory, signal detection, and others.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**EE 530(3)** Course ID:008174 2014-12-05

**High-Voltage Techniques and Measurements**

Generation of high-voltage AC, DC and impulse. High-voltage dielectric loss measurements. Discharge measurements. High-voltage insulation problems.

**Components:** Lecture

**Req. Designation:** Technology

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**EE 531(3)** Course ID:008175 2021-01-14

**Power System Planning**

Long-term planning will identify a financially viable and physically feasible mix of resources, including traditional generation and transmission sources as well as advanced techniques such as renewable generation, demand response, and the microgrid, to enhance the overall reliability of power systems. This course will introduce the students generation and transmission expansion planning of a vertically integrated utility and in a competitive market.

**Components:** Lecture

**Same As Offering:** EE 531

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng**

EE 531(3) Course ID:008175

2021-01-14

**Power System Planning**

Long-term planning will identify a financially viable and physically feasible mix of resources, including traditional generation and transmission sources as well as advanced techniques such as renewable generation, demand response, and the microgrid, to enhance the overall reliability of power systems. This course will introduce the students generation and transmission expansion planning of a vertically integrated utility and in a competitive market.

**Components:** Lecture**Same As Offering:** EE 531**Attributes:** Given When Needed**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

EE 532(3) Course ID:008176 2014-12-05

**Advanced Electric Machines and Drives**

Development of state models of conventional and electronically controlled electric machinery and drive systems. Use of linear transformations in the development of dynamic models of synchronous, induction, permanent magnet, and other rotating machinery, as well as electronically controlled drive systems. Study of the dynamic and transient characteristics of these machinery and drive systems by computer-aided methods. Study of the effects of electronic power conditioning and associated harmonics on the design of these machinery systems, including nonlinearities.

Prerequisite: EE 331 (Energy Conversion) or equivalent

Components: Lecture

Req. Designation: Technology

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EE 533(3) Course ID:008177 2016-07-12

**Operation and Control of Electric Power Systems**

Course topics include: modeling of generators and transmission networks; security-constrained economic dispatch and security-constrained unit commitment formulations (linear programming and mixed-integer programming) and methodologies (dynamic programming, Lagrangian relaxation, and Benders decomposition); market clearing under different time scales; locational marginal price.

Prerequisite: EE 333 or equivalent.

Components: Lecture

Req. Designation: Technology

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EE 536(3) Course ID:008173 2022-01-04

**Advanced Topics in Energy Power Systems**

This course is designed to discuss advanced topics in emerging power systems. In particular, this course will cover various issues related to the Microgrid. This course will discuss concepts, technical features, operational and management issues, economic viability and market participation in deregulated environment of Microgrid with the presence of significant distributed energy resources (DER).

Prerequisite: EE331.

Components: Lecture

Req. Designation: Technology

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EE 537(3) Course ID:008181 2019-09-30

**Power System Protection**

Power system fault performance, protective system goals, fault sensing and protection algorithms.

Applications to generator, transformer, bus transmission line, and distribution line protection. Distributed generation and the connection to the grid.

Prerequisite: EE333, or knowledge of symmetrical components and fault current calculations

Components: Lecture

Same As Offering: EE 537

Req. Designation: Technology

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EE 537(3) Course ID:008181 2019-09-30

**Power System Protection**

Power system fault performance, protective system goals, fault sensing and protection algorithms.

Applications to generator, transformer, bus transmission line, and distribution line protection. Distributed generation and the connection to the grid.

Prerequisite: EE333, or knowledge of symmetrical components and fault current calculations

Components: Lecture

Same As Offering: EE 537

Req. Designation: Technology

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EE 538(3) Course ID:008182 2014-12-05

**Alternate Energy Systems**

The basic technology of emerging renewable or non-carbon based energy sources will be considered, and contrasted with traditional sources of energy. Topics will include photovoltaic, wind and others. The impacts of energy storage and electrified transportation will be discussed. The capability of these technologies will be assessed, and barriers to implementation will be explored. The role of the electric power grid in enabling alternate energy technologies will be covered.

Components: Lecture

Course Equivalents: EE 438, ES 438

Req. Designation: Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

EE 539(3) Course ID:008183 2015-01-29

**Dielectrics**

Dielectric properties of materials and polarization models. Complex permittivity and relaxation spectra. Electrical breakdown in gases, liquids and solids.

Components: Lecture

Attributes: Offered Odd Falls

Req. Designation: Technology

EE 541(3) Course ID:008184 2020-03-20

**Electronic Devices**

[Cross listed with EE441] Study of modern electronic devices, p-n junctions, bipolar junction transistors (BJTs) and metal-oxide-semiconductor field-effect transistors (MOSFETs), for integrated circuit applications. SPICE device models are introduced, and several SPICE simulation projects are given for integrated circuit design and analysis. This course provides a foundation for understanding SPICE device models and the basics of the microelectronic technology.

Prerequisites: ES260 and EE341, or consent of the instructor.

Components: Lecture

Course Equivalents: EE 441

Attributes: Offered Even Falls

Requirement Group: Prerequisites: ES241 or EE341, or equivalent

Req. Designation: Technology

EE 542(3) Course ID:008185 2020-03-20

**CMOS IC Design**

An introduction to CMOS integrated circuit design and simulation. Students will learn CMOS device models and study design, simulation and layout of digital CMOS integrated circuit blocks.

Prerequisites: EE264 and EE341, or consent of the instructor.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisites: EE264 and EE341, or consent of the instructor.

Req. Designation: Technology

EE 544(3) Course ID:012757 2016-09-23

**Semiconductor Material and Devices for Engineers**

[Cross-listed with EE443] Fundamentals of quantum mechanics, energy band concept in crystalline materials, band structure modeling, band structure modification, semiconductor device physics, carrier recombination processes, carrier transport phenomena, lattice vibrations, advanced concepts in quantum device technology.

Components: Lecture

Course Equivalents: EE 443

Attributes: Offered Spring Term

Req. Designation: Technology

EE 550(3) Course ID:008188 2015-02-19

**Control Systems**

Introduction to the analysis and design of continuous-time feedback control systems. Topics include: mathematical representation of physical systems with linear differential equations, Laplace transforms, transfer functions, block diagrams and signal flow graphs, feedback, sensitivity, transient specifications, steady-state tracking errors, stability, root locus plots, compensator design, simulation.

Prerequisite: EE321.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

EE 551(3) Course ID:008189 2015-01-20

**Digital Control**

Introduction to the analysis and design of discrete-time feedback control systems. Topics include: mathematical representation of physical systems with linear difference equations, z-transforms, transfer functions, sampling, A/D and D/A converters, sampled-data systems, discrete equivalent systems, transient specifications, steady-state tracking errors, stability, controller design, quantization effects. Significant independent investigation of advanced topics will be required.

Prerequisite: EE321.

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

EE 552(3) Course ID:011742 2015-02-19

**Optimization Techniques in Engineering**

Introduction to optimization techniques in engineering. Topics include: engineering applications of optimization, types of optimization problems, linear programming and the simplex method, one-dimensional optimization, unconstrained nonlinear programming, nonlinear programming with equality and inequality constraints, advanced optimization techniques, practical aspects of optimization.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: MA339 or equivalent or consent of instructor.**Req. Designation:** Technology

EE 555(3) Course ID:012846 2017-10-18

**Robotics I**

[Cross-Listed EE445] The course presents an introduction to the fundamentals of mobile robotic systems including common mechanical configurations with sensors and actuators, as well as the typical sensory, perceptual, and cognitive layers that comprise the field of study. Topics explored will include: Mobile Robot Locomotion (e.g., Legged, Wheeled, and Aerial), Mobile Robot Kinematics (e.g., Models and Constraints, Maneuverability, Workspace Analysis, and Motion Control), Mobile Robot Perception (e.g., Exploration of Sensors, Fundamentals of Computer Vision, Fundamentals of Image Processing, Feature Extraction, and Place Recognition), Mobile Robot Localization (e.g., Noise and Aliasing, Localization-Based Navigation, Map Representations, Probabilistic Map-Based Localization and Autonomous Map Building), and Planning and Navigation (Path Planning, Obstacle Avoidance, and Navigation Architectures). Throughout the course, students will work in teams with a supplied robotics kit of parts to design and implement a mobile robot

**Components:** Lecture**Course Equivalents:** EE 455**Attributes:** Offered Spring Term**Req. Designation:** Technology

EE 556(3) Course ID:008194 2018-02-26

**Robotics II**

The course presents an introduction to the fundamentals of industrial robotics. Topics explored will include: Robotic manipulation, direct kinematics, inverse kinematics, workspace analysis and trajectory planning, differential motion and statics, manipulator dynamics, robot control, robot vision and task planning. Throughout the course, students will work in teams with a supplied robotics kit of parts and appropriate software tools to design and implement a robot manipulator that demonstrates various aspects of the course applied to a real-world problem.

**Components:** Lecture**Course Equivalents:** EE 456**Attributes:** Offered Fall Term**Req. Designation:** Technology

EE 559(3) Course ID:012902 2020-10-19

**Microgrid Design and Control**

The focus of the course will be microgrid design with PV, Wind, and Energy Storage, and their control and integration into the power systems using power electronics devices. Various topics will be covered in this course to provide students with cutting-edge knowledge in microgrid applications, design, and control. In this course, students will have a chance to 1) learn power converters (DC/DC, DC/AC, and AC/DC) and utilize the converters to create an AC or DC Microgrid with PV, Wind, or Batteries, 2) learn how to control the power quality (voltage, frequency) in islanded and grid-connected modes, 3) learn how to regulate the power flow in islanded and grid-connected modes, and 4) learn about anti-islanding controls and low voltage ride through requirements.

**Components:** Lecture**Same As Offering:** EE 559**Attributes:** Given When Needed**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

**EE 559(3)**                   **Course ID:012902**                   **2020-10-19**

**Microgrid Design and Control**

The focus of the course will be microgrid design with PV, Wind, and Energy Storage, and their control and integration into the power systems using power electronics devices. Various topics will be covered in this course to provide students with cutting-edge knowledge in microgrid applications, design, and control. In this course, students will have a chance to 1) learn power converters (DC/DC, DC/AC, and AC/DC) and utilize the converters to create an AC or DC Microgrid with PV, Wind, or Batteries, 2) learn how to control the power quality (voltage, frequency) in islanded and grid-connected modes, 3) learn how to regulate the power flow in islanded and grid-connected modes, and 4) learn about anti-islanding controls and low voltage ride through requirements.

**Components:** Lecture

**Same As Offering:** EE 559

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**EE 561(3)**                   **Course ID:011744**                   **2019-03-05**                   **Instructor Consent Required**

**Many-Core Architecture and Programming Model**

This course will introduce students with the concepts of the state-of-the-art many-core processors. It intends to provide students with deep understandings of hardware architecture as well as the software programming model of such processors. The advanced dynamic power management features will also be covered. The students will have the opportunity to gain hands-on experience through programming a real many-core processor.

Prerequisites: EE446 or equivalent or consent of instructor.

**Components:** Lecture

**Course Equivalents:** EE 469, EE 519

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**EE 562(3)**                   **Course ID:008199**                   **2015-01-23**

**Field Programmable Gate Arrays for Digital Signal Processing**

This is an advanced project based graduate level course on embedded digital signal processing (DSP) system design using Field Programmable Gate Arrays (FPGAs). FPGAs provide a highly reliable and high performance alternative to the ubiquitous microprocessor based DSP platforms. This course introduces advanced DSP theory and algorithms and applications that can be implemented using MATLAB/Simulink blocks from leading FPGA vendors. The course will have a strong lab component. Students will use tools to design DSP systems using demo FPGA boards.

**Components:** Lecture

**Attributes:** Offered Spring When Needed

**Req. Designation:** Technology

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**EE 563(3)**                   **Course ID:008200**                   **2016-11-18**                   **Instructor Consent Required**

**Advanced Software Engineering**

Study of the principles and practices of software engineering. Topics include software quality concepts, process models, software requirements analysis, design methodologies, software testing, and software maintenance. Hands-on experience building a software system using the waterfall life cycle model and CASE tools. Students working in teams develop all life cycle deliverables: requirements document, specification and design documents, system codes, and user manuals. Students will learn theoretical concepts from research, such as APFD and PORT for test case prioritization, and apply these concepts to their project.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**EE 564(3)**                   **Course ID:010463**                   **2014-12-05**

**Enterprise Software Development**

This course will examine the design, implementation, and deployment of distributed applications in the J2EE environment. Common J2EE architectures, models, technologies, and components will be discussed including RMI, SOAP, JDBC, servlets, JSP, MVC, EJB, and JMS. Students will be required to design and develop a multi-tier, enterprise application using the J2EE and a state-of-the-art J2EE application development tool.

Prerequisites: EE408, CS242 or equivalent.

**Components:** Lecture

**Req. Designation:** Technology

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School of Arts and Sciences - Computer Science - Subject: Electrical & Computer Eng

EE 565(3) Course ID:008201 2021-11-30

**Artificial Intelligence: Theory and Practice**

[Cross-listed with CS 551] This course is an introduction to the computational study of intelligent systems. Topics include heuristic search, knowledge representation, automated reasoning, knowledge-based systems, reasoning under uncertainty, planning, and intelligent agents. Additional topics may be drawn from machine learning, neural networks, computer vision, and natural language understanding. AI programming techniques and methods will also be covered throughout the course.

Prerequisites: CS344 or equivalent or consent of the instructor.

Components: Lecture

Course Equivalents: CS 551

Attributes: Given When Needed

Req. Designation: Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**


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**EE 566(3)** Course ID:008202 2015-02-19

**Computer Architecture**

A study of computer system design. Topics include system structure, instruction sets and addressing modes, software control structures, microprogramming, cache memory and different replacement policies, memory hierarchies, paging, vector processing, pipeline techniques, parallel architectures and interconnection networks. Independent investigation of advanced topics is required.

Prerequisite: EE264.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

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**EE 567(3)** Course ID:008203 2023-06-12

**Software System Architecture**

A study of system software components in the context of a modern operating system such as UNIX, together with the necessary tools and utilities for software development. Topics will include software development tools, operating system interfaces and utilities, and network access methods. Emphasis will be placed on conceptual understanding and practical use of system software components rather than on detailed implementation.

Independent investigation of advanced topics will be required.

Prerequisite: EE261 or equivalent programming experience in C.

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

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**EE 568(3)** Course ID:008204 2014-11-18

**Database Systems**

[Cross-listed with CS 560] An introduction to database systems. The entity-relationship and relational models are presented and applied to the design of typical databases. New developments in object-oriented and multimedia databases are presented. Emphasis will be placed on database design for applications in the context of an existing database management system such as ORACLE or ACCESS. Substantial independent investigation of advanced topics will be required.

Prerequisite: programming experience in a high level language.

Components: Lecture

Course Equivalents: CS 560

Attributes: Offered Spring Term

Req. Designation: Technology

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**EE 570(3)** Course ID:008206 2016-09-23

**Coding and Information Transmission**

Error detecting and error correcting codes. Encoding of sources and data compression. Huffman codes. Concepts of entropy. Limits on attainable data compression. Limits on data rates for reliable or errorless transmission. Selected advanced topics from rate distortion theory, channel capacity theorem, and the asymptotic equipartition property.

Corequisite: MA/STAT381 or MA/STAT383 (MA/STAT381 is preferred.)

Components: Lecture

Attributes: Offered Fall Term

Requirement Group: Prerequisites: STAT383 or STAT381 or equivalent, or instructor approval

Req. Designation: Technology

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**EE 572(3)** Course ID:012753 2016-09-23

**Digital Communications**

A graduate course covering the foundations of digital communications. Topics covered include EM propagation, multipath and antennas for wireless communications. Communication standards for 3G, WiFi and LTE. Advanced topics include channel capacity, digital modulation techniques, and error correcting codes for data communications.

Components: Lecture

Attributes: Offered Odd Falls

Requirement Group: Prerequisites: EE321, and STAT383 or STAT381 or equivalent, or instructor approval

Req. Designation: Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

**EE 573(3)** Course ID:013073 2020-11-04

**Computer Vision**

[Cross-Listed CS473/CS573] This course will cover an overview of basic theoretical underpinnings and practical applications of computer vision, with particular emphasis on geometrical techniques underlying 2D and 3D vision. Topics covered include, but are not restricted to, estimation of image transformations, image formation, pose estimation, camera calibration, epipolar geometry, structure-from-motion, stereo reconstruction, filtering, interest point detection, motion estimation, image segmentation, and object recognition.

**Components:** Lecture

**Course Equivalents:** CS 473, CS 573

**Requirement Group:** Prerequisites:CS142 or EE262, and MA339 (or equivalent, with consent from the instructor)EE573 Requisite

**Req. Designation:** Technology

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**EE 574(3)** Course ID:008209 2022-02-09

**Pattern Recognition and Machine Intelligence**

Bayes decision theory, discriminant functions and decision surfaces. Supervised learning, parametric methods, Parzen windows, nearest neighbor classification, Fisher's linear discriminant. Unsupervised learning and clustering. Neural networks, single-layer perceptron convergence algorithm, gradient descent training, generalizations to multilayer feed-forward networks. Classifier complexity and sample size. Hopfield networks for autoassociative memory, unsupervised and self-organizing networks.

Prerequisite: MA/STAT381 or equivalent.

**Components:** Lecture

**Attributes:** Offered Even Falls

**Requirement Group:** Prerequisites: MA/STAT383, or MA/STAT381, or EE529 or equivalent

**Req. Designation:** Technology

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**EE 576(3)** Course ID:012800 2017-03-29 **Instructor Consent Required**

**Secure Computer System Design**

An advanced course on cybersecurity with focus on hardware security. Roles that computer hardware plays in cybersecurity which include: implementing cryptography primitives in hardware, security threats from hardware and their countermeasures, and enhancement of system security and trust by hardware.

**Components:** Lecture

**Req. Designation:** Technology

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**EE 579(3)** Course ID:012869 2018-03-19

**Distributed Algorithms for Wireless Sensor Networks**

This research-driven course involves the study of state-of-the-art distributed algorithms for wireless sensor networks. We will study algorithms for inference. We will also examine algorithms that are fully distributed, specifically, algorithms in the family of consensus methods.

**Components:** Research

**Attributes:** Offered Even Falls

**Requirement Group:** Prerequisites: EE529 or instructor approval. A graduate course in detection and estimation theory and

**Req. Designation:** Technology

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**EE 582(3)** Course ID:012794 2017-02-27 **Instructor Consent Required**

**Advanced Electromagnetics**

Study of time-varying electromagnetic fields and applications. Fundamental electromagnetic theory will be covered in order to analyze the solutions of time-varying Maxwell's equations in problems involving wave propagation, radiation and guidance.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**EE 583(3)** Course ID:012848 2018-01-23

**Modeling and Design of Electromagnetic Structures**

This course will cover the theory, analytical and numerical modeling and design of various composite engineered structures that operate in different spectral ranges, including devices that operate in the optical region, others that operate in the IR, and others in microwave spectral range. Devices and structures that will be studied include: surface plasmonic structures, photonic crystals, metamaterials, diffraction grating, antennas. The modeling tools HFSS and Lumerical FDTD will be covered.

**Components:** Lecture

**Same As Offering:** EE 583

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng**

EE 583(3) Course ID:012848 2018-01-23

**Modeling and Design of Electromagnetic Structures**

This course will cover the theory, analytical and numerical modeling and design of various composite engineered structures that operate in different spectral ranges, including devices that operate in the optical region, others that operate in the IR, and others in microwave spectral range. Devices and structures that will be studied include: surface plasmonic structures, photonic crystals, metamaterials, diffraction grating, antennas. The modeling tools HFSS and Lumerical FDTD will be covered.

**Components:** Lecture**Same As Offering:** EE 583**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng****EE 584(3)****Course ID:012920****2018-12-11****Metamaterials**

This course will teach the theory and application on metamaterials. The different types of metamaterials that are covered include materials that operate in the ultraviolet, visible, infrared and microwave spectral ranges. Acoustic metamaterials are also covered. Negative index of refraction, hyperbolic metamaterials, near-zero metamaterials, cloaking materials, and light trapping structures will be studied.

**Components:** Lecture**Attributes:** Offered Odd Springs**Requirement Group:** Prerequisite: EE583 or permission of the instructor**Req. Designation:** Technology**EE 585(3)****Course ID:011168****2014-11-20****Neural Engineering**

This course applies engineering principles to the study of neuroscience and to the design of devices or techniques intended to replace missing or augment existing functions such as seeing, hearing, speaking, and walking. The course provides a detailed overview of sensorimotor systems, neurophysiology, neuroanatomy, neuropathology and clinical neurology. The class sequences through the various sensory and movement systems, providing a quantitative basis for how the nervous systems works for these systems, for how it dysfunctions, for the disability produced, and finally for how function can be restored by neuroprostheses. Students will prepare and present a paper on a neural engineering topic.

Prerequisites: MA132 and PH132 or PH142.

**Components:** Lecture**Course Equivalents:** EE 485, BY 485, ES 485**Req. Designation:** Technology**EE 586(3)****Course ID:012877****2018-04-26****Advanced Electromagnetics II**

This course will cover the second half of Balanis's book Advanced Engineering Electromagnetics. The topics covered will be waveguides and cavities, transmission lines, scattering, integral equations and method of moments, the geometrical theory of diffraction, diffraction by wedges and Green's functions.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: EE582 and PH580**Req. Designation:** Technology**EE 591(3)****Course ID:012878****2018-05-02****Blockchain Technology: Cryptocurrencies and Beyond**

Blockchains, the basis of the foundational technology underpinning cryptocurrencies, offer many desirable features to end users such as anonymity, immutability, and direct, peer-to-peer transactions. There is immense interest in applying this technology to disrupt and reshape other areas such as cybersecurity, supply chains, health-care, finance & taxation, media, government & administration, and transportation. Goals of adopting this technology include minimizing fraud, providing decentralization, and maximizing efficiency, security, and transparency. This course will introduce blockchain design, including the blockchain data structure, distributed systems, consensus management, public key cryptography, hashing, transactions, smart contracts, proofs of work, and wallets. Based on this groundwork, the course will explore political, economic and social implications of blockchain technology in the context of course projects. Basic knowledge of computer programming is expected. Students from different disciplines are welcome to enroll and encouraged to

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**EE 593(3)****Course ID:013169****2022-08-18****Control and Management of Modern Electric Power Distribution System**

This course is the operation and control technology of modern electric power distribution systems. The selected topics will cover: the modeling & design of electric power distribution systems (overhead/underground lines, distribution transformers, and capacitor banks), technology for fault detection, isolation, and service restoration (FLISR), Volt/Var Optimization and Conservation Voltage Reduction (CVR) technologies, State Estimation for Distribution Systems, Smart Inverter/AMIs data to support grid operation, and Distribution grid impacts from Electric Vehicles (EVs).

Prerequisites: EE333 or equivalent.

**Components:** Lecture**Same As Offering:** EE 593**Attributes:** Offered Fall Term**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng****EE 593(3) Course ID:013169 2022-08-18****Control and Management of Modern Electric Power Distribution System**

This course is the operation and control technology of modern electric power distribution systems. The selected topics will cover: the modeling & design of electric power distribution systems (overhead/underground lines, distribution transformers, and capacitor banks), technology for fault detection, isolation, and service restoration (FLISR), Volt/Var Optimization and Conservation Voltage Reduction (CVR) technologies, State Estimation for Distribution Systems, Smart Inverter/AMIs data to support grid operation, and Distribution grid impacts from Electric Vehicles (EVs).

Prerequisites: EE333 or equivalent.

**Components:** Lecture

**Same As Offering:** EE 593

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng**


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**EE 600(3)** Course ID:012361 2020-07-16

**Disruptive Technology**

[Cross-listed with ME 600] [Formerly EER 600] This course is designed to prepare the student to be able to efficiently evaluate potential disruptive technologies and their potential for application/commercialization. The course will cover such topics as the CO<sub>2</sub> Mitigation, Solid state Energy Systems, Bio Energy and Fusion that have potential to impact the future. In order to cover this broad range of technical topics, the course will utilize multiple instructors that have technical depths as well as experience in the field.

**Components:** Lecture

**Same As Offering:** EE 600

**Req. Designation:** Technology

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**EE 600(3)** Course ID:012361 2020-07-16

**Disruptive Technology**

[Cross-listed with ME 600] [Formerly EER 600] This course is designed to prepare the student to be able to efficiently evaluate potential disruptive technologies and their potential for application/commercialization. The course will cover such topics as the CO<sub>2</sub> Mitigation, Solid state Energy Systems, Bio Energy and Fusion that have potential to impact the future. In order to cover this broad range of technical topics, the course will utilize multiple instructors that have technical depths as well as experience in the field.

**Components:** Lecture

**Same As Offering:** EE 600

**Req. Designation:** Technology

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**EE 602(3)** Course ID:012342 2016-07-01

**Engineering Statistics**

[Cross-listed with CS 506, ME 577] [Formerly EER 572] Modern engineering practice makes extensive use of statistical methods for the efficient collection and analysis of engineering data, and to support data-based decision making. This course will introduce the statistical tools that are of greatest importance for practicing engineers. Core topics to be covered will include probability and distribution theory, the construction and interpretation of statistical intervals, statistical hypothesis testing, regression analysis and empirical modeling, statistical experimental design, and statistical quality/process control. Additional specialized topics may also be covered, depending upon the interests of the class; possible topics include system reliability analysis, measurement system analysis, process capability analysis (and "six-sigma"), accelerated life testing, and acceptance sampling.

**Components:** Lecture

**Course Equivalents:** CS 506, ME 577

**Req. Designation:** Technology

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**EE 603(3)** Course ID:012971 2019-11-11

**Statistical Methods for Reliability and Life Data Analysis**

[Cross-listed with ME578 and BOE623]

Reliability analysis is concerned with understanding the failure modes that affect an engineered product, estimating the expected life of the product under service conditions, and predicting the failure rate of the product

as a function of time in service. The primary response variable in reliability analysis is time to failure, which may

be measured in controlled laboratory experiments, or observed empirically from post-introduction studies of products "in the field". The analysis of data for which the primary variable of interest is time to failure requires

specialized statistical concepts and tools; this course will cover some of the most useful approaches.

**Components:** Lecture

**Same As Offering:** EE 603

**Course Equivalents:** ME 578, ME 577, BOE 623

**Attributes:** Offered Winter Term

**Requirement Group:** Prerequisites: EE602, ME577, or CS506 or instructor consent.

**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng**

**EE 603(3)** Course ID:012971 2019-11-11

**Statistical Methods for Reliability and Life Data Analysis**

[Cross-listed with ME578 and BOE623]

Reliability analysis is concerned with understanding the failure modes that affect an engineered product, estimating the expected life of the product under service conditions, and predicting the failure rate of the product

as a function of time in service. The primary response variable in reliability analysis is time to failure, which may

be measured in controlled laboratory experiments, or observed empirically from post-introduction studies of products "in the field". The analysis of data for which the primary variable of interest is time to failure requires

specialized statistical concepts and tools; this course will cover some of the most useful approaches.

**Components:** Lecture

**Same As Offering:** EE 603

**Course Equivalents:** ME 578, ME 578, BOE 623

**Attributes:** Offered Winter Term

**Req. Designation:** Technology

**EE 610(1 - 0)** Course ID:008212 2020-04-24

**ECE Seminar**

**Components:** Seminar

**Same As Offering:** EE 610

**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

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EE 610(1 - 0) Course ID:008212 2020-04-24

ECE Seminar

Components: Seminar

Same As Offering: EE 610

Req. Designation: Technology

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EE 613(1 - 15) Course ID:008213 2020-04-24

**Thesis, Dissertation Credits**

Analytical or experimental studies in electrical and computer engineering under the direction of a faculty adviser. Credit for this work is given when the requirements for the degree are completed including the presentation of a thesis or dissertation as appropriate to the degree program.

Components: Thesis Research

Same As Offering: EE 613

Attributes: Offered Each Term

Req. Designation: Technology

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**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng**

EE 613(1 - 15) Course ID:008213

2020-04-24

**Thesis, Dissertation Credits**

Analytical or experimental studies in electrical and computer engineering under the direction of a faculty adviser. Credit for this work is given when the requirements for the degree are completed including the presentation of a thesis or dissertation as appropriate to the degree program.

**Components:** Thesis Research**Same As Offering:** EE 613**Attributes:** Offered Each Term**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng****EE 616(1 - 7)** Course ID:011460 2015-02-03**Special Project Credits**

Engineering project credits associated with a Masters of Engineering degree under the direction of a faculty advisor.

**Components:** Project Team  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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**EE 622(3)** Course ID:012030 2016-09-23**Advanced Biometrics**

This special topics graduate level course will focus on the field of biometrics. With increasing reliance on the cyber-domain, knowledge of the individual plays a vital role in trusted electronic transactions, whether they be social, professional or financial. The course will be driven by in-depth review and discussion of journal papers, as well as a semester long project. Students will explore a variety of topics within biometrics including various modalities (fingerprint, iris, face, voice, keystroke, ECG), multi-modal fusion, image processing, pattern recognition, quality assessment, vulnerabilities, social implications, and performance evaluation.

**Components:** Lecture  
**Attributes:** Given When Needed  
**Requirement Group:** Prerequisites: EE523 or equivalent  
**Req. Designation:** Technology

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**EE 628(3)** Course ID:012752 2016-09-22**Adaptive Signal Processing**

An introduction to adaptive signal processing. Topics include: Applications of adaptive systems, adaptive linear combiner, Wiener least-squares solution, gradient search, the LMS/RLS algorithms, block time/frequency domain LMS, system identification.

**Components:** Lecture  
**Attributes:** Offered Odd Springs  
**Requirement Group:** Prerequisites: EE401/501 or equivalent, and EE529 or equivalent, or instructor approval.  
**Req. Designation:** Technology

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Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng

EE 630(3) Course ID:013093

2023-01-30

**Data Analytics for Power System Applications**

A graduate level course on data analytics for power system applications with selected topics covering: 1) remote terminal unit data and its application for state estimation; 2) PMU data and its application for event detection and linear state estimation; 3) Electricity data for load forecasting (including multi-variable linear regression & Artificial Neural Network (ANN) methodology, Singular Value Machine based load forecasting, and recent development of probabilistic load forecasting technologies); 4) Wind generation forecasting and wind resource assessment; 5) Solar generation forecasting.

**Components:** Lecture**Same As Offering:** EE 525**Attributes:** Given When Needed**Requirement Group:** Prerequisite: EE333 or Equivalent**Req. Designation:** Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng****EE 637(3)** Course ID:013114 2021-07-06**Interconnection of Distributed Energy Resources to the Power System**

This is a graduate level course on the topic interconnection of Distributed Energy Resources (DER) to the power system. It covers DER technology types such as PV, fuel cell, battery storage, wind, ICE, combustion turbines and others. The course shows students how to evaluate and analyze the power system impacts of DER, and determine the allowable penetration limits of DER. It deals with various interconnection issues such as voltage regulation, ground fault overvoltage, system grounding, load rejection overvoltage, overcurrent protection coordination, islanding protection, synchronization, voltage flicker, harmonics and other factors.

Solutions to common problems are explained and addressed. Includes many examples and methodologies. Also covers various industry interconnection standards such as IEEE1547 and the application of various utility, federal and state interconnection protocols. Future DER trends in interconnection technology and emerging solutions are discussed as well.

**Components:** Lecture**Requirement Group:** Prerequisite: EE681 or equivalent.**Req. Designation:** Technology**EE 638(3)** Course ID:013014 2020-01-17**Grid Connected Renewable Energy Systems**

Power grid energy resources. The solar resource, photovoltaic cell characteristics, solar array performance.

Wind energy principles, wind turbine characteristics. Maximum power point operation. Energy storage systems. Grid integration issues.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: EE681 or equivalent.**Req. Designation:** Technology

**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng**

EE 639(3) Course ID:013015 2021-09-23

**Electric Power Distribution Systems - Part 1**

A graduate level course on modern electric power distribution systems, with topics selected from: distribution feeder & substation layouts, overhead and underground line configurations, voltage regulation, capacitor applications, distribution faults and protection, reliability and power quality, lightning protection, grounding, interconnection of distributed generation, basic distribution planning. This is part 1 of a 2 part series.

**Components:** Lecture**Same As Offering:** EE 639**Attributes:** Given When Needed**Requirement Group:** Prerequisites: EE681 or equivalent.**Req. Designation:** Technology

EE 639(3) Course ID:013015 2021-09-23

**Electric Power Distribution Systems - Part 1**

A graduate level course on modern electric power distribution systems, with topics selected from: distribution feeder & substation layouts, overhead and underground line configurations, voltage regulation, capacitor applications, distribution faults and protection, reliability and power quality, lightning protection, grounding, interconnection of distributed generation, basic distribution planning. This is part 1 of a 2 part series.

**Components:** Lecture**Same As Offering:** EE 639**Attributes:** Given When Needed**Requirement Group:** Prerequisites: EE681 or equivalent.**Req. Designation:** Technology

EE 640(3) Course ID:012346 2016-06-13

**Fuel Cell Science and Hydrogen Engineering**

[Cross-listed with ME 581] [Formerly EER 580] Introduce the student to the science and engineering of fuel cell technology. Emphasis will be on developing an understanding of different types of fuel cells, their applications, and the engineering of complete fuel cell systems. Elements of the class will include: electrochemistry; polymer materials science for proton exchange membrane (PEM) based systems; ceramics for solid oxide fuel cells; liquid-electrolytes for phosphoric acid and alkaline fuel cells; and other methods of generating power directly from a fuel and an oxidant. The system requirements of the fuel cell stack will be introduced to provide a complete picture of the technology. Other elements addressed during the course will include thermochemistry; electrochemistry; fuel processing or reforming; electrical & power management; polymer science and systems engineering. Developing an understanding of the proton exchange membrane fuel cell will be the primary objective. After completing this course, the student is expected to have an

**Components:** Lecture**Course Equivalents:** ME 581**Req. Designation:** Technology

EE 642(3) Course ID:008215 2016-07-01

**Electronic Power Conversion**

[Formerly EER 542] This course examines the application of power semiconductor devices to the efficient conversion of electrical energy. Circuit analysis, signal analysis, and energy concepts are integrated to develop steady-state and dynamic models of generic power converters. Specific topics include AC/DC conversion, DC/DC conversion, DC/AC conversion, and AC/AC conversion. These generic converters are applied as controlled rectifiers, switching power supplies, motor drives, HVDC transmission, induction heating, and others. Ancillary circuits needed for the proper operation and control of power semiconductor devices are also discussed. Prerequisites: Courses in circuit analysis, signals and systems.

**Components:** Lecture**Req. Designation:** Technology

EE 643(3) Course ID:012347 2016-07-01

**Photovoltaic Engineering**

[Cross-listed with ME 582] [Formerly EER 580A] The course focuses on the physical principles, technology, and design of efficient semiconductor photovoltaics. Course goals equip students with the concepts and analytical skills to understand efficiency limitations, to assess the viability of various solar and thermophotovoltaic technologies, and to introduce the physics required for understanding photovoltaic energy conversion. The course will focus on three primary aspects of photovoltaic energy conversion, (i) the transfer and conversion of solar (i.e. thermal) radiation to electronic energy, (ii) the theory and design of the semiconductor photovoltaic cell and (iii) photovoltaic systems and applications.

**Components:** Lecture**Course Equivalents:** ME 582**Req. Designation:** Technology

**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng**

EE 644(3)

Course ID:012344

2016-07-01

**Solid State Electronics**

[Formerly EER 574] Course reviews the physics and technology of semiconductor electronic devices and their dynamic behavior. Emphasis will be placed on semiconductor devices used in high-power and high frequency applications such as power electronic switching elements and microwave power amplifiers. Course emphasizes physical understanding of device operation and limitations through energy band diagrams, electron carrier statistics and transport, charge control equations, and equivalent circuit models. Derivation of electrical characteristics and dynamic limitations will be presented for (1) power diodes, (2) bipolar devices such as the power bipolar junction transistor and thyristors, (3) unipolar devices such as the microwave field effect devices and (4) new classes of controlled power electronic devices such as the insulated gate bipolar transistor. Issues such as reduction of parasitic electrical losses, high band-gap semiconductor material development, and thermal management will be discussed.

Components: Lecture

Req. Designation: Technology

**Engineering - Computer Science - Subject: Electrical & Computer Eng****EE 652(3)****Computer Vision**

[Cross-listed with CS 652] This course will cover both classical and recent progress in the field of computer vision, both on the theory and practice. Material covered will be from both the textbook and relevant research papers in the area. After taking this course, students will achieve the necessary knowledge to solve various practical computer-vision problems and build a solid background for further computer-vision research. Topics covered include: Early vision on one and multiple images (linear filters, edge detection, stereopsis), mid-level vision (segmentation, object tracking), high-level vision (model-based vision, graph-based image segmentation) and applications (medical image analysis, image-based rendering).

Prerequisites: CS344 and MA339 (or equivalent, with consent from the instructor)

**Components:** Lecture

**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng****EE 653(3)** Course ID:012330

2016-07-01

**Modeling and Control of Energy Conversion**

[Formerly EER 542A] This course examines modeling and control techniques appropriate for application to power electronic and electric machine systems. The course will involve examination of the appropriate theory, followed by application through examples and small design projects. Simulation will be used to evaluate the merits of various techniques.

**Components:** Lecture**Req. Designation:** Technology**EE 657(3)** Course ID:012327

2016-07-01

**Linear Control Systems**

[Cross-listed with ME 560] [Formerly EER 522] This course addresses practical control system design primarily from a classical perspective. Beginning with transfer function modeling of dynamic systems, the course moves through transient, root locus, and frequency response analysis to end with frequency domain techniques for controller design.

**Components:** Lecture**Course Equivalents:** ME 560**Req. Designation:** Technology**EE 658(3)** Course ID:012328

2016-07-01

**Digital Control Systems**

[Formerly EER 528] The course begins with a brief review of continuous-time control methods before transitioning to the theory and implementation techniques for control of dynamic processes by digital computers. Topics covered include discrete system analysis, sampled data systems, quantization effects, state space representation of digital control systems, and the design of digital control algorithms.

**Components:** Lecture**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

EE 659(3) Course ID:013126

2022-02-03

**Electric Power Distribution Systems - Part 2**

A graduate level course on modern electric power distribution systems, with advanced topics selected from: distribution automation and smart grid, advanced lightning protection, microgrid architectures/systems, DC systems, advanced planning, reliability and power quality concepts, energy conservation and efficiency concepts.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisite: EE 639 or equivalent**Req. Designation:** Technology

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**School of Arts and Sciences - Computer Science - Subject: Electrical & Computer Eng****EE 667(3) Course ID:008218 2015-08-15****Computer Algorithms**

[Cross-listed with CS 547] This course will study and contrast a variety of computational algorithms and develop tools for algorithm analysis. Methods and topics such as dynamic programming, greedy algorithms, graph algorithms, circuits, parallel algorithms, matrix and polynomial algorithms, string matching, and geometrical algorithms will be explored. The theory of NP-completeness and methods of managing NP-complete problems will also be covered.

Prerequisites: CS344, MA211 or MA346.

**Components:** Lecture

**Course Equivalents:** CS 547

**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng**

**EE 680(3)** Course ID:012338 2016-07-01

**Power System Analysis I**

[Formerly EER 560] Power and energy in AC circuits. Single-phase, three-phase and poly-phase circuits in balanced and unbalanced regimes. Measurement of three-phase power. Determination of three-phase sequence. Single-line diagrams. Per-unit method of representation and computations. Transformers and synchronous machines in power systems. Parameters of transmission lines.

Prerequisite: Electric Circuits or equivalent.

Components: Lecture

Req. Designation: Technology

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**EE 681(3)** Course ID:012339 2016-07-01

**Power System Analysis II**

[Formerly EER 561] Wave-propagation in transmission lines. Analysis of power networks, load-flow solutions and control. Three-phase faults and symmetrical components. Power system protection. Stability of power systems.

Prerequisites: Electric Circuits or equivalent.

Components: Lecture

Req. Designation: Technology

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**EE 682(3)** Course ID:012331 2016-07-01

**Electromechanical Energy Conversion**

[Formerly EER 542B] This course is designed to introduce the student to the inside of AC electric machinery. It begins with a review of computing inductance using the integral form of Maxwell's equations. Next, the energy method for computing the forces of electrical origin is introduced. These forces are then combined with circuit equations and the equations of mechanics to obtain dynamic models of electromechanical systems. The methodology developed is applied to simple electromechanical structures and then to various types of synchronous machines; induction machines are also considered. Consideration will be given to the electronic control of electric machines.

Prerequisite: A undergraduate course in electromagnetics.

Components: Lecture

Req. Designation: Technology

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**EE 683(3)** Course ID:012348 2016-07-01

**Turbine Engineering**

[Cross-listed as ME 583] [Formerly EER 580B] Course on fundamentals of design, analysis, and technology of turbo machinery - jet engines, gas turbines, steam turbines, water turbines, and wind turbines. The course will provide an understanding of all aspects of system development: thermodynamic cycles, design-point and off-design performance; function and design of components (inlets, compressors, combustors, turbines, outlets), operational limits, and environmental concerns; structural analysis, lifting, and materials; rotor dynamics and blade aeromechanics; clearance analysis, sealing, and packing; heat transfer, blade and component cooling; starting and control; power and thrust generation; testing and instrumentation. The student is expected to develop a broad understanding of the state-of-the-art, challenges, and future of turbine systems.

Components: Lecture

Course Equivalents: ME 583

Req. Designation: Technology

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**EE 684(3)** Course ID:012349 2016-07-01

**Wind Energy Engineering**

[Cross-listed with ME 588] [Formerly EER 580D] The course focuses on 'Wind Farm Project Design and Development' and 'Wind Turbine Technology.' Part I: Teams will demonstrate understanding of complete wind farm design/development process inclusive of site selection, wind resource evaluating target land area, turbine choice, location, energy projection, cost, transmission. Part 2: Focuses on technical understanding of Wind Turbine attributes such as structural, blade system, Nacelle system, electrical system, performance, and future opportunities.

Components: Lecture

Course Equivalents: ME 588

Req. Designation: Technology

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**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng**

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**EE 685(3)** Course ID:012350 2016-07-01**Solar Energy Engineering**

[Cross-listed as ME 587] [Formerly EER 580E] This course is designed to enable the student to effectively grasp the complex and quickly changing solar industry. The course will cover such topics as the economy of solar, photovoltaic devices, systems and applications. In order to cover this broad range of technical topics, the course will utilize multiple instructors. Each instructor has significant expertise and depth in the given field and the student will be able to draw from their experience. Students completing this course will develop knowledge of the solar industry, looking at the past, present and future of this technology area. Students will gain key technical background in every aspect of the industry and will be able to assess new technologies as they are developed. Understanding of the economics of solar and its future will also be obtained.

**Components:** Lecture

**Course Equivalents:** ME 587

**Req. Designation:** Technology

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**EE 686(3)** Course ID:012351 2016-07-01**Synchronous Electrical Generators**

[Cross-listed with ME 589] [Formerly EER 580G] Course on fundamentals of design and analysis of power generators, such as those used in thermal power plants and wind turbines. The course will address the basic operating principles of the synchronous machine and consider configurations such as would field, permanent magnet, and doubly fed generators. Key topics will include understanding and analysis of the magnetics within the machine, losses and efficiency, thermal performance, mechanical behavior, operation on the power system, and key IEEE and IEC standards. Further topics will include the duty imposed on the machine during service as well as the duty it imposes on the turbine. The student is expected to develop a broad functional understanding of the current engineering technology, challenges, and future of generator technology.

**Components:** Lecture

**Course Equivalents:** ME 589

**Req. Designation:** Technology

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**EE 687(3)** Course ID:012341 2016-07-01**Nuclear Engineering**

[Cross-listed with ME 575] [Formerly EER 570] The purpose of this course is provide students of various engineering disciplines a functional knowledge of nuclear engineering principles and those most important to the design of nuclear power generation systems. The course will focus both on the nuclear reactor core as well as plant systems. The intent is that students will gain a physical understanding of nuclear engineering principles as they relate to their own field of interest. Class participation will be highly encouraged and focused through the discussion of current events in the nuclear industry as well as proposed future nuclear technologies.

**Components:** Lecture

**Course Equivalents:** ME 575

**Req. Designation:** Technology

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**EE 690(3)** Course ID:012355 2019-08-30**Independent Study**

[Formerly EER 590] Advanced graduate course in the field of engineering sciences. Topics of special interest will be selected for current needs. A description of the course content in any particular term will be announced in advance.

**Components:** Independent Study

**Same As Offering:** EE 690

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

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EE 690(3) Course ID:012355 2019-08-30

**Independent Study**

[Formerly EER 590] Advanced graduate course in the field of engineering sciences. Topics of special interest will be selected for current needs. A description of the course content in any particular term will be announced in advance.

**Components:** Independent Study  
**Same As Offering:** EE 690  
**Attributes:** Given When Needed  
**Req. Designation:** Technology

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EE 691(3) Course ID:012352 2019-08-30

**Special Topics in Electrical Engineering**

[Formerly EER 581] Topics chosen from the current literature according to faculty and student interest. Possible topics include new developments in the major areas of electrical engineering such as electromagnetic fields, communications, controls, circuits, power, devices, electronics, and computer design. Topics may include but not be limited to image processing, machine vision, speech synthesis, integrated optics, antenna systems, adaptive filtering, variational methods, stochastic processes, optical communications, space and satellite communications, and computer networks. Each of these special topics courses has a variable content addressing specific current areas of interest to students.

**Components:** Lecture  
**Same As Offering:** EE 691  
**Attributes:** Given When Needed  
**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng****EE 691(3)** Course ID:012352

2019-08-30

**Special Topics in Electrical Engineering**

[Formerly EER 581] Topics chosen from the current literature according to faculty and student interest. Possible topics include new developments in the major areas of electrical engineering such as electromagnetic fields, communications, controls, circuits, power, devices, electronics, and computer design. Topics may include but not be limited to image processing, machine vision, speech synthesis, integrated optics, antenna systems, adaptive filtering, variational methods, stochastic processes, optical communications, space and satellite communications, and computer networks. Each of these special topics courses has a variable content addressing specific current areas of interest to students.

**Components:** Lecture**Same As Offering:** EE 691**Attributes:** Given When Needed**Req. Designation:** Technology**EE 692(3)** Course ID:008219

2022-01-01

**Independent Study**

Advance graduate course in the field of engineering sciences. Topics of special interest will be selected for current needs. A description of the course content in any particular term will be announced in advance.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

**EE 693(1 - 3)** Course ID:008220 2015-02-03 Instructor Consent Required

**Directed Study in Electrical and Computer Engineering**

Investigation of topics of current interest in selected areas of electrical and computer engineering.

**Components:** Independent Study

**Req. Designation:** Technology

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**EE 694(1 - 3)** Course ID:008221 2014-12-04 Instructor Consent Required

**Directed Study in Electrical & Computer Engineering**

Investigation of topics of current interest in selected areas of electrical and computer engineering.

**Components:** Independent Study

**Req. Designation:** Technology

**Engineering - CRC Engineering Programs - Subject: Electrical & Computer Eng**

EE 698(0) Course ID:013007

2020-01-02

**MS-EE Graduate Project - Studies**

This non-credit Seminar project provides a capstone experience for Electrical Engineering graduate students not completing a thesis or independent study (i.e., all course work). The candidate and faculty advisor agree on project scope and evaluation process. The candidate performs required analytical and/or experimental studies to complete a Graduate Project Paper and Presentation.

**Components:** Seminar**Attributes:** Given When Needed**Req. Designation:** Technology

EE 699(0) Course ID:012360

2020-01-02

**MS-EE Graduate Project - Defense**

[Formerly EER 599] This non-credit Seminar project provides a capstone experience for Electrical Engineering graduate students not completing a thesis or independent study (i.e., all course work). The candidate will deliver and defend results from studies documented in a Graduate Project Paper and Presentation. The candidate receives a pass/fail grade which appears on the official transcript.

**Components:** Seminar**Attributes:** Given When Needed**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Electrical & Computer Eng**

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EE 739(1 - 10) Course ID:012784 2018-01-03

**Seminar in Nonlinear Processes**

Seminar in Nonlinear Processes

Components: Seminar

Course Equivalents: MA 739

Attributes: Given When Needed

Req. Designation: Technology

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EE 997(3) Course ID:013202 2023-05-05

**Special Topics in Engineering**

Used for graduate transfer credit for which Clarkson does not have an equivalent EE course number.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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EE 998(3) Course ID:013203 2023-05-05

**Special Topics in Engineering**

Used for graduate transfer credit for which Clarkson does not have an equivalent EE course number.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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EE 999(1 - 10) Course ID:011129 2015-01-13

**Special Topics in Electrical Engineering**

Used for graduate transfer credit for which Clarkson does not have an equivalent EE course number.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

**Institute for STEM Education - CRC Education Program - Subject: English****EGL 575(3) Course ID:012906 2022-04-08****Interdisciplinary Connections of History and Multicultural Literature**

Framed around universal concepts of humanity (change, diversity, intolerance, ethics, creativity, freedom, and legacy), this course is designed to illustrate the interdisciplinary connections between secondary social studies and English language arts. Recognition that these key concepts span time and place, and are applicable to every period in history, will help to develop a broad understanding of the human experience, and the unity of humanity, through the study of history and multicultural literature. In addition to the historic and literature specific content of the course, other goals include development of empathy and a respect for diversity, as well as learning how to guide discussions that value different points of view.

**Components:** Seminar**Course Equivalents:** HST 575**Attributes:** Given When Needed**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program**Req. Designation:** Technology**EGL 580(3) Course ID:012375 2021-10-08****MAT Project in English (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program**Req. Designation:** Technology**EGL 585(3) Course ID:012378 2018-01-16****Nonfiction in the English Classroom**

The Common Core Standards for ELA mandate a shift in the English classroom towards the use of more nonfiction/informational texts. The precise nature of this mandate and its impact on the practices of English teachers continues to be a source of controversy and confusion. In this 3-credit course, we will come to terms with this controversy, and articulate a vision for using nonfiction texts in the English classroom. Additionally, we will explore reading and writing in the literary genres that comprise the category of nonfiction, including memoir, the essay, argumentative writing, and literary journalism.

**Components:** Lecture**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program**Req. Designation:** Technology

Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Environmental Health Scien

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EHS 1(2 - 4) Course ID:008406 2022-01-26

**Industrial Hygiene Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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EHS 2(2 - 4) Course ID:008407 2022-01-26

**Industrial Hygiene Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

This course may be used to satisfy a Science Foundation Curriculum Requirement.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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EHS 309(3) Course ID:008408 2022-01-26

**Introduction to Environmental and Occupational Health**

[Cross-listed with BY309] Study of the recognition, evaluation and control of chemical, biological, radiological, physical and ergonomic hazards found in the work environment and surrounding community. Key aspects of the course will include hazard assessment, basic anatomy and physiology associated with routes of entry and toxicology of hazardous agents, environmental, health and safety regulations, exposure monitoring instrumentation, and effective controls to minimize the risk of illness or injury.

Components: Lecture

Course Equivalents: BY 309

Attributes: Offered Spring Term

Requirement Group: Prerequisites: CM132 or CM104/106

Req. Designation: Technology

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EHS 310(2) Course ID:008409 2022-01-26

**Introduction to Industrial Hygiene Laboratory**

This is a lab course that meets for three hours a week. The course consists of weekly labs. Students must prepare lab reports on a weekly basis. These lab reports are evaluated for consistency, accuracy, presentation and overall quality. The course ends with students individually presenting scenarios that encompass knowledge gained over the length of the course. Students are expected to communicate knowledge of both environmental health and public health. In addition, each student must prepare a final report to accompany their presentation. The written material will be critiqued by the instructor and feedback will be provided to each student. A portion of the labs will be dedicated to instruction on writing and presentation skills.

Components: Laboratory

Attributes: One communication unit, Offered Spring Term

Requirement Group: Corequisite: EHS309

Req. Designation: Technology

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EHS 330(3) Course ID:010321 2022-01-26

**Occupational Safety and Ergonomics**

This course will provide students with an overview of the contemporary Environmental, Health and Safety (EHS) management techniques for occupational settings. The EHS management systems of today have evolved over many years (ISO 14001, ISO 45001). The Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency are the primary regulatory organizations in the United States. However, compliance is the minimum standard of care. Cost effective systems to minimize risk among the community and workers as well as ensure compliance with state and federal regulation must include a comprehensive and integrated Environment, Health, and Safety Management System (EHS-MS) that is sustainable for the long term. The course will introduce techniques used to assess the risk of injury including job safety analysis, fault tree analysis, systems safety and design for safety . In addition, this course will provide the students with the fundamental elements of occupational ergonomic assessments, risk factors and controls. The course will be a

Components: Lecture

Attributes: Offered Odd Falls

Req. Designation: Technology

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Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Environmental Health Scien

EHS 405(4) Course ID:008412 2022-03-08

**Methods and Analysis**

IH405, Methods and Analysis, is a combined lecture/laboratory course. Students complete nine full laboratory assignments requiring complete reports (~10 pages) to be turned in weekly or bi-weekly. Students are provided feedback on content and writing mechanics (technical reporting) and are offered (sometimes requested) the opportunity to resubmit.

**Components:** Laboratory, Lecture

**Attributes:** One communication unit, Given When Needed

**Requirement Group:** Prerequisites: EHS 309 and open to students majoring in EHS, ES&P and Chemistry only. Two years of col

**Req. Designation:** Technology

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EHS 406(3) Course ID:008413 2023-05-30

**Industrial Hygiene Control Methods**

Various ways to prevent and solve common industrial hygiene problems will be considered; topics will include typical engineering controls, administrative controls and personal protection to control chemistry exposure and releases. In addition controls for temperature extremes, noise and vibration exposure, and ergonomic stressors will be studied. About two-thirds of the course is devoted to industrial exhaust ventilation design. (2 credits of design, for Civil and Environmental Engineering Majors)

**Components:** Lecture

**Course Equivalents:** EHS 506

**Attributes:** Two Design Credits, Offered Even Falls

**Requirement Group:** Prerequisite: EHS309 or consent of the instructor.

**Req. Designation:** Technology

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School of Arts and Sciences - Inst for a Sustainable Environ - Subject: Environmental Health Scienc

EHS 408(1)

Course ID:013143

2022-01-26

**Exposure Assessment Laboratory**

This class is a laboratory based course exploring human exposure. Each class (once per week, 3 hour lab) will include a 30-45 minute lecture addressing the theory and application of the laboratory material. The laboratory experiments are designed to acquaint students with a variety of environmental and occupational field sampling methods and their corresponding laboratory analytical methods.

Many analytical techniques are used to analyze industrial hygiene and environmental samples. Some techniques provide immediate results while others require laboratory analysis. This course will allow the student to use a variety of methods to analyze contaminants, and an opportunity to compare and contrast sampling and analytical methods. In addition to collecting the samples, data analysis techniques and modeling exposures will be used to analyze the data with a few types of software. While the course will focus on sampling and sample analysis, related topics will be discussed briefly. Variables and conditions such as, who, when, how

**Components:** Laboratory

**Course Equivalents:** EHS 508

**Attributes:** Offered Even Falls

**Requirement Group:** Prerequisites: EHS309, and CE433, or consent of the instructor.

**Req. Designation:** Technology

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Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Environmental Health Scien

EHS 416(3) Course ID:008415 2023-05-30

**Principles of Toxicology and Epidemiology**

[Cross-listed with BY 416] This is an introductory course in toxicology and epidemiology. Toxicology is the study of the harmful interactions, including absorption, distribution, metabolism and disease effects, of chemical, biological and physical agents with biological systems, when administered by accident or design. Epidemiology is the study of the distribution and determinants of disease frequency in populations exposed to these toxicants and stressors. The first two thirds of this course will focus on the toxicological interaction and effects of environmentally and occupationally derived toxicants with the human body. The last third of the course will focus on the epidemiological tools to evaluate the risk of exposure to such toxins, and will examine, in detail, several important historical and recent case studies of toxic exposures to individuals and populations in the home, the outdoor environment, and the work place. Toxicology and Epidemiology are important sciences that provide a sound basis for developing measures to reduce the risk of

**Components:** Lecture

**Course Equivalents:** BY 416, EHS 518, BY 518

**Attributes:** Offered Odd Falls

**Requirement Group:** Prerequisites: EHS 309 or consent of the instructor.

**Req. Designation:** Technology

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EHS 481(3) Course ID:008416 2022-01-26

**Advanced Topics in Environmental and Occupational Health**

This course is a project based course that requires students to work on a broad array of topics in environmental health. Students will have multiple projects (6-8) running simultaneously and each will require writing assignments and presentations. Literature and text reviews will be necessary for most of the projects. Group communication skills are also developed as some projects are done in groups. Course work and lab preparation call for combining both lab work and lecture material in a cohesive and accessible format. The course also involves consistent review of student work by the instructor, in the form of both written and oral feedback. IH481 also requires for a minimum of three oral presentations by individuals.

**Components:** Lecture

**Attributes:** One communication unit, Offered Spring Term

**Requirement Group:** Prerequisite: Senior standing in the following majors or minors: EHS or ES&P, or consent of the instruc

**Req. Designation:** Technology

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**Science - Inst for a Sustainable Environ - Subject: Environmental Health Science****EHS 490(0 - 3)****Course ID:**011300**2023-05-30****Internship/Co-op**

Students who obtain a (summer) internship/co-op position may obtain credit for the work experience by registering for this course the semester following the position. Students will be required to keep a daily journal of work activities and submit the journal entries to the EHS Program Director every two weeks. During the semester following the internship/co-op, a 10-page report on some aspect of their work experience and a 30 minute presentation will be required.

**Components:** Independent Study**Attributes:** Offered Fall and Spring**Requirement Group:** Prerequisite: Open to EHS or ES&P major or minor only, or by consent of the program director**Req. Designation:** Technology

Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Environmental Health Scien

EHS 494(1 - 3) Course ID:011306 2022-03-08

**Directed Research for Undergraduates**

A research project will be completed; research projects may include laboratory projects or individual study of industrial hygiene topics not available in other industrial hygiene courses.

**Components:** Research

**Attributes:** Offered Fall and Spring

**Requirement Group:** Prerequisite: Open to EHS or ES&P major or minor only, or by consent of the program director

**Req. Designation:** Technology

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EHS 495(1 - 3) Course ID:011307 2022-03-08

**Directed Research for Undergraduates**

A research project will be completed; research projects may include laboratory projects or individual study of industrial hygiene topics not available in other industrial hygiene courses.

**Components:** Research

**Attributes:** Offered Fall and Spring

**Requirement Group:** Prerequisite: Open to EHS or ES&P major or minor only, or by consent of the program director

**Req. Designation:** Technology

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EHS 497(1 - 3) Course ID:011316 2022-03-08

**Directed Study**

A research project will be completed; research projects may include laboratory projects or individual study of industrial hygiene topics not available in other industrial hygiene courses.

**Components:** Independent Study

**Attributes:** Given When Needed

**Requirement Group:** Prerequisite: Open to EHS or ES&P major or minor only, or by consent of the program director

**Req. Designation:** Technology

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EHS 505(4) Course ID:008420 2022-03-08

**Methods and Analysis**

This course covers the same topics as IH405 and includes additional material on the graduate level.

Prerequisites: two years' college chemistry and major Industrial Hygiene, IH309.

**Components:** Laboratory, Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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EHS 506(3) Course ID:008421 2022-03-08

**Industrial Hygiene Control Methods**

This course covers the same topics as IH 406 and includes additional material on the graduate level.

Prerequisites: IH309 or consent of the instructor.

**Components:** Lecture

**Course Equivalents:** EHS 406

**Attributes:** Offered Even Falls

**Req. Designation:** Technology

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EHS 508(1) Course ID:013142 2022-01-26

**Exposure Assessment Laboratory**

This class is a laboratory based course exploring human exposure. Each class (once per week, 3 hour lab) will include a 30-45 minute lecture addressing the theory and application of the laboratory material. The laboratory experiments are designed to acquaint students with a variety of environmental and occupational field sampling methods and their corresponding laboratory analytical methods.

Many analytical techniques are used to analyze industrial hygiene and environmental samples. Some techniques provide immediate results while others require laboratory analysis. This course will allow the student to use a variety of methods to analyze contaminants, and an opportunity to compare and contrast sampling and analytical methods. In addition to collecting the samples, data analysis techniques and modeling exposures will be used to analyze the data with a few types of software. While the course will focus on sampling and sample analysis, related topics will be discussed briefly. Variables and conditions such as, who, when, how

**Components:** Laboratory

**Course Equivalents:** EHS 408

**Attributes:** Offered Even Falls

**Req. Designation:** Technology

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Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Environmental Health Scien

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EHS 518(3) Course ID:010303 2022-01-26

**Principles of Toxicology and Epidemiology**

[Cross-listed with BY 518] This course covers the same topics as EHS 416 and includes additional material on the graduate level.

**Components:** Lecture

**Course Equivalents:** BY 416, EHS 416, BY 518

**Req. Designation:** Technology

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EHS 581(3) Course ID:010316 2022-01-26

**Advanced Topics in Environmental and Occupational Health**

This course covers the same topics as IH481 and includes additional material on the graduate level.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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EHS 999(1 - 10) Course ID:011111 2022-01-26

**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**Business - Engineering & Management - Subject: Engineering & Mgmt**

**EM 1(2 - 4)** Course ID:008224 2015-01-19

**Engineering and Management Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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**EM 2(2 - 4)** Course ID:009666 2015-01-19

**Engineering & Management**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

This course may be used as a Professional Elective.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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**EM 120(3)** Course ID:008225 2015-02-19

**Team-based Design and Innovation**

The first in a two-course sequence, this course is required for all first-year students in the Engineering & Management Program. Students will undertake a yearlong project to design, produce, and potentially commercialize a product. Projects will require the application of both engineering and management tools and principles. The primary focus of the fall semester is to build functional teams, introduce design tools and complete a conceptual design of the product. Open only to E&M, University Studies, Engineering Studies, and Science Studies first-year students unless approved by E&M Director.

Components: Laboratory, Lecture

Attributes: One communication unit, Offered Fall Term

Req. Designation: Technology

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**EM 121(2)** Course ID:008226 2015-10-20

**Technological Entrepreneurship**

The second in a two-course sequence, this course is required for all first-year students in the Engineering & Management Program. Students will undertake a yearlong project to design, produce, and potentially commercialize a product. The primary focus of the spring semester is to build a business plan from the fall semester conceptual design. Open only to E&M, University Studies, Engineering Studies, and Science Studies first-year students unless approved by E&M Director.

Components: Laboratory, Lecture

Attributes: One communication unit, Offered Spring Term

Requirement Group: Prerequisite: EM120.

Req. Designation: Technology

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**EM 190(1 - 3)** Course ID:008227 2015-01-23

**Independent Study**

An investigation of an interdisciplinary socio-technical problem undertaken by an upperclass student under the guidance of a faculty member.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

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**EM 205(3)** Course ID:011133 2022-02-10

**Introduction to Financial and Managerial Accounting**

[Cross-listed with AC 205] An introductory survey of accounting information to guide and improve decision making. Many course topics involve cost planning and control techniques used to evaluate and improve the financial performance of organizations and/or products.

Components: Lecture

Course Equivalents: AC 205

Attributes: Offered Fall and Spring

Requirement Group: Prerequisites: Restricted to E&M majors only

Req. Designation: Technology

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**Business - School of Business - Subject: Engineering & Mgmt****EM 211(3)** Course ID:011134

2020-05-13

**Intro to Enterprise Information Systems**

This course will introduce students to enterprise information systems, their components, integration, and use as part of the business process. The distributed, accurate, real time flow of information is a critical success factor for most organizations. The ability of an organization to collect and analyze this information is crucial in today's data-driven economy. The focus of this course is on the functional and strategic use of enterprise resource planning (ERP) software, its application, input devices, implementation issues and use. Hands-on experience with SAP ERP is integral to this course. Offered fall and spring semesters.

**Components:** Lecture**Attributes:** Offered Each Term**Requirement Group:** Prerequisites: students may not receive credit for IS200 as well as EM211 and restricted to E&M majors**Req. Designation:** Technology**EM 286(3)** Course ID:011135

2016-02-19

**Organizational Behavior I**

[Cross-listed with OS 286, PY 286] (May be used to satisfy a CUSB MBA or MS foundation requirement.) An introduction to the processes required to manage contemporary organizations with a focus on individual behaviors as they relate to the functions of planning, organizing, controlling, and leading. The most recent concepts of behavioral science in the practice of management are presented to assist the student in gaining understanding of the pervasiveness of the discipline in all types of organizations and processes. Topics include motivation, leadership, perceptions, personality theory, learning theory, personnel issues, stress management, organizational culture, and decision making.

**Components:** Lecture**Course Equivalents:** OS 286, PY 286**Attributes:** Individual and Group Behavior, Offered Each Term**Requirement Group:** Prerequisites: sophomore standing and restricted to E&M majors.**Req. Designation:** Technology

**Business - Engineering & Management - Subject: Engineering & Mgmt****EM 301(3)** Course ID:013106 2022-03-17**Applied Data Analytics**

[Cross-listed with IS301] Proper utilization of modern analytical tools is a critical component of effective and timely creation and use of organizational intelligence in a variety of fields of human endeavor: management, social science, health care, engineering etc. This course focuses on critical skills for using software tools such as Excel, SQL, and Tableau (or their equivalents) for the purpose of conducting a variety of analytics tasks and operations to improve gathering, generation and presentation of organizational intelligence. Focus is on proper data gathering and preparation, followed by the use of key analysis grouping and summation tools as well as data presentation and visualization.

**Components:** Lecture**Course Equivalents:** IS 301**Attributes:** Offered Fall and Spring**Requirement Group:** Prerequisite: IS110**Req. Designation:** Technology**EM 310(0)** Course ID:011873 2022-02-10**E&M Professional Experience**

Project-based professional experience in engineering & management, related to student career interests and/or field of study. Fulfills Clarkson Common Experience Professional Experience requirement for E&M students. Course registration requires E&M approval of application. Completion of course requires approval of E&M Director.

**Components:** Independent Study**Attributes:** Offered Fall and Spring**Req. Designation:** Technology

**School of Arts and Sciences - Engineering & Management - Subject: Engineering & Mgmt**

EM 313(3) Course ID:012967

2022-02-10

**Professional Communication**

[Cross-listed with COMM313] This course presents students opportunities to learn how to design and present effective professional documents. The course emphasizes a rhetorical approach to analyzing the issues and details important to the communication to be produced (e.g., audience, style, format, purpose). Students will practice writing both individually and collaboratively and will be expected to present their work orally on occasion. Students will encounter topics such as, but not limited to, abstracts, email, instructions, letters, memoranda, proposals, and various types of reports. Students of any major may take this course.

**Components:** Lecture**Course Equivalents:** COMM 313**Attributes:** Two communication units, Offered Fall and Spring**Req. Designation:** Technology

**Business - Engineering & Management - Subject: Engineering & Mgmt**

**EM 314(3)** Course ID:011634 2014-11-19

**Database Design & Management**

[Cross-listed with IS 314] This course provides the student with in-depth knowledge of database analysis, design, and implementation principles. Students who successfully complete this course will be able to use the entity-relationship data model to represent business data requirements, to translate that model into a relational schema, to normalize this schema and to build and use a relational database that implements the schema, using the Standard Query Language (SQL).

**Components:** Lecture

**Course Equivalents:** IS 314

**Requirement Group:** Prerequisite: Restricted to E&M students

**Req. Designation:** Technology

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**EM 331(3)** Course ID:011137 2022-02-10

**Operations & Supply Chain Management**

[Cross-listed with OM 331] (May be used to satisfy a CUSB MBA and MS foundation requirement.) An introduction to the planning, analysis and control of production systems. Topics include product and service design, manufacturing processes, aggregate production planning, inventory models and MRP, just-in-time systems, facility layout, forecasting/demand planning, project management, and quality management. Students acquire problem solving experience using ERP software.

**Components:** Lecture

**Course Equivalents:** OM 331

**Attributes:** Offered Fall and Spring

**Requirement Group:** Prerequisites: STAT 282 or STAT 383 or MA 330, and at least sophomore standing

**Req. Designation:** Technology

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**EM 333(3)** Course ID:011280 2022-02-10

**Elements of Operations Research**

Application of optimization models to typical engineering and management situations and problems. Topics include: optimization theory (linear programming, transportation and assignment models), decision analysis under uncertainty, queuing theory and Monte Carlo simulation.

**Components:** Lecture

**Attributes:** Offered Fall and Spring

**Requirement Group:** Prerequisites: STAT383 and at least junior standing, and restricted to E&M majors only.

**Req. Designation:** Technology

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**EM 341(3)** Course ID:011139 2017-10-11

**Supply Chain Design & Management**

[Cross-listed with OM 341] Fierce competition in today's global markets has forced business enterprises to focus on reducing costs while meeting rising customer expectations by designing and managing effective and sustainable supply chains. This course focuses on a systems approach to review state-of-the-art models and practical tools for inventory and materials management, design for supply chain, as well as supply chain integration. Topics covered include managing inventories in the supply chain, the bullwhip effect, risk pooling, delayed differentiation, measuring the financial performance of supply chains, the value of information and the role of information technology in the supply chain, coordination and collaboration with channel partners, supply chain related strategic alliances, and outsourcing/off-shoring/reshoring trends. Several team projects and hand-on experiences are utilized to demonstrate real world issues and applications.

**Components:** Lecture

**Course Equivalents:** OM 341

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: EM331 and restricted to E&M majors.

**Req. Designation:** Technology

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**EM 356(3)** Course ID:012871 2022-02-10

**Invention Development and Protection**

[Cross-listed with SB356] In this course, students learn how to develop inventions and protect them. Students will work in small teams to develop and describe their inventions in a form suitable for filing provisional patent applications with the U.S. Patent and Trademark Office. Aspects of intellectual property laws in the US and other countries will be covered to guide the student inventing process. Open only to E&M students.

**Components:** Lecture

**Course Equivalents:** SB 356

**Attributes:** Given When Needed

**Requirement Group:** Requirements: E&M major and Junior standing

**Req. Designation:** Technology

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**Business - Engineering & Management - Subject: Engineering & Mgmt**

EM 361(3) Course ID:011144

2014-11-18

**Supply Chain Environmental Management**

[Cross-listed with SB 361] This course aims to gain a greater understanding of supply chain environmental management by examining: (i) the advantages and business risks of adopting and implementing environmental practices and technologies in the supply chain, (ii) the role of suppliers and customers to facilitate the adoption/ implementation of environmental practices and technologies, and (iii) the implications of such supply chain activities on an organization's operations strategy. This course consists of a mix of lectures and class discussion.

**Components:** Lecture**Course Equivalents:** SB 361**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: EM331 and restricted to E&M majors.**Req. Designation:** Technology

**Business - School of Business - Subject: Engineering & Mgmt****EM 371(3)****Course ID:012841****2022-02-10****Strategic Sourcing**

This course provides an in-depth analysis of the procurement process and supplier management, with strong emphasis on managing a supplier base for both products and services. Topics covered include the strategic role of sourcing in supply chains, the identification and evaluation of requirements, the strategic make versus buy decision, supplier selection, development and evaluation processes, the supplier coordination and control mechanisms, the relationship between product design and the supplier base and the impact of information technology on strategic sourcing. Both theoretical and quantitative perspectives will be offered. In addition, the topics will be addressed from strategic, financial, sustainability and global perspectives. Students will also develop practical skills in using quantitative tools to select and evaluate suppliers.

**Components:** Lecture**Course Equivalents:** OM 371**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: OM/EM331 and at least junior standing**Req. Designation:** Technology

**Business - Engineering & Management - Subject: Engineering & Mgmt****EM 380(3)** Course ID:011142 2022-03-09**Project Management**

[Cross-listed with OM 380] This course will introduce students to all phases of project management from project initiation to termination. Topics covered include project selection, organization, contracts, planning and scheduling (PERT and CPM), estimating, budgeting and cost control, procurement, resource allocation, variance analysis, auditing and termination procedures. Project management software, case studies, and student team projects will be an integral part of the course.

**Components:** Lecture**Course Equivalents:** OM 380**Attributes:** Economics and Organizations, Offered Fall and Spring**Requirement Group:** Restrictions: Enrollment is limited to students in E&M, or consent of instructor. Corequisites: STAT**Req. Designation:** Technology**EM 381(3)** Course ID:012742 2022-03-09**Logistics Management**

[Cross-Listed SB381] Logistics involves planning, implementation and control of the forward and reverse flow and storage of goods, services, and information in the supply chain in order to effectively meet customer demand. Primary topics covered include management and location of facilities, management of channel networks, warehousing, transportation, management and design of integrated logistics networks, distribution strategies, third-party logistics, international logistics, and vehicle routing. In addition to lectures, case studies, numerical assignments and simulation of logistics systems may be utilized.

**Components:** Lecture**Course Equivalents:** SB 381**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: MK 320 and OM/EM 331**Req. Designation:** Technology

**Business - School of Business - Subject: Engineering & Mgmt****EM 415(3)****Course ID:011691****2022-03-09****Data Warehousing for Analytics**

[Cross-listed with IS 415] This course covers the fundamental concepts, design, management and application of data warehouses and business/enterprise intelligence systems. Specific topics covered include the logical design of a data warehouse, the data staging area and extraction-transformation-loading process, the design, implementation and utilization of multi-dimensional data analysis systems, as well as key business/enterprise intelligence concepts, processes and techniques including knowledge discovery and exploratory analysis. Offered Fall semesters.

**Components:** Lecture**Course Equivalents:** IS 415**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: EM314 or CS460/EE468 and Restricted to E&M students.**Req. Designation:** Technology

**Business - Engineering & Management - Subject: Engineering & Mgmt**

**EM 432(3)** Course ID:011138 2015-03-03

**Organizational Policy and Strategy**

[Cross-listed with OS 432] A capstone course designed to integrate the functional areas and tools of management studied in previous courses within a strategic planning framework giving due attention to ethical and social responsibility concerns and international business issues. Emphasis is placed on the business environment in a global economy, industry analysis, tactical planning, overall strategic planning, policy establishment and implementation. Case analysis, in the small group setting, is utilized, enabling students to share their expertise and explore their value structure. Students present results via written and oral reports.

**Components:** Lecture

**Course Equivalents:** OS 432

**Attributes:** Two communication units, Offered Each Term

**Requirement Group:** Prerequisites: FN361, EM331, EM286, MK320, senior standing, and restricted to E&M majors.

**Req. Designation:** Technology

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**EM 441(3)** Course ID:011143 2014-11-18

**Advanced Topics in Global Supply Chain Management**

[Cross-listed with SB 441] This course introduces several emerging topics in supply chain management, including: demand management, revenue management, risk management, supply chain agility and flexibility, supply chain disruption management, and supply chain contracts. This course also provides students with the opportunity to gain experience dealing with complex supply chain issues by utilizing a simulation game. The simulation deals with both strategic and tactical aspects of managing the supply chain.

**Components:** Lecture

**Course Equivalents:** SB 441

**Requirement Group:** Prerequisite: EM341 and restricted to E&M majors.

**Req. Designation:** Technology

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**EM 451(3)** Course ID:011140 2022-02-10

**Quality Management & Lean Enterprise**

[Cross-listed with OM 451] This course will introduce the students to both the managerial and technical aspects of quality improvement. The course emphasizes statistical applications to quality related topics such as process/product design, process capability, quality control, design of experiment, and inspections/sampling. Other topics of interest include: Juran quality trilogy, six-sigma project methodology, and cost of quality. The course consists of a series of lecture and problems solved in class.

**Components:** Lecture

**Course Equivalents:** OM 451

**Attributes:** Offered Fall and Spring

**Requirement Group:** Prerequisites: STAT 383 and restricted to E&M majors.

**Req. Designation:** Technology

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**EM 456(3)** Course ID:010732 2022-02-10

**Process Engineering and Design**

This course is a capstone design experience for students who have completed a foundation engineering science education. Primarily designed for the Engineering & Management (E&M) program, this course involves solution of a real world technical problem. Requires both written reports and oral presentations.

**Components:** Lecture

**Attributes:** One communication unit, Offered Fall and Spring

**Requirement Group:** Prerequisites: Senior Standing in E&M or iE&M, ES220, and two of: ES250, ES330, or ES340. Corequisites

**Req. Designation:** Technology

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**EM 476(3)** Course ID:011141 2022-02-10

**Management of Technology**

[Cross-listed with OM 476] Management of technology links together the engineering, science, and management disciplines to plan, develop, and implement technological capabilities to be competitive in the global arena.

Students taking the course will gain an understanding of the following topics: innovation, product life cycles, product development process, concurrent engineering, management of technology strategy, selecting technical projects, management of the R&D process, initiating new ventures, international technology transfer, and the management of complex projects.

**Components:** Lecture

**Course Equivalents:** OM 476

**Attributes:** Science, Technology and Society, Offered Fall and Spring

**Requirement Group:** Prerequisites: EM331 and restricted to E&M majors.

**Req. Designation:** Technology

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**Business - Engineering & Management - Subject: Engineering & Mgmt****EM 482(3)** Course ID:012744

2022-02-10

**Systems Engineering and Management**

Systems Engineering (SE) is an iterative process of top-down synthesis, development, and operation of real-world systems that combines technical leadership and systems management. Technical leadership is necessary for incorporating and balancing the contributions of structural, mechanical, electrical, software, systems safety, and power engineers, among others, to produce a coherent whole. Through the interdisciplinary approach of SE, systems management is focused on effectively and efficiently managing the development and operation of complex systems that result from integrating physical, smart, software, and connectivity components. Students taking this course will gain an understanding of how to create a design that considers both the business and technical needs of all customers with the goal of providing a quality product that meets customers' needs and maintain its integrity throughout its life cycle. Topics include but are not limited to fundamental concepts of systems theory and systems thinking used for SE, life cycle process

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Restrictions: Junior or Senior standing in an engineering or EM major, or permission by the instructor**Req. Designation:** Technology**EM 484(3)** Course ID:012746

2022-02-10

**Advanced Project Management**

[Cross listed with OM484] This course builds on the foundation of EM/OM380 (Project Management) by introducing advanced topics in decision making, risk, and cost control as well as providing comprehensive knowledge of project scheduling and other PM tools. This course also provides an opportunity for students to further extend their PM skills in managing and controlling projects by applying the PM methods in a project management simulation using typical project management software. Students are exposed to advanced research topics in the emerging PM areas.

**Components:** Lecture**Course Equivalents:** OM 484**Attributes:** Offered Fall and Spring**Requirement Group:** Prerequisite: EM/OM380**Req. Designation:** Technology

**Business - School of Business - Subject: Engineering & Mgmt****EM 487(1 - 3)****Course ID:012148****2017-08-27****Instructor Consent Required****Special Project in Engineering and Management**

An investigation of a problem or in-depth topic undertaken by the student under the guidance of a faculty member. Prerequisites: Permission of instructor

**Components:** Research**Attributes:** Given When Needed**Req. Designation:** Technology

**Business - Engineering & Management - Subject: Engineering & Mgmt****EM 490(1 - 3)** Course ID:008228 2016-04-05 **Instructor Consent Required****Internship**

An investigation of a problem or in-depth topic undertaken by the student under the guidance of a faculty member. Prerequisite: Permission from the instructor.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology**EM 494(1 - 3)** Course ID:012918 2018-11-14**Directed Research**

A research project will be completed; research projects may include laboratory projects, literature research, or individual study of interdisciplinary engineering and management topics not available in other Clarkson courses.

**Components:** Research**Attributes:** Given When Needed**Requirement Group:** Restriction: Open to Engineering and Management majors only**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Engineering & Mgmt****EM 505(3)** Course ID:013045

2020-08-25

**Project Controls and Lean Methods in Construction**

[Cross-listed with CE 505] This course will cover the use of construction project management controls typical in varying scales of projects. Using the Lean Construction model, the course will cover Lean as both a system and culture, while emphasizing the central place of project delivery processes. Topics in project controls will include: Goal Setting, Scheduling, Budgeting, Problem Solving, and Decision-Making.

Prerequisites: Graduate standing, CE 305, or consent of the instructor

**Components:** Lecture

**Course Equivalents:** CE 505

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**Graduate Interdisciplinary - Engineering Management MS - Subject: Engineering & Mgmt**

EM 610(3) Course ID:012855

2017-12-07

**Operations Management and Factory Physics**

This course introduces the principles of manufacturing and service management while taking a cursory and scientific look at the processes and operations that impact an organization. The course exposes the student to a wide range of management terms and theories as they relate to strategic and tactical decision making. As such, it provides a basis on which to assess, evaluate, and recommend corrective management actions. In addition, focus is placed on developing an understanding of the relationship between operations and other business functions, such as marketing, finance, accounting, and human resources. Another aspect of the course is Factory Dynamics. This is the study of the factory interactions between people, equipment, raw materials and operations. It is the scientific study of how best to manage these complex interactions so the factory or operations as a whole will work effectively.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Restriction: This course requires admission to the Engineering Management MS program.**Req. Designation:** Technology

**Engineering - Engineering Management MS - Subject: Engineering & Mgmt****EM 620(3)** Course ID:012946 2019-05-21**Introduction to Artificial Intelligence: Principles and Techniques**

This course will explore and discuss various theories, models, techniques and practical applications revolving around the topics of Artificial Intelligence and Machine Learning. In a rapidly changing and increasingly global economy, AI or Artificial Intelligence has become the all-powerful and an omnipresent tool/solution and is being used in some form or fashion by every industry. Artificial Intelligence is the machines which are designed and programmed in such a manner that they think and act like humans. The greatest advantage of artificial intelligence is that machines do not require sleep or breaks and are able to function without stopping. They can continuously perform the same task without getting bored or tired. When employed to carry out dangerous tasks, the risk to human health and safety is reduced. AI systems have the ability to execute tasks naturally associated with human intelligence, like speech recognition, decision-making, visual perception, and translating languages. AI would have a low error rate compared to

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**EM 625(3)** Course ID:013144 2021-11-05**Analytics for Decision Making**

The overall course objective is to provide a broad data science foundation that enables students to grasp the fundamental methods, techniques and software used to design, develop, and deploy solutions. This objective is met by introducing frameworks for understanding descriptive, predictive, and prescriptive analytics and their relationship with real life applications.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**Graduate Interdisciplinary - Engineering Management MS - Subject: Engineering & Mgmt****EM 630(3)** Course ID:012857

2018-01-11

**Law for Engineers**

This course provides engineers the legal background and introductory knowledge they need to successfully navigate the many different areas of law they will encounter throughout their careers. Students will learn critical aspects of corporate law, tort (liability/accident) law, intellectual property (IP) law, and contract law during the course. They will also become familiar with, and learn to recognize, key areas of constitutional law, comparative/international law, environmental law, administrative law, and computer network/cyber law which often affect technical work on a daily basis.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Restriction: This course requires admission to the Engineering Management MS program.**Req. Designation:** Technology**EM 640(3)** Course ID:012928

2019-02-13

**Leading and Managing Organizations**

Success in leading people and managing performance demands that you have an understanding of how work groups operate and what motivates employees, as well as a candid assessment of your own personality and style. The purpose of this course is to help you understand the general principles and processes of effective leadership so that you can lead in a wide variety of organizational situations. Leadership development is relevant for any student pursuing a managerial career, and is particularly relevant to students who already hold leadership positions in their organizations. Topics covered in the on-campus sessions will focus on aspects of interpersonal behavior, including personality, leadership, teamwork, and conflict management. During the online sessions we will take a more macro perspective, examining firm-level issues such as power and influence, culture, and organizational congruence.

**Components:** Seminar**Attributes:** Given When Needed**Requirement Group:** Restriction: This course requires admission to the Engineering Management MS program.**Req. Designation:** Technology**EM 650(3)** Course ID:012930

2019-03-01

**Enterprise Sustainability**

There is a growing sense of urgency around climate change and resource scarcity, and a lack of trust in the ability of global economic and political systems to solve large-scale societal environmental and social problems. Increasingly, the general public expects business to proactively contribute to solving these societal problems, striving towards making a net positive environmental and social impact on the world. Sustainability managers need to know how to lead projects, and more importantly how to help bring about a cultural change within their organizations so that ultimately sustainability is fully integrated into every function. The goal of this course is to empower managers in any function (not just sustainability managers) to lead in sustainability.

This course will provide an introduction to corporate sustainability in manufacturing companies. We will

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Restriction: This course requires admission to the Engineering Management MS program.**Req. Designation:** Technology**EM 660(3)** Course ID:012721

2017-01-12

**Cost Management and Financial Analysis**

The overall course objective is to increase the student's ability to deliver a project within cost expectations and to make decisions within the corporate financial perspective. This objective is met by understanding the technical underpinning of engineering economic and simulation based costing analysis, understanding how project decisions impact the organization's profit/financial health, and understanding the role of life cycle costing.

**Components:** Lecture**Same As Offering:** EM 660**Attributes:** Given When Needed**Req. Designation:** Technology

**Graduate Interdisciplinary - Engineering Management MS - Subject: Engineering & Mgmt****EM 660(3)** Course ID:012721 2017-01-12**Cost Management and Financial Analysis**

The overall course objective is to increase the student's ability to deliver a project within cost expectations and to make decisions within the corporate financial perspective. This objective is met by understanding the technical underpinning of engineering economic and simulation based costing analysis, understanding how project decisions impact the organization's profit/financial health, and understanding the role of life cycle costing.

**Components:** Lecture**Same As Offering:** EM 660**Attributes:** Given When Needed**Req. Designation:** Technology**EM 680(3)** Course ID:012720 2017-01-12**Decision Analysis and Risk Management**

A successful manager needs to be equipped with the techniques and tools of decision analysis in today's competitive business environment. The primary goal of this course is to develop the student's ability to define business problems, construct quantitative models and effectively utilize decision making tools (such as MS Excel Solver, Analytic Solver Platform, and decision trees). This course introduces decision modeling techniques by focusing on the development and analysis of models for a variety of business management problems. Topics include supply chain network design, transshipment and logistics management, capital budgeting and fixed charge problems, and decision making under uncertainty and risk.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**Business - Engineering Management MS - Subject: Engineering & Mgmt****EM 690(3)****Capstone Project**

Students complete a semester-long project which applies engineering management problem-solving skills to a real-world problem. Students demonstrate the application of engineering problem-solving methodology and project management. Students must demonstrate the ability to engage with a client, define a problem, derive specifications for a successful solution, generate and evaluate appropriate solutions, generate the optimal solution, successfully complete the process and present the result professionally in both oral and written format.

**Components:** Lecture  
**Req. Designation:** Technology

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**Engineering - Engineering & Management - Subject: Engineering & Mgmt**

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**EM 997(3)** Course ID:013205 2023-05-05

**Special Topics in Engineering Management**

Used for graduate transfer credit for which Clarkson does not have an equivalent EM course number.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**EM 998(3)** Course ID:013206 2023-05-05

**Special Topics in Engineering Management**

Used for graduate transfer credit for which Clarkson does not have an equivalent EM course number.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**EM 999(3)** Course ID:013207 2023-05-05

**Special Topics in Engineering Management**

Used for graduate transfer credit for which Clarkson does not have an equivalent EM course number.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**Engineering - School of Engineering - Subject: Engineering Science**

ES 1(2 - 4) Course ID:008229 2015-01-19

**Engineering Science Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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ES 2(2 - 4) Course ID:008230 2015-01-19

**Engineering Science Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

This course may be used as a Professional Elective.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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ES 41(1) Course ID:011738 2015-01-23

**Spatial Thinking Skills**

This course develops 3D spatial visualization skills through tutorials and exercises. Coverage includes (as time permits): surfaces and solids of revolution, combining solid objects, isometric drawings and coded plans, orthographic drawings, orthographic projections and inclined and curved surfaces, flat patterns, rotation of objects about axes, object reflections and symmetry, and cutting planes and cross sections.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

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ES 100(2) Course ID:008232 2022-07-18

**Introduction to Engineering Use of the Computer**

[Cross-listed with HP 103] Introduction to computer programming using equation solving software applied to engineering problems.

Components: Lecture

Course Equivalents: HP 103

Attributes: Offered Spring Term

Req. Designation: Technology

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ES 110(3) Course ID:009795 2015-08-26

**Engineering and Society**

Engineers apply scientific knowledge and principles, and use the engineering design process to develop technology. While engineers frequently develop solutions to problems in controlled environments, the products that are developed are used by 'real people' in the 'real world.' Thus, it is essential that engineers have an understanding of the interactions between engineering, technology development, and society. This course will highlight the diverse applications of engineering and technological skills in addition to ethical and other concerns about the societal consequences of technological developments. Students will gain an understanding of ways that conceptual models can be used to frame how both science and technology shape society and how society can shape science and technology. Students will be introduced to the engineering design process and use it to solve a simple engineering problem. Then, through case study, they will apply the societal models and gain an understanding of how the design process can be used to solve complex,

Components: Lecture

Attributes: One communication unit, Science, Technology and Society, Offered Each Term

Requirement Group: Corequisites: MA 180 or equivalent. Open to all majors - engineering majors must be first year student

Req. Designation: Technology

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ES 147(0) Course ID:011288 2017-01-13 Instructor Consent Required

**First Year Research Experience**

The student conducts research under the guidance of a research advisor. Appropriate for paid or voluntary non-credit bearing research experiences. By permission of research advisor or academic advisor only. Pass/no credit only.

Components: Research

Attributes: Offered Each Term

Req. Designation: Technology

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**Engineering - School of Engineering - Subject: Engineering Science**

ES 220(3) Course ID:008236 2015-02-09

**Statics**

Fundamental concepts of the statics of rigid bodies using a vector analysis approach; force systems, analysis of simple structures, centroids and centers of gravity, free body diagrams, equilibrium, friction and moments of inertia.

**Components:** Lecture, Tutorial**Attributes:** Offered Fall, Spring, and Summer**Requirement Group:** Prerequisites: MA131 and PH131**Req. Designation:** Technology

ES 222(3) Course ID:008238 2015-09-11

**Strength of Materials**

Elementary analysis of the strength and deformation of deformable bodies; stress and strain at a point, Mohr's circle, axial loads, flexure, torsion, deflections and column action. Introduction to design concepts.

**Components:** Lecture, Tutorial**Attributes:** Offered Fall, Spring, and Summer**Requirement Group:** Prerequisites: ES220 or consent of instructor**Req. Designation:** Technology

ES 223(3) Course ID:008239 2022-04-06

**Rigid Body Dynamics**

Introduction to the basic principles of Newtonian mechanics. Topics covered include kinematics of particles; Newton's laws of motion, energy and momentum methods; systems of particles; planar kinematics of rigid bodies; planar dynamics of rigid bodies; forces and acceleration energy and momentum methods. Special topics such as non-inertial reference frames may be introduced.

**Components:** Lecture**Requirement Group:** Prerequisites: ES220**Req. Designation:** Technology

ES 238(3) Course ID:011252 2020-11-05

**Introduction to Energy Systems**

The focus of this course is to introduce fundamental energy principles and discuss various energy resources and options currently available, including the supply and availability as well as the demand for these energy resources. Primary consideration is given to current strategies for energy production, conversion and use, with a brief overview of renewable technologies. The course topics are presented within a social, economic, political, and environmental context to provide a comprehensive understanding of the role of energy in our current and future society. Students examine the sustainability of our current and future systems of energy resource consumption, including U.S. and global energy consumption rates as well as societal and environmental impacts. Issues such as energy efficiency, conservation, systems analysis and life cycle analysis, and the environmental and economic consequences of various sources, will be discussed. Finally, implications and relationships between global climate change and growing global energy use in the 21st

**Components:** Lecture**Attributes:** Science, Technology and Society, Offered Spring Term**Requirement Group:** Prerequisite: ES110 OR Corequisite: ES110**Req. Designation:** Technology

ES 241(3) Course ID:012860 2018-01-29

**Solid-State Material Systems for Advanced Technologies**

Topics include: Crystal structure of solid-state materials system, structural stability of materials, electronic properties of materials, optoelectronic properties of materials, engineered materials, metamaterials, low-dimensional materials, introduction of solid-state materials-based device technologies.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PH131, CM103 or CM131, and MA131 Corequisites: MA132**Req. Designation:** Technology

ES 243(1 - 4) Course ID:011282 2017-01-20 Instructor Consent Required

**Introductory Undergraduate Research I**

The student participates in the research process under the guidance of a faculty research advisor. May include some independent work. For 1-2 credits, student prepare a short paper or report. For 3-4 credits, student prepares a paper and gives an oral presentation. By permission of research advisor only.

**Components:** Research**Attributes:** Offered Each Term**Req. Designation:** Technology

**Engineering - School of Engineering - Subject: Engineering Science**


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**ES 244(1 - 4)** Course ID:011283 2017-01-12 **Instructor Consent Required**

**Introductory Undergraduate Research II**

A Continuation of ES 243. By permission of research advisor only.

**Components:** Research

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**ES 247(0)** Course ID:011289 2017-01-13 **Instructor Consent Required**

**Sophomore Research Experience**

The student conducts research under the guidance of a research advisor. Appropriate for paid or voluntary non-credit bearing research experiences. By permission of research advisor or academic advisor only. Pass/no credit only.

**Components:** Research

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**ES 250(3)** Course ID:008240 2016-06-27

**Electrical Science**

Network concepts. DC circuits: mesh and node equations, network theorems, operational amplifiers. Complex numbers, effective values, sinusoids and phasors. AC circuits: phasor diagrams, power. Time domain solution of first order circuits.

**Components:** Lecture

**Attributes:** Offered Each Term

**Requirement Group:** Corequisites: MA232, and PH132

**Req. Designation:** Technology

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**ES 260(3)** Course ID:008241 2015-02-03

**Materials Science and Engineering I**

The fundamentals of the interactions between structure, processing, properties and applications of solid metals, non-metallic elements, inorganic compounds, and polymers. Topics include atomic bonding, structure, imperfections, diffusion, mechanical properties, deformation and strengthening mechanisms, failure. Possible additional topics include phase diagrams, phase transformations, electrical properties, processing, composites, corrosion, thermal properties, and environmental consideration.

**Components:** Lecture

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisites: PH131, CM103 or CM131, MA131 Co-requisite: MA132

**Req. Designation:** Technology

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**ES 330(3)** Course ID:008246 2015-02-09

**Fluid Mechanics**

Basic principles of fluid mechanics. Topics include statics, forces on plane and curve surfaces, kinematics of fluid motion, integral and differential representation of conservation of mass, balance of linear and angular momenta, the first Law of Thermodynamics, Bernoulli's equation, dimensional analysis, and elementary viscous flow. Frictional losses, simple pipeline analysis and steady channel flow are covered. Understanding of the physical phenomena is stressed and vector notation is used wherever suitable.

**Components:** Lecture

**Attributes:** Offered Fall, Spring, and Summer

**Requirement Group:** Prerequisites: MA232 or MA231 and ES220.

**Req. Designation:** Technology

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**ES 340(3)** Course ID:008247 2015-02-12

**Thermodynamics**

The fundamental concepts of thermodynamics and their application to pure substances. Topics include: properties of pure substances; work, heat, energy and the First Law of Thermodynamics; technique of First Law analysis; disorder, entropy and the Second Law of Thermodynamics; technique of Second Law analysis.

**Components:** Lecture

**Attributes:** Offered Fall, Spring, and Summer

**Requirement Group:** Prerequisites: MA231 and PH132

**Req. Designation:** Technology

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**Engineering - School of Engineering - Subject: Engineering Science**

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ES 347(0) Course ID:011290 2017-01-13 Instructor Consent Required

**Junior Research Experience**

The student conducts research under the guidance of a research advisor. Appropriate for paid or voluntary non-credit bearing research experiences. By permission of research advisor or academic advisor only. Pass/no credit only.

Components: Research

Attributes: Offered Each Term

Req. Designation: Technology

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ES 360(3) Course ID:008253 2015-01-20

**Materials Science and Engineering II**

Continuation of the study of the science and engineering of materials. Emphasis is placed on the processing of materials to achieve optimum engineering properties. Topics include: heat treatment of metals and ceramics to yield strength and toughness at high temperatures; formation of composite materials (directionally solidified superalloys, transformation strengthened ceramics, fiber reinforced polymers); processing of amorphous materials for optical applications (lens, fibers, lasers); processing of magnetic materials for both hard and soft applications; and, protection of materials in corrosive environments.

Components: Lecture

Attributes: Offered Spring Term

Requirement Group: Prerequisites: ES260.

Req. Designation: Technology

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ES 361(3) Course ID:008254 2015-02-19

**Fine Particle Technology**

An introduction to the characterization, processing and applications of ceramic, metal and polymer fine particles and composites. Analysis of property-structure relationships. Formation of novel bulk materials from fine powders through sintering.

Components: Lecture

Attributes: Offered Fall Term

Requirement Group: Prerequisite: CM104 or CM132.

Req. Designation: Technology

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ES 375(1 - 4) Course ID:012923 2019-01-09 Instructor Consent Required

**Directed Study**

Special reading or laboratory study of a specific problem or subject area under the direction of a member of the faculty.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Engineering Science**

ES 380(3) Course ID:010957 2014-11-18

**Special Topics: Biomechanics**

[Cross-listed with ME 380] This course will examine the application of engineering principles to biologic systems. The structure and function of biologic tissue will be examined in the context of engineering mechanics. Emphasis will be placed on the biomechanics of human movement, including the basic principles of orthopedic biomechanics. Students will develop the skills necessary to explore biomechanics in the contemporary scientific literature and will write a term paper on a biomechanics topic of their choice.

**Components:** Discussion, Lecture**Course Equivalents:** ME 380**Requirement Group:** Prerequisites: PH131 and MA132**Req. Designation:** Technology

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**Engineering - Chemical & Biomolecular Eng - Subject: Engineering Science**

ES 400(3) Course ID:008259

2015-01-23

**Numerical and Engineering Computing**

Topical coverage includes numerical methods for solving single nonlinear equations, matrix computations, systems of nonlinear equations, ordinary differential equations, partial differential equations, differential algebraic equations, and much more.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisite: ES100 or consent of the instructor.**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Engineering Science**

ES 402(3) Course ID:010940

2014-11-20

**Biomedical Engineering Fundamentals**

[Cross-listed with BR 400, BY 440] This interdisciplinary course will introduce students to basic principles of biomedical rehabilitation engineering. The course will present principles of disability and the diverse roles of engineering in medicine and rehabilitation. Students will use engineering methods to study anatomical and physiological systems including applications in rehabilitation engineering, bioinstrumentation, biosignal and image processing, biomechanics, and biomaterials.

**Components:** Lecture**Course Equivalents:** BY 440, BR 400, BR 500, BY 540**Requirement Group:** Prerequisites: MA131/132, PH131/132, BR 200, MA 232 Corequisites: BY 471/473 or BY 472/474**Req. Designation:** Technology

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**Engineering - School of Engineering - Subject: Engineering Science**

ES 422(3) Course ID:012870

2018-04-11

**Signal Processing and Applications**

This project-driven course involves qualitative and quantitative descriptions of DSP algorithms, software and applications. The class covers applications in engineering, computing, music, and the arts, with MATLAB, Java and mobile simulations.

**Components:** Lecture**Course Equivalents:** ES 522, EE 422**Attributes:** Offered Even Falls**Requirement Group:** Prerequisites: MA132 or equivalent, or instructor approval.**Req. Designation:** Technology

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**Engineering - Environmental Science & Policy - Subject: Engineering Science**

ES 432(3)

Course ID:010619

2015-02-23

**Risk Analysis**

Risk assessment entails the evaluation of the hazardous properties of substances, the extent of human exposure to them and the characterization of resulting risk. It is a systematic approach to organizing and analyzing the scientific knowledge regarding potentially hazardous activities or substances. Variability and uncertainty are used to estimate the level of confidence in the risk assessment. The general approach to risk assessment including the use of default assumptions and uncertainty analysis will be presented along with illustrative examples. Graduate Students will be required to do an additional work at the graduate level.

**Components:** Lecture**Course Equivalents:** EV 532**Attributes:** 1.5 Design Credits, One communication unit, Offered Spring Term**Requirement Group:** Prerequisites: CM131 or CM103.**Req. Designation:** Technology

**Engineering - Inst for a Sustainable Environ - Subject: Engineering Science**

ES 436(3) Course ID:011399 2023-05-30

**Global Climate Change: Science, Engineering & Policy**

The primary objective of the course is to provide the necessary background that will permit undergraduate students to understand and accurately describe the workings of the Earth's climate system, the interactions between the atmosphere, ocean, and climate, and human's involvement in altering these processes. The course is broken into four primary components: earth science, energy, policy, and programming. The highly quantitative course will use project-based experiences to allow each student an opportunity to complete a data acquisition/modeling project of their own design to show correlations between human activities, current atmospheric concentrations and resulting ecosystem change. Students will use computational programming tools (Matlab) in combination with mapping tools (Google Maps API) to quantify, analyze, and display geographical variations of integrated and averaged values of quantities studied.

Prerequisites: Quantitative and modeling skills (Matlab, Excel) are required, statistics is recommended.

**Components:** Lecture

**Attributes:** Contemporary and Global Issues, Science, Technology and Society, University Course,  
Offered Even Springs

**Req. Designation:** Technology

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**Engineering - School of Engineering - Subject: Engineering Science**

**ES 438(3)** Course ID:011253 2015-02-23

**Alternate Energy Systems**

[Cross-listed with EE 438] The basic technology of emerging renewable or non-carbon based energy sources will be considered, and contrasted with traditional sources of energy. Topics will include photovoltaic, wind and others. The impacts of energy storage and electrified transportation will be discussed. The capability of these technologies will be assessed, and barriers to implementation will be explored. The role of the electric power grid in enabling alternate energy technologies will be covered.

**Components:** Lecture

**Course Equivalents:** EE 538, EE 438

**Attributes:** One Design Credit, Offered Even Springs

**Requirement Group:** Prerequisite: ES250 or permission of the instructor.

**Req. Designation:** Technology

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**ES 443(1 - 4)** Course ID:011284 2017-01-13 Instructor Consent Required

**Undergraduate Research I**

The student develops and conducts a self-contained independent research project under the guidance from a faculty research advisor. For 1-2 credits, student prepares a short paper or report. For 3-4 credits, student prepares a paper and gives an oral presentation. Junior standing required. By permission of research advisor only.

**Components:** Research

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**ES 444(1 - 4)** Course ID:011285 2017-01-13 Instructor Consent Required

**Undergraduate Research II**

A Continuation of ES 443. Junior standing required. By permission of research advisor only.

**Components:** Research

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**ES 445(1 - 4)** Course ID:011286 2015-02-03 Instructor Consent Required

**Undergraduate Research III**

A Continuation of ES 444. Junior standing required. By permission of research advisor only.

**Components:** Independent Study

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**ES 446(1 - 4)** Course ID:011287 2017-01-13 Instructor Consent Required

**Undergraduate Research IV**

A Continuation of ES 445. Junior standing required. By permission of research advisor only.

**Components:** Research

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**ES 447(0)** Course ID:011291 2021-12-16 Instructor Consent Required

**Senior Research Experience**

The student conducts research under the guidance of a research advisor. Appropriate for paid or voluntary non-credit bearing research experiences. By permission of research advisor or academic advisor only. Pass/no credit only.

**Components:** Research

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**Engineering - Chemical & Biomolecular Eng - Subject: Engineering Science****ES 452(3)** Course ID:011046 2021-08-06**Biomaterials and Biomedical Engineering Applications**

This course will examine the biomaterials, biomolecular engineering, and tissue engineering aspects of biomedical engineering. Topics covered will include metallic, ceramic, and polymeric biomaterials; manufacturing technologies; sterilization and degradation; the characterization of bulk and surface properties; mechanical and electrical properties of tissues; the interactions between biomaterials and the physiological environment; orthopedic, neural, and cardiovascular biomaterials; and biomaterials for drug delivery and medical imaging.

**Components:** Lecture**Requirement Group:** Requirement: Junior or Senior Standing**Req. Designation:** Technology**ES 459(3)** Course ID:012965 2021-11-08**Electrochemical Processes for Sustainability**

[Cross-listed with ES559] This course introduces the fundamentals of electrochemistry and applications of electrochemical technologies for sustainability. General theory, electroanalytical techniques, and interfacial structure are discussed. These principles are then used to describe and quantify the controlling features in electrochemical separations, electrochemical water treatment, and electrochemical energy systems.

**Components:** Lecture**Attributes:** Offered Even Springs**Requirement Group:** Prerequisites: CM132 (or CM104) and Corequisites: ES340 (CH260 or CM371) and junior or senior standing**Req. Designation:** Technology**ES 464(3)** Course ID:008268 2020-03-02**Corrosion of Metals**

[Cross-listed with EE564] Mechanisms of environmental degradation of materials. Methods for eliminating or reducing environmental degradation.

**Components:** Lecture**Course Equivalents:** ES 564**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: CM132 (or CM104), and ES 260**Req. Designation:** Technology

**Engineering - School of Engineering - Subject: Engineering Science**

**ES 485(3)**                           **Course ID:**011672                           **2014-11-20**

**Neural Engineering**

[Cross-listed with EE 485, BY 485] This course applies engineering principles to the study of neuroscience and to the design of devices or techniques intended to replace missing or augment existing functions such as seeing, hearing, speaking, and walking. The course provides a detailed overview of sensorimotor systems, neurophysiology, neuroanatomy, neuropathology and clinical neurology. The class sequences through the various sensory and movement systems, providing a quantitative basis for how the nervous systems works for these systems, for how it dysfunctions, for the disability produced, and finally for how function can be restored by neuroprostheses. Students will prepare and present a paper on a neural engineering topic.

**Components:** Lecture

**Course Equivalents:** EE 585, EE 485, BY 485

**Requirement Group:** Prerequisites: MA132 and PH132 or PH142.

**Req. Designation:** Technology

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**ES 499(0)**                           **Course ID:**011237                           **2022-02-11**                           **Instructor Consent Required**

**Professional Experience for Engineering Majors**

This course number is used to matriculate the Professional Experience requirement of the Clarkson Common Experience curriculum. The student must participate in a project-based professional experience such as a co-op, internship, directed research, significant responsibility in an appropriate team project, or a community project clearly related to the student's professional goals. Enrollment is restricted to engineering majors.

Prerequisite: Pre-approval (using the PRE-APPROVAL WORKSHEET for the PROFESSIONAL EXPERIENCE Requirement in the Wallace H. Coulter School of Engineering.)

**Components:** Independent Study

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**ES 500(3)**                           **Course ID:**010658                           **2021-04-02**

**Numerical and Engineering Computing**

Advanced programming course. Topical coverage includes numerical methods for solving single, nonlinear equations, matrix computations, systems of nonlinear equations, ordinary differential equations, partial differential equations, differential algebraic equations, and much more. Nonstandard graphical imagery.

**Components:** Lecture

**Same As Offering:** ES 500

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Engineering Science**

ES 500(3) Course ID:010658

2021-04-02

**Numerical and Engineering Computing**

Advanced programming course. Topical coverage includes numerical methods for solving single, nonlinear equations, matrix computations, systems of nonlinear equations, ordinary differential equations, partial differential equations, differential algebraic equations, and much more. Nonstandard graphical imagery.

**Components:** Lecture**Same As Offering:** ES 500**Attributes:** Offered Fall Term**Req. Designation:** Technology

ES 510(3) Course ID:008277

2021-08-17

**Strategic Project Management**

[Cross-listed with OM 680, OM 681] A project is a one-time or infrequently occurring operation with a unique goal, a limited lifespan and limited resources. This course will focus on project management from a decision-making perspective and how projects can be used to implement organizational strategy. The course follows the project life cycle model from project initiation to implementation to termination. Topics covered include such things as project scope development, project selection, organizational strategy, leadership, team building, planning, conflict resolution, budgeting, resource allocation, information management, control, auditing, and termination procedures. Computer applications such as MS Project, case studies, project simulations and student project teams will be an integral part of the course. This course satisfies the educational prerequisite for the Project Management Institute's (PMI) Certified Associate in Project Management (CAPM) and Project Management Professional (PMP) certifications.

**Components:** Lecture**Course Equivalents:** OM 680, OM 681**Attributes:** Offered Fall Term**Req. Designation:** Technology

**Engineering - Electrical & Computer Eng - Subject: Engineering Science**

ES 522(3) Course ID:011060

2018-03-22

**Signal Processing and Applications**

This project-driven course involves qualitative and quantitative descriptions of DSP algorithms, software, and applications. The class covers applications in engineering, computing, music, and the arts, with MATLAB, Java, and mobile simulations. Prerequisites: EE321 Signals and Systems, or equivalent, or instructor approval.

**Components:** Lecture**Course Equivalents:** ES 422, EE 422**Attributes:** Offered Even Falls**Req. Designation:** Technology

**Engineering - Chemical & Biomolecular Eng - Subject: Engineering Science****ES 552(3)** Course ID:011047 2019-10-09**Biomaterials and Biomedical Engineering Applications**

This course will examine the biomaterials, biomolecular engineering, and tissue engineering aspects of biomedical engineering. Topics covered will include metallic, ceramic, and polymeric biomaterials; manufacturing technologies; sterilization and degradation; the characterization of bulk and surface properties; mechanical and electrical properties of tissues; the interactions between biomaterials and the physiological environment; orthopedic, neural, and cardiovascular biomaterials; and biomaterials for drug delivery and medical imaging. Students enrolled in ES552 will be expected to complete extra assignments in addition to those given to ES452 students.

**Components:** Lecture**Req. Designation:** Technology**ES 559(3)** Course ID:012966 2019-09-26**Electrochemical Processes for Sustainability**

[Cross-listed with ES459] This course introduces the fundamentals of electrochemistry and applications of electrochemical technologies for sustainability. General theory, electroanalytical techniques, and interfacial structure are discussed. These principles are then used to describe and quantify the controlling features in electrochemical separations, electrochemical water treatment, and electrochemical energy systems. The topics are the same as ES459 but there are additional assignments required of graduate students.

**Components:** Lecture**Attributes:** Offered Even Springs**Req. Designation:** Technology**ES 564(3)** Course ID:008285 2020-03-02**Corrosion of Metals**

[Cross-listed with ES464] Mechanisms of environmental degradation of materials. Methods for eliminating or reducing environmental degradation. Prerequisite: CM132.

**Components:** Lecture**Course Equivalents:** ES 464**Attributes:** Offered Fall Term**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Engineering Science**

ES 575(3)

Course ID:012127

2015-10-19

**Sustainable Nanotechnology**

[Cross-listed with CM 575, and MSE 575] The goal of this course is to provide graduate students and advanced undergraduates with a modern view of current and emerging research in nanotechnology. Topics will include: fundamental nanoscale properties and applications, green manufacturing and assembly in functional devices, interaction of nanomaterials with biological systems, the physical and chemical phenomena at nano-bio interfaces, fate, transport and transformation of engineered nanomaterials, environmental and health impact, nanometrology, nanotoxicology and hazard identification of nano-based products. Development of analytical methods and characterization tools for assessing nanoscale properties and materials will also be discussed. Students will be exposed to interdisciplinary topics and an integrated training bridging material and environmental sciences with biology and analytical chemistry. Students will be able to demonstrate a basic awareness of risks and benefits of emerging technologies and evaluate overall environmental and societal

**Components:** Lecture**Course Equivalents:** CM 475, CM 575, MSE 575**Attributes:** Offered Spring Term**Req. Designation:** Technology

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**Engineering - School of Engineering - Subject: Engineering Science****ES 580(3)** Course ID:011921 2022-10-14**Foundations of Teaching College STEM**

The course introduces students to the foundations of engineering education. It couples pedagogical theory and best practices with practical approaches to provide a basis for teaching college level engineering courses. Topics to be covered include: theories of student learning, educational research and best practices, design of courses, delivery of course material, and developing, delivering, and assessing college level engineering courses.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**ES 581(3)** Course ID:011922 2015-01-23**Selected Topics in Engineering Science**

An advanced graduate course in the field of engineering sciences. Topics of special interest will be selected for current needs. A description of the course content in any particular term will be announced in advance.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**ES 587(3)** Course ID:012912 2018-11-02**Applications of Synchrotron and Electron Based Techniques**

The purpose of the course is to familiarize all students with the x-ray and electron based experimental techniques available at Brookhaven National Lab and other similar facilities. Students will be cognizant of the applications of these cutting edge facilities, and well positioned to use them in their own research. This course is suitable for graduate students, postdocs, and advanced undergrads in physical sciences and engineering, as well as students in biological, environmental, and chemical sciences who may have the interest to learn more about the techniques they may use for their research.

**Components:** Lecture**Course Equivalents:** PH 587, CM 487, CM 587, PH 487, MSE 587**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Engineering Science**

ES 601(3) Course ID:008270 2014-12-05

**Mechanics of Fracture I**

A study of the fundamentals of fracture mechanics is presented. Linear elastic fracture mechanics (LEFM): elastic solutions, energy balance approach, LEFM testing. Elastic-plastic fracture mechanics (EPFM): EPFM testing. Concepts for crack growth: fatigue crack growth, dynamic crack growth and arrest. Mechanism and mechanics of fracture in metallic materials, polymers, ice, composites.

Prerequisites: ES222, CE/ME554, CE/ME551, or consent of instructor.

**Components:** Lecture

**Req. Designation:** Technology

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**Engineering - School of Engineering - Subject: Engineering Science**

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ES 610(1 - 2) Course ID:008289 2015-02-03

**Engineering Science Seminar**

Students, staff and visiting lecturers present research results and topics of current interest.

Components: Seminar

Attributes: Offered Each Term

Req. Designation: Technology

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ES 612(1 - 4) Course ID:008291 2017-08-27

**Directed Study in Engineering Science**

For graduate students with baccalaureate degree in an engineering field.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

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ES 615(1 - 15) Course ID:008294 2015-02-03

**Thesis, Dissertation Credits**

Analytical or experimental studies in interdisciplinary engineering science under the direction of a faculty adviser. Credit for this work is given when the requirements for the degree are completed including the presentation of a thesis or dissertation as appropriate to the degree program.

Components: Thesis Research

Attributes: Offered Each Term

Req. Designation: Technology

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ES 999(1 - 10) Course ID:011130 2015-01-19

**Special Topics in Engineering Science**

Used for graduate transfer credit for which Clarkson does not have an equivalent course number.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Environmental Science & Po

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EV 1(2 - 4) Course ID:008298 2022-01-26

**Environmental Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study  
Attributes: Transfer Credit Only  
Req. Designation: Technology

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EV 2(2 - 4) Course ID:008299 2022-01-26

**Environmental Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.  
This course may be used to satisfy a Professional Elective requirement.

Components: Independent Study  
Attributes: Transfer Credit Only  
Req. Designation: Technology

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EV 100(1) Course ID:008300 2022-01-26

**Introduction to Environmental Science & Policy Professions**

The purpose of this course is to introduce students to environmental science and policy issues. The course is an overview of local and global issues relating to safety, health, environmental science and policy, and industrial hygiene concerns in the community and the work place. Students will review journal articles on selected topics and attend 1-2 field trips to local industries. The course will provide an open forum for discussion of curriculum choices and career options in environmental science and policy.

Components: Lecture  
Attributes: Offered Fall Term  
Req. Designation: Technology

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EV 280(3) Course ID:009806 2022-03-08

**Environmental Science**

This course will investigate the key concepts and principles of environmental science, emphasizing human impacts to the earth. The themes will include, energy flows through nature, and biogeochemical systems and how they have been perturbed by human activities. Technology and population growth have enabled humans to increase both the rate and scale of their impact on the environment. Quantitative analysis of air, soil, and water quality on local, regional, and global scales will be a significant component of the course. Emerging principles in environmental science, including sustainability, industrial ecology, risk assessment, and the precautionary principle will be introduced. The course will prepare students to qualitatively and quantitatively analyze fluid and contaminant flow in varied biological and geologic systems.

Components: Lecture  
Course Equivalents: BY 280  
Attributes: Offered Fall Term  
Requirement Group: Prerequisites: sophomore standing, CM131/CM132 or CM103/CM104, or consent of the instructor.  
Req. Designation: Technology

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EV 305(3) Course ID:008301 2022-03-08

**Sustainability & the Environment**

This course is an introduction to sustainability and the environment. Students are expected to harness initial knowledge from science, engineering, and policy courses to collectively address environmental problems and issues on campus, or in the local community. Class time is split between lectures on sustainability and the environment, and a projects (real-world) on a local community or campus environmental issue. In addition, EV 305 allows for direct review and instructor on the quality of the written and oral communication by the students. Written and oral progress reports will be required throughout the semester by each student/group. The papers and presentations are intended to be professional format to motivate.

Components: Lecture  
Attributes: One communication unit, Offered Odd Falls  
Requirement Group: Prerequisite: At least Sophomore standing  
Req. Designation: Technology

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**Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Environmental Science & Pol**

EV 312(3) Course ID:011659 2022-03-08 Instructor Consent Required

**Adirondack Ecology and Environmental Science**

[Cross-listed with BY 312] This course introduces ecological and environmental science concepts relevant for understanding the structure and function of terrestrial, aquatic, and human systems in the Adirondack Park. Students will learn to identify important plant and animal species representative of the Adirondack Mountains, and learn major features of ecological systems in the Park. The course will also provide the students an assessment of human impacts on the ecology of the Adirondack Park. Enrollment is limited to those students participating in the Adirondack Semester Program.

**Components:** Laboratory, Lecture

**Course Equivalents:** BY 312

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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EV 313(3) Course ID:011377 2022-01-26

**Biogeochemical Earth Systems Science**

[Cross-listed with BY 313, CE 313] This course will investigate the key concepts and principles of environmental science emphasizing the earth's biogeochemical cycles and how they have been perturbed by human activities. Quantitative analysis of air, soil and water quality on local, regional and global scales will be a significant component of the course. Emerging principles in environmental science, including sustainability, industrial ecology, risk assessment and the precautionary principle will be introduced. In addition to the quantitative aspects, the course will consider the historical, social, and political contexts in which the practice of environmental science takes place.

**Components:** Lecture

**Course Equivalents:** BY 313, CE 313

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: CM132 (or CM104), or consent of the instructor

**Req. Designation:** Technology

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EV 314(3) Course ID:011660 2022-03-08 Instructor Consent Required

**Adirondack Integrated Research Project**

This problem-based learning course will task students to analyze and suggest solutions to complex problems relevant to the economic, social, and environmental welfare of the Adirondack Park. The course is intended to reinforce what students have learned in other Adirondack courses.

Enrollment is limited to students participating in the Adirondack Semester Program.

**Components:** Research

**Attributes:** One Design Credit, Two communication units, Contemporary and Global Issues, Science, Technology and Society, University Course, Offered Fall Term

**Req. Designation:** Technology

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EV 316(1 - 3) Course ID:011640 2022-01-26 Instructor Consent Required

**Adirondack Environmental Science**

A brief history of air, soil, and water pollution in the Adirondacks followed by an investigation into the major sources and concerns of pollution in the region. Through lectures and laboratory experiences the following areas will be studied: air, water and soil quality parameters and their measurements; material and energy balances; water, air and soil chemistry concepts; toxicology and risk assessment.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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EV 320(3) Course ID:011642 2022-03-08 Instructor Consent Required

**Social and Political Issues in the Adirondacks**

[Cross-listed with SS 320] The historical, social, political, and environmental factors contributing to the fabric of the Adirondack Park is an evolving social experiment. The course readings will focus upon the New York State constitutional provisions that engendered the park, the policies that shaped the park, along with the political actions that influence the park today. The Adirondack State Park is extraordinary for its history and because it is a place where human residents live and recreate in sustainable ways that conserve resources and 'forever wild' regions of the park.

Enrollment is limited to those students participating in the Adirondack Semester Program.

**Components:** Lecture

**Course Equivalents:** SS 320

**Attributes:** Two communication units, Cultures and Societies, Offered Fall Term

**Req. Designation:** Technology

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**Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Environmental Science & Po**

**EV 322(3)**  
**Adirondack Park**

Course ID:011643

2022-03-08

Instructor Consent Required

To understand a place, one must often understand the views of nature and the environment as seen by writers and essayists. Students will explore the Adirondacks through literature while experiencing the lakes, rivers, streams, and mountains. The readings, discussions, and written assignments will explore the aesthetics, the social and political climate, and the prevailing attitudes toward the environment that helped create the Adirondack Park. In addition, the course will provide students with an opportunity to participate in seasonal outdoor activities to learn how recreational activities have impacted the social, cultural, economic, and physical aspects of the Park.

Enrollment is limited to those students participating in the Adirondack Semester Program.

**Components:** Lecture

**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Offered Fall Term

**Req. Designation:** Technology

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**EV 330(3)**

Course ID:011413

2022-01-26

**Great Lakes Water Protection**

[Cross-listed with BY 330] The Laurentian Great Lakes contain 20% of the world's surface fresh water and serve both water supply and waste disposal services for over 30 million residents in the United States and Canada. Technological advances have controlled the outflow of the Great Lakes at the St. Lawrence River and this has brought with it social benefits and environmental costs. The United States and Canada share the management of this resource and have shared notable success controlling environmental consequences of development yet are faced with emerging issues. The LGL/SLR system will be examined from a multidisciplinary, multinational perspective to illustrate that a shared resource can be maintained. Students will be able to understand the forces (geomorphic, biological, chemical, social, economic, and political) that have shaped and impacted a globally significant resource.

**Components:** Lecture

**Course Equivalents:** BY 330

**Attributes:** One communication unit, Contemporary and Global Issues, Science, Technology and Society, University Course, Offered Spring Term

**Requirement Group:** Prerequisite: At least Sophomore standing.

**Req. Designation:** Technology

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**EV 390(3)**

Course ID:011676

2022-01-26

Instructor Consent Required

**Sustainability Project Experience**

This course prepares students for and includes a two-week intensive work/study experience at a business with a stated sustainability focus. Students will study the nature of the business and their current sustainability practices through structured class time prior to traveling. Students successfully completing this course will gain a better perspective on the technology, business, cultural and regulatory constraints and opportunities that enable the enterprise to operate in a sustainable fashion. Interdisciplinary teams of students will identify additional possible projects to creatively overcome complex, real-world sustainability challenges for the business, and complete a preliminary feasibility study that includes interdependent technical, economic and environmental considerations. Project ideas and progress will be communicated through oral presentations and progress reports throughout the semester, culminating in a presentation and report to the business staff.

**Components:** Lecture

**Attributes:** Three Design Credits, Two communication units, Science, Technology and Society, Offered Spring Term

**Requirement Group:** Prerequisites: At least sophomore standing & permission of the instructor

**Req. Designation:** Technology

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**EV 400(1 - 3)**

Course ID:008308

2022-03-08

**Environmental Science Capstone**

This course is part one of a two course sequence with EV 401 that acts as the cornerstone of the Environmental Science and Policy and Environmental Health Science Programs. Each student will conduct a research project as an individual or in a group that involves several components of the scientific process. Students will be given lectures on research methods and will be required to have weekly meetings with a capstone advisor. At these meetings, work that has been completed will be evaluated and subsequent goals will be planned and established. In addition, several drafts of a final Capstone report will be written throughout the semester. The final paper is meant to be similar to the process of writing a thesis, both in scope and quality. The final presentation of this course is designed to be the culmination of a student's experience in the Environmental Science & Policy and Environmental Health Science Program, and the projects will be presented at the SURE conference or a similar type of forum.

**Components:** Lecture

**Attributes:** One communication unit, Offered Fall and Spring

**Requirement Group:** Prerequisites: Senior status in EHS or ES&P or consent of the instructor

**Req. Designation:** Technology

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**Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Environmental Science & Pol**

EV 401(1 - 3) Course ID:010966 2022-03-08

**Capstone Project (continuation)**

This senior level course is the conclusion of the Capstone Project. The course is for students who have taken EV400 and will be finishing their Capstone Project. The course will conclude with a final paper and presentation.

**Components:** Independent Study  
**Attributes:** Offered Fall and Spring  
**Requirement Group:** Prerequisite: EV400 or consent of the instructor.  
**Req. Designation:** Technology

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EV 490(0 - 3) Course ID:008312 2022-03-08

**Internship/Co-op**

Students who obtain a internship/co-op position should register for this course to document their professional experience on their transcript. During the fall semester, spring semester, or summer, a student must complete a professional experience that is not necessarily directly environmental science or environmental health science related, but clearly meets the professional goals of the student and the Clarkson university-wide requirements for a professional experience. The experience must involve a minimum of 120 hours of training and work, and must be pre-approved by the student's faculty advisor or director of the program. The student can obtain credit for the work experience by registering for this course the semester following the position, then writing a paper 20 page paper and doing a formal presentation. The amount of credit will be commiserate with the amount of work. Students will be required to keep a journal of work activities and submit the journal entries to the EHS program director upon completion of the professional

**Components:** Independent Study  
**Attributes:** Offered Fall and Spring  
**Requirement Group:** Prerequisite: Open to EHS or ES&P major or minor only, or by consent of the program director  
**Req. Designation:** Technology

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EV 492(0 - 3) Course ID:010330 2022-03-08

**Internship/Co-op**

Students who obtain a (summer) internship/co-op position may obtain credit for the work experience by registering for this course the semester following the position. Students will be required to keep a daily journal of work activities and submit the journal entries to the ES&P Program Director every two weeks. During the semester following the internship/co-op, a 10-page report on some aspect of their work experience and a 30 minute presentation will be required.

**Components:** Independent Study  
**Attributes:** Offered Fall Term  
**Requirement Group:** Prerequisite: Open to EHS or ES&P major or minor only, or by consent of the program director  
**Req. Designation:** Technology

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EV 494(1 - 3) Course ID:010352 2022-03-08

**Directed Research for Undergraduates**

A research project will be completed; research projects may include laboratory projects, literature research, or individual study of environmental science, environmental engineering, and/or environmental policy topics not available in other Clarkson courses.

**Components:** Research  
**Attributes:** Offered Fall and Spring  
**Requirement Group:** Prerequisite: Open to EHS or ES&P major or minor only, or by consent of the program director  
**Req. Designation:** Technology

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EV 495(1 - 3) Course ID:011304 2022-03-08

**Directed Research for Undergraduates**

A research project will be completed; research projects may include laboratory projects, literature research, or individual study of environmental science, environmental engineering, and/or environmental policy topics not available in other Clarkson courses.

**Components:** Research  
**Attributes:** Offered Fall and Spring  
**Requirement Group:** Prerequisite: Open to EHS or ES&P major or minor only, or by consent of the program director  
**Req. Designation:** Technology

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EV 496(1 - 3) Course ID:011305 2022-03-08

**Directed Research for Undergraduates**

A research project will be completed; research projects may include laboratory projects, literature research, or individual study of environmental science, environmental engineering, and/or environmental policy topics not available in other Clarkson courses.

**Components:** Research  
**Attributes:** Offered Spring Term  
**Requirement Group:** Prerequisite: Open to EHS or ES&P major or minor only, or by consent of the program director  
**Req. Designation:** Technology

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**Engineering - Civil & Environmental Eng - Subject: Environmental Science & Policy**

EV 502(3) Course ID:013050 2022-06-06

**Applications in Geospatial Analytics, Science, and Engineering**

[Cross-listed with CE 502, SC 502] This course will use techniques in geospatial analytics, science, and engineering to address applied challenges in various contextual situations. Geotagging, network analysis, spatial visualization, geospatial data manipulation, cartographic presentations, and other similar methods will be studied and applied to real-world or research applications. Students will develop a set of tools that enable completion of projects in the major field using geospatial capabilities.

Prerequisites: Graduate standing, CE 301, or consent of the instructor

**Components:** Laboratory, Lecture

**Course Equivalents:** CE 502, SC 502

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Environmental Science & Pol**

EV 532(3) Course ID:008278

2022-01-26

**Risk Analysis**

Risk assessment entails the evaluation of the hazardous properties of substances, the extent of human exposure to them and the characterization of resulting risk. It is a systematic approach to organizing and analyzing the scientific knowledge regarding potentially hazardous activities or substances. Variability and uncertainty are used to estimate the level of confidence in the risk assessment. The general approach to risk assessment including the use of default assumptions and uncertainty analysis will be presented along with illustrative examples.

Prerequisites: graduate standing or senior with >B average.

**Components:** Lecture

**Course Equivalents:** ES 432

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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EV 536(3) Course ID:011518

2023-05-30

**Global Climate Change: Science, Engineering & Policy**

The primary objective of the course is to provide the necessary background that will permit students to understand and accurately describe the workings of the Earth's climate system, the interactions between the atmosphere, ocean, and climate, and human's involvement in altering these processes. The course is broken into four components covering earth science, energy, policy, and database access/programming. This highly quantitative course will use project-based experiences to allow each student an opportunity to complete a data acquisition/modeling project of their own design to show correlations between human activities, current atmospheric concentrations, and resulting ecosystem change. For example, the global spatial and temporal distributions of greenhouse gases, clouds, aerosols, radiation, etc. Students will use computational programming tools (Matlab, Excel) in combination with mapping tools (Google Maps, API) to quantify, analyze, and display geographical variations of integrated and averaged values of quantities studied. The project will

**Components:** Lecture

**Attributes:** Offered Even Springs

**Req. Designation:** Technology

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EV 590(1 - 3) Course ID:011924

2022-01-26

**Special Topics in Environmental Science and Engineering**

Advanced study of special topics in the area of environmental science and engineering.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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EV 591(1 - 3) Course ID:011923

2022-01-26

**Special Topics in Environmental Politics and Governance**

Advanced study of special topics in the area of environmental politics and governance. With approval, students may take this class up to three times as long as the topical area is substantially different and the course is not repeated in the same semester.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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EV 610(1) Course ID:011012

2022-01-26

**ISE Graduate Seminar**

Seminar course for ISE graduate students in the Environmental Science and Engineering and the Environmental Politics and Governance (EPG) programs.

**Components:** Seminar

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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EV 612(1 - 15) Course ID:010920

2022-01-26

**Thesis, Dissertation or Special Project**

Analytical or experimental studies in civil and environmental engineering under the direction of a faculty adviser. Credit for this work is given when the requirements for the degree are completed including the presentation of a thesis, dissertation, or project report as appropriate to the degree program.

**Components:** Thesis Research

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Environmental Science & Po

EV 999(1 - 10) Course ID:011098

2022-01-26

**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Transfer Credit Only**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Film Studies**

**FILM 1(2 - 4)** Course ID:010814 2015-01-19

**FILM Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**FILM 2(2 - 4)** Course ID:010815 2015-01-19

**FILM Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Humanities or Social Science Foundation Curriculum Requirement, depending on the specific designator.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**FILM 226(3)** Course ID:011931 2015-03-05

**Short Film Screenwriting**

[Cross-listed with COMM 226] In this course, you will learn the process of writing short screenplays for narrative fiction films of any genre. Short films can be anywhere from 30 seconds to 40 minutes long, though the majority of them fall between seven and fifteen minutes. Each student will complete two short scripts and then revise one of these from the ground up. Since this is a workshop, you are expected to comment thoughtfully on your classmates' work, as they will comment thoughtfully on yours. Though there is some reading in this course, your primary concern should be writing, writing, writing!

**Components:** Lecture

**Course Equivalents:** COMM 226

**Attributes:** Two communication units, Imaginative Arts, Given When Needed

**Req. Designation:** Technology

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**FILM 230(3)** Course ID:012113 2015-10-21

**Cinemas of Resistance**

This course means to explore major film-making movements that fall within a category of "cinema of resistance." We will discuss concepts in and approaches to film theory and film-making that resist a Western, hetero-normative, white, and/or patriarchal discourse and will contextualize feminist and queer cinema, black cinema, postcolonial, imperfect, and third cinema, among others. We will furthermore emphasize how films are tied to the political reality of their time and place, including major historical moments of resistance such as decolonization, the feminist movements, the Civil Rights Movement, LGBTQ rights movements, and others. While these will be our major points of discussion, we will also touch on issues like genre, spectatorship, and politics of marketing and distribution. We will watch and discuss films by filmmakers such as Vittorio De Sica, Ousmane Sembene, Julie Dash, Sally Potter, Spike Lee, Gillo Pontecorvo, and Stephen Frears, among others.

**Components:** Laboratory, Lecture

**Attributes:** One communication unit, Contemporary and Global Issues, Given When Needed

**Req. Designation:** Technology

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**FILM 235(3)** Course ID:012136 2018-02-23

**Crossing Borders**

In this class, we want to take a close look at the representation of migration and border crossings in global cinema from the U.S., Canada, Germany, France, the U.K. Senegal, Nigeria, Algeria, Iran, Israel, Mexico, Argentina, and China.

More often than not, conversations approach the issue of migration on a policy level, but in this class we want to take a look at how filmmakers from around the world imagine individual migrant stories and get a sense of the body of migration films that has emerged over the past three decades. Although we will certainly address policy issues, political debates, and legal frameworks, we want to focus on how cinema can create an individual humanity of migrant and refugee characters. What are the politics of representation in an unequal world order? How is the migrant humanized or de-humanized? Does a certain way of representing immigrants indicate specific national anxieties? We will discuss issues such as clandestine border crossings, migrant

**Components:** Laboratory, Lecture

**Attributes:** One communication unit, Contemporary and Global Issues, Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Film Studies****FILM 237(3)****Course ID:012882****2022-02-11****The Horror Film**

In addition to being one of the most consistently profitable film genres, horror movies also provide a window into the culture anxieties captured at the time these films were made. This course examines horror films across a variety of sub-genres over the past several decades. In addition to watching these films, students will read commentary by critics and scholars that has shaped the way we think about horror films. Students will also have an opportunity to learn the basic tools of film studies while also honing their writing abilities.

**Components:** Lecture**Attributes:** One communication unit, Imaginative Arts, Offered Even Falls**Req. Designation:** Technology**FILM 250(3)****Course ID:012759****2016-09-27****Dystopian Visions in International Cinema**

In this course we want to explore the representations of various forms of dystopias in international cinema and our own fascination with these "bad" fictional places. How might dystopian films represent and recreate societal developments and anxieties? How do filmmakers and authors respond to different socio-political contexts and concerns, such as oppressive totalitarian regimes, environmental destruction, natural disasters, and/or medical catastrophes? Finally, we will investigate issues such as religion, gender, sexuality, race, and class as they relate to dystopian scenarios.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Imaginative Arts, Given When Needed**Req. Designation:** Technology**FILM 260(3)****Course ID:013137****2022-02-11****Major Marginalized Movie-Makers**

Using the lens of the director, or auteur, and mainly focusing on American films from the last 20 years, this class will study the productions of people who have historically been—and continue to be—underrepresented in mainstream cinema: BIPOC, LGBTQIA2+ people, and women. We will consider, for example, how directors implement their creative vision in a largely collaborative industry, as well as how directors from marginalized groups have "broken into" Hollywood. Over the course of the semester we will watch two or three films by each director and discuss not only social and cultural aspects of each film but also how to analyze theme and style across an auteur's body of work. Our primary objectives will be to consider how marginalized peoples use fictional narrative films to engage audiences with cultural and social worldviews to which they may not have been previously exposed, AND for audiences who don't often see their own cultural and social experiences reflected on screen. We might think, for example, about how Taika Waititi's vision for Thor: Ragnarok can be

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Imaginative Arts, Offered Even Springs**Req. Designation:** Technology**FILM 322(3)****Course ID:008590****2015-03-05****The Hollywood Cinema**

[Formerly LF373] The Hollywood Cinema was launched in the early part of this century when a group of New Yorkers transferred their operations to the warmth and bright natural light of Los Angeles. Since then, the Hollywood style of filmmaking has grown to be a dominant influence in world cinema. In this course, students will study the history, economics, technology and theory of Hollywood filmmaking. The course will explore the different means through which movies communicate with viewers, focusing on technical components such as photography, frame compositions, movement, sound, and editing, as well as more literary components such as screenplay, acting, and directing. It will explore as well the cultural components of film viewing, since the ultimate goal of the course is to gain a better understanding of the movies that both reflect and affect the lives and times of those who make and see them.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Economics and Organizations, Imaginative Arts, University**Course, Given When Needed****Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Film Studies****FILM 326(3)** Course ID:011955 2015-03-05**Feature Film Screenwriting**

In this course, you will learn the process of writing a feature-length screenplay. You will devise an original story idea, craft intermediate documents (i.e. logline, treatment, and beat sheet), and then write a first draft. Our goal is not to complete a polished draft (most screenplays go through at least a dozen revisions), but rather to execute a full draft in proper screenplay format that hits all the dramatic turning points, fleshes out characters and dialog, and leaves you with a document ready for substantive revision - now that you know what you're writing. Since this is a workshop, you are expected to comment thoughtfully on your classmates' work, as they will comment thoughtfully on yours. Along the way, you will read several professional scripts and complete a brief critique of each. We will also learn about the profession of screenwriting, including what to do with finished scripts, how to seek representation, and what the Writers Guild of America is. Though there is a good amount of reading in this course, your primary concern should be

**Components:** Lecture**Same As Offering:** COMM 326**Attributes:** Two communication units, Imaginative Arts, Given When Needed**Req. Designation:** Technology**FILM 340(3)** Course ID:008587 2022-02-11**World in a Frame**

[Formerly LF370] Film is a complex medium that surrounds its participants, conveying ideas and emotions through the combination of words, images, sounds, and music. This course will explore the different means through which movies communicate with viewers, focusing on technical components such as photography, frame composition, movement, sound, and editing, as well as on more literary components such as screenplay, acting, directing, and producing. In the process of this exploration, class members will also learn about the major areas of film theory, since the ultimate goal of the course is to gain a better understanding of the movies that both reflect and affect the lives and times of those who make and see them.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Imaginative Arts, Offered Odd Springs**Req. Designation:** Technology**FILM 345(3)** Course ID:013086 2022-02-11**Film and Native America**

This course focuses on the filmmaking practices of Native American and global Indigenous communities over the past 30 years. We will consider such concepts as Fourth Cinema, self-representation, authorship and genre definitions. How, for example, does Indigenous horror or documentary film have its own aesthetic and cultural concerns? Students will be introduced to both the history and theory of Indigenous cinema, from the factors motivating its emergence to the major movements and representative filmmakers. Further, students will become acquainted with aesthetic and narrative practices in Indigenous filmmaking. Although our focus will be on Turtle Island (the landmass now known as North America), we will also broaden our perspective to compare global Indigenous movements. Through the study of films by Native American and global Indigenous peoples, along with critical readings about film studies and Indigenous cultures, students will be introduced to, discuss, research, and analyze the complex nature of Indigenous cultures and societies. While the focus of

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Offered Odd Springs**Req. Designation:** Technology**FILM 490(1 - 10)** Course ID:010765 2015-02-03 **Department Consent Required****Independent Study**

Designed primarily for an advanced student who wishes to pursue special interests in film studies for one or more semesters, this series allows students to design and conduct independent study projects under faculty guidance.

Prerequisite: consent of the instructor.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology

**Business - School of Business - Subject: Finance**

**FN 1(2 - 4)** Course ID:008333 2015-06-30

**Finance Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**FN 2(2 - 4)** Course ID:008334 2015-06-30

**Finance Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**FN 361(3)** Course ID:008335 2017-07-06

**Financial Management**

(May be used to satisfy a CUSB M.B.A. or M.S. foundation requirement.)

The basic goals of this introductory finance course are to familiarize students with the concepts and tools used in corporate financial management decisions. These include the analysis of financial statements for long-term financial planning, the notion of present value in addition to the relationship between risk and return. The concepts and techniques are, in turn, used to evaluate and make decisions regarding the firm's capital expenditures and capital structure as well as security valuation.

**Components:** Lecture

**Attributes:** Offered Fall, Spring, and Summer

**Requirement Group:** Prerequisites: MA/STAT282 or MA/STAT383 or MA330, and EC150 or EC350, and AC203 or AC/EM205 (or their

**Req. Designation:** Technology

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**FN 455(3)** Course ID:008337 2015-06-30

**Venture Capital and Private Equity**

Course is designed to address financial issues relating to high tech industries and the new economy. Topics covered will include venture capital, and in-depth study of the IPO process, valuation, capital structure, long run performance and other issues related to new industries.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisite: FN361.

**Req. Designation:** Technology

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**FN 462(3)** Course ID:008338 2022-02-10

**Investments**

Beginning with the formulation of individual and institutional investment objectives and policies, this course examines the various assets, securities, and contracts provided in the private and public sector. Besides the characteristics of these investments vehicles, the course also looks at how trades occur in the respective markets and the general investment-decision making process.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisite: FN361.

**Req. Designation:** Technology

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**FN 464(3)** Course ID:008339 2015-06-30

**Financial Management II**

This course introduces students to the complexities of financial management while providing a comprehensive overview of the major issues in Financial Management. Picking up where FN361 left off, FN464 will focus on financial strategy and the right-hand side of the balance sheet. Specific topics will include: an introduction to capital markets and the issuing of securities, capital structure issues, dividend policy, working capital considerations, mergers and acquisitions, and corporate governance. The course will integrate concepts from accounting, statistics, and economics.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisite: A grade of C or better in FN361; Corequisite: AC 312

**Req. Designation:** Technology

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**Business - School of Business - Subject: Finance**

FN 467(3) Course ID:008340 2015-06-30

**International Finance**

This course explores issues in international finance, especially as they pertain to financial management. Coverage includes an overview of the international financial environment, encompassing topics such as the international monetary system, balance-of-payments, trade agreements, and capital flows such as foreign direct investment. Specific attention is given to understanding exchange rate systems, purchasing-power parity (PPP), interest rate parity and international arbitrage. Techniques for measuring and managing exchange rate risk are covered in detail.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisites: FN361, EC/EM150 and EC151 or EC350.

Req. Designation: Technology

FN 468(3) Course ID:008341 2022-02-10

**Financial Markets and Institutions**

[Cross-listed with EC 468] Emphasis is placed on understanding the basics of managing financial institutions, such as banks, the flow of funds, markets, and regulatory agencies that affect the institutions. The course addresses risk management, term structure of interest rates, international and domestic market operations and policy questions about financial markets and related topics.

Components: Lecture

Course Equivalents: EC 468

Attributes: Offered Spring Term

Requirement Group: Prerequisite: FN361.

Req. Designation: Technology

FN 470(3) Course ID:011335 2015-07-08

**Strategic Financial Management**

This case oriented capstone Finance course is designed to acquaint students with the fundamental issues in strategic financial management using financial markets. Using the underlying principle of shareholder wealth maximization, the key role of valuation in the strategic planning process will be highlighted by studying corporate decisions that interface with financial markets. Both theoretical valuation models and methods used in practice 'on the street' will be discussed, compared and implemented to measure the value created by investment, divestment, and restructuring decisions. The course examines the causes of value gaps in firms and develops methods to close the gaps and unlock hidden value. We will rely heavily on material from all previous Finance and Accounting courses.

Components: Lecture

Attributes: Offered Spring Term

Requirement Group: Prerequisite: FN464

Req. Designation: Technology

FN 474(3) Course ID:008343 2022-02-10

**Models for Financial Analysis**

The objective of the course is to understand how financial statement information affects the market value of securities. This course examines assessment of the firm through in-depth analysis of the financial statements. In addition to direct and ratio analysis of the financial statements, the course examines analysis of such topics as short and long-lived assets, tax strategy, leasing, pension plans & benefits, hedging, off-balance sheet considerations, business combinations, other forms of restructuring, multinational operations, credit and other risk analysis. The impacts of import FASB and international accounting and tax rules are examined. Coverage is done within a CFA (TM) framework.

Components: Lecture

Attributes: Offered Fall Term

Requirement Group: Prerequisites: FN361.

Req. Designation: Technology

FN 575(1 - 3) Course ID:012002 2015-07-08

**Professional Fund Management I**

Professional fund management involves two principal topic areas: Portfolio management and security analysis. Portfolio management involves establishing an investment strategy and constructing a portfolio of financial assets consistent with said strategy. Security analysis on the other hand involves the evaluation of individual financial securities. While we address both areas throughout the semester, the focus of this class is security analysis. The primary structure of this course is an application of fund management with a focus on a rotating investment style. Each semester, students will be directed to follow different investment styles such as, sector rotation, growth, or quantitative analysis. Furthermore the class will be responsible for managing a designated portion of the Clarkson University endowment. This student managed investment fund (SMIF) will be primarily invested in equity securities; security selection within the equity assets class will be made by the current class members.

Components: Lecture

Req. Designation: Technology

**Business - School of Business - Subject: Finance****FN 576(1 - 3)** Course ID:012003 2015-07-08**Professional Fund Management II**

Professional fund management involves two principal topic areas: Portfolio management and security analysis. Portfolio management involves establishing an investment strategy and constructing a portfolio of financial assets consistent with said strategy. Security analysis on the other hand involves the evaluation of individual financial securities. While we address both areas throughout the semester, the focus of this class is security analysis. The primary structure of this course is an application of fund management with a focus on a rotating investment style. Each semester, students will be directed to follow different investment styles such as, sector rotation, growth, or quantitative analysis. Furthermore the class will be responsible for managing a designated portion of the Clarkson University endowment. This student managed investment fund (SMIF) will be primarily invested in equity securities; security selection within the equity assets class will be made by the current class members.

**Components:** Lecture**Req. Designation:** Technology**FN 607(2)** Course ID:008348 2015-06-30**Financial Management (MBA Module)**

[Cross-listed with FN 608, FN 610] An application of the tools and models that produce better decisions for the firm in short and long term. Asset selection, risk management, inventory management, credit and capital acquisition, and overall value enhancement are covered. Emphasis is put on the quantitative tools, the practices of existing corporations, and the international environment.

**Components:** Discussion, Lecture**Course Equivalents:** FN 608, FN 608, HC 617**Attributes:** Offered Spring Term**Requirement Group:** Restriction: Admission to the MBA program required**Req. Designation:** Technology**FN 608(3)** Course ID:008349 2022-10-13**Financial Management**

[Cross-listed with FN 607, FN 610, HC 617] This course introduces students to the complexities of financial valuation and decision-making while providing a comprehensive overview of the major issues in Corporate Finance. Specific topics will include: valuation of financial instruments, capital budgeting, an introduction to capital markets, the assessment and pricing of risk, capital structure issues, dividend policy, and working capital considerations. The course will integrate concepts from Accounting (Income Statement and Balance Sheet Analysis as well as pro forma statements), Decision Sciences (Excel, modeling and sensitivity analysis), and Economics (wealth maximization, demand estimation and forecasting).

**Components:** Lecture**Same As Offering:** FN 608**Course Equivalents:** FN 607, HC 617**Attributes:** Offered Summer Term**Req. Designation:** Technology

**Business - CRC Business - Subject: Finance****FN 608(3)****Course ID:008349****2022-10-13****Financial Management**

[Cross-listed with FN 607, FN 610, HC 617] This course introduces students to the complexities of financial valuation and decision-making while providing a comprehensive overview of the major issues in Corporate Finance. Specific topics will include: valuation of financial instruments, capital budgeting, an introduction to capital markets, the assessment and pricing of risk, capital structure issues, dividend policy, and working capital considerations. The course will integrate concepts from Accounting (Income Statement and Balance Sheet Analysis as well as pro forma statements), Decision Sciences (Excel, modeling and sensitivity analysis), and Economics (wealth maximization, demand estimation and forecasting).

**Components:** Lecture**Same As Offering:** FN 608**Course Equivalents:** FN 607, HC 617**Attributes:** Offered Summer Term**Req. Designation:** Technology

**Business - School of Business - Subject: Finance****FN 610(3)****Financial Analytics**

This course introduces methods and tools for financial data analysis in SAS and Python, focusing on analyzing financial information data and stock return data. Topics covered in this course include, but are not limited to, univariate analysis, regression analysis, panel data models, event studies, stock return anomalies, high-frequency data analysis, and Monte Carlo simulations. A variety of data sources are used: financial websites, government sites, and finance research databases such as WRDS. Students will become proficient in financial data analysis, which will prepare them for careers in the financial industry.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: IA 530 or equivalent.**Req. Designation:** Technology

**Business - CRC Business - Subject: Finance****FN 615(3)** Course ID:013104

2021-04-23

**Financial Modeling and Analysis**

The objective for this course is to develop the financial modeling skills used in the application of financial theory to practical problems in investment analysis, portfolio management, and valuation. Financial models have become increasingly complicated over the years, and this course is intended as an introduction to some of the modeling techniques used by professionals in the finance field. Topics covered include construction of free cash flows, forecasting cash flows, capital budgeting, risk measurement, and portfolio choice subject to constraints. The course is suitable for students seeking a career in finance, but also for students with broader interests who wish to strengthen their general modeling skills.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: FN608**Req. Designation:** Technology**FN 619(3)** Course ID:012546

2016-07-01

**Investments**

[Formerly MBA 619] This course provides an in-depth analysis of modern investment strategies and portfolio management techniques. Current theory, empirical evidence, and institutional practices are considered. Topics covered include portfolio theory and asset pricing models, market efficiency, fixed-income portfolio management and immunization, equity valuation models, the valuation of options and option strategies, and portfolio management and performance evaluation.

**Components:** Lecture**Req. Designation:** Technology**FN 629(3)** Course ID:012556

2016-07-01

**Money, Markets, and Banking**

[Formerly MBA 629] The course covers the nature and functions of money and finance in the economy. Commercial and central banking, monetary theory, and monetary policy are also considered.

**Components:** Lecture**Req. Designation:** Technology**FN 661(3)** Course ID:012570

2016-07-25

**International Finance**

[Formerly MBA 661] An analysis is made of international financial markets and the special problems and opportunities associated with the financial management of multinational firms. The international monetary and banking system (including the World Bank and IMF), balance of payments, and economic relationships are also examined. Foreign exchange and interest rate risk management, arbitrage, international equity and debt financing activities, derivatives, multinational capital budgeting, political risk, international taxation and accounting issues are considered. Coursework involves an intensive team research project focused on a specific country and the international financial exposures of select global corporations.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

**Business - School of Business - Subject: Finance**

FN 680(3) Course ID:008357

2015-06-30

**Strategic Financial Management**

This course examines in depth (1) financing courses for entrepreneurs and business developers, as well as (2) risk management methods. Besides the capital markets, the sources for operating and fixed asset financing for firms in development or with strategic alliances include venture capital, vendor and customer financing, bank and insurance company loans, and leasing. In addition to financing topics, commodity price risk management, as achieved with forward contracting, futures contracts, over-the-counter options and swaps, is examined as means to control price uncertainty.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: FN607 or consent of the instructor**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: French Language****FRN 580(3)** Course ID:012396 2021-10-08**MAT Project in French (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology**FRN 585(3)** Course ID:013107 2021-04-27**Advanced French Grammar**

This course is designed to give students who already have a deep understanding of the French language and French and francophone cultures the opportunity to more fully develop grammatical knowledge and accuracy in French. Emphasis will be placed on listening, speaking, reading, and writing in French using complex grammatical structures. Students will complete a systematic exploration of functional and stylistic features and gain a firmer grasp on grammar, understanding what grammar is and what purposes it serves, in addition to knowing grammatical rules.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**FRN 988(3)** Course ID:012408 2017-07-01**Independent Study in French**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Given When Needed**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology**FRN 989(3)** Course ID:012409 2017-07-01**Independent Study in French**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Given When Needed**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology

**Other - Student Affairs - Subject: First Year****FY 100(1)****Course ID:008361****2022-01-21****First Year Seminar**

[Cross-listed with PE 100] With a focus on group work and team dynamics, this adjustment course is required for all first-year students. It introduces the mission and expectations of the learning process at Clarkson; builds communication and teamwork skills; and provides some fundamental content relating to wellness and relationships during the college experience. Discussion, team activities, leadership opportunities, and interaction with upperclass peer educators form the foundation of the course.

**Components:** Seminar**Requirement Group:** Restriction: Freshman standing**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Geology**

GEO 580(3) Course ID:012413 2021-10-08

**MAT Project in Earth Science (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: German Language****GER 580(3)** Course ID:012420 2021-10-08**MAT Project in German (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology**GER 988(3)** Course ID:012424 2018-06-13**Independent Study in German**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Given When Needed**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology**GER 989(3)** Course ID:012425 2018-06-13**Independent Study in German**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Given When Needed**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.**Req. Designation:** Technology

**Health Sciences - Lewis School - Subject: Health Management**

HC 101(3) Course ID:013201 2023-04-03

**Medical Terminology**

This course is a study of the principles of word analysis, word construction and word meanings as applied to healthcare and common across biomedical technology, clinical medicine, healthcare management, and public health and policy. Case studies will be used to ensure that terminology is applied within the context of healthcare.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

HC 190(4) Course ID:013125 2021-08-30

**EMT Basic**

This course will provide students with the knowledge and skills necessary to care for the sick and injured in the prehospital setting as an Emergency Medical Technician (EMT). Course topics include the recognition and treatment of respiratory, cardiac, diabetic, and other medical emergencies. Environmental exposure, traumatic injuries, emergency childbirth, and psychological emergencies will also be examined. Successfully completing this course will fulfill the educational requirements for the student to take the New York State EMT certification exam. Once certified, students may utilize their skills in a variety of settings including EMS and first responder agencies, health care facilities, and to aid their own friends and family. This course will help prepare students for future healthcare studies and careers. Students planning on working or volunteering with an EMS agency will be capable of performing the job expectations of an entry level EMT safely and effectively on completion of this course.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology

HC 207(3) Course ID:013200 2023-04-03

**Medical Anthropology**

Medical anthropology is a holistic study at the intersections of health, pathogens, human bodies, illness experience, and disease. In this course, we will ask how complex interactions between biology, culture, ideology, and society relate to the construction of medical facts with both cultural and historical context. This course will consider medical experiences in the context of people's larger life stories. We ask how disease or illness impacts and is impacted by familial, social, and political contexts. Medical anthropologists are concerned with disease at three basic levels: pathogen, human organism, and society.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

HC 301(3) Course ID:013197 2023-03-22

**Evidence Based Practice**

Evidence-based practice in healthcare is the integration of the best available research with clinical expertise in the context of patient characteristics, culture and preferences. This is an introductory course in the processes associated with collecting and utilizing evidence to make public health policy, clinical decisions, and inform business practices.

**Components:** Lecture**Requirement Group:** Prerequisites: One of STAT282, STAT318, STAT381, STAT383, or STAT389.**Req. Designation:** Technology

HC 402(3) Course ID:013199 2023-04-03

**General Medical Conditions**

Introduce students to the process of evaluation, differential diagnosis and pharmacological treatment of a variety of general medical conditions. Explore common signs and symptoms and recognize, evaluate, and differentiate common systemic diseases and understand the principles of pharmacology.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: HC301**Req. Designation:** Technology

**Health Sciences - Lewis School - Subject: Health Management**

HC 405(1 - 3) Course ID:013165

2022-04-08

**Experiential Learning in Health Care**

This is as an independent study course under the mentorship of a member of the Lewis School of Health Sciences faculty. This is a variable credit course (1-3cr) where 50hrs is equal to 1 credit hour. The student is required to complete at least 50 hours of work in a health profession setting. The work must include some form of interaction with health professionals and with patients or analogous health-service recipients. Examples include healthcare internships or volunteer positions at a hospital or clinic, completions of HS 210 Health Coaches II, serving as an EMT, or emergency first-responder. Conducting research with medical applications that does not involve working with patients/ health-service recipients will not meet the requirements for this course. Upon completing each 50hr experience, the student will prepare a short (around 3 page) self-reflective essay on what the student did and learned during the experience, and how the experience has affected the student's professional goals and preparation. In the essay(s), specific

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

**Business - CRC Business - Subject: Health Management**

HC 600(3) Course ID:012426

2023-07-11

**Introduction to Health Systems**

[Formerly HCM 500] This course examines the determinants of health, illness, and medical care utilization, institutional arrangements and settings for the delivery of acute and chronic care, the doctor-patient relationship, resource allocation and financing, and measuring and evaluating system performance.

**Components:** Lecture**Same As Offering:** HC 600**Course Equivalents:** HC 630**Attributes:** Offered Fall Term**Req. Designation:** Technology

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**Business - CRC Healthcare Management - Subject: Health Management**

HC 600(3) Course ID:012426

2023-07-11

**Introduction to Health Systems**

[Formerly HCM 500] This course examines the determinants of health, illness, and medical care utilization, institutional arrangements and settings for the delivery of acute and chronic care, the doctor-patient relationship, resource allocation and financing, and measuring and evaluating system performance.

**Components:** Lecture**Same As Offering:** HC 600**Course Equivalents:** HC 630**Attributes:** Offered Fall Term**Req. Designation:** Technology

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**Business - CRC Healthcare Data Analytics - Subject: Health Management****HC 604(3)** Course ID:012434 2023-05-30**Hospital Analytics**

[Formerly HCM 604] An application of principles of analytics to hospital settings, problems, and strategic issues. Students will learn the array of alternative platforms hospitals use for collecting, storing, and distributing data within the hospital-health system setting, including data displays, analytical modules, and user interfaces. Students will also work with hospital data to answer clinical and strategic questions that senior leaders pose, and understand the promise and limitations of the data. Finally, students will be exposed to issues related to data communication and sharing among internal constituencies including owned physician practices and subsidiaries, related parties (e.g., PHO's and voluntary physicians), and Health Information Exchanges through RHIO's.

**Components:** Lecture**Attributes:** Offered Winter Term**Req. Designation:** Technology**HC 605(3)** Course ID:012428 2022-10-12**Health Operations**

[Formerly HCM 505] This course instructs the students in quantitative methods useful for analysis, improvement, and design of efficient and effective organizational processes within a health-care organization. Operations management (OM) is concerned with evaluating the performance of operating units, understanding why they perform as they do, designing new or improved operating procedures and systems for competitive advantage, making short-run and long-run decisions that affect operations, and managing the work force. Health systems OM is the analysis, design, planning, and control of all steps necessary to provide a service for a client. The course will involve readings from a selected text, review of published studies, exercises in internal and external benchmarking, and exploration of the tools and methods promoted at the national level.

**Components:** Lecture**Course Equivalents:** OM 603, OM 603**Attributes:** Offered Fall and Spring**Req. Designation:** Technology**HC 606(3)** Course ID:012435 2023-05-30**Payer Analytics**

[Formerly HCM 606] Health insurers and healthcare providers share a common mission of improving health however their means to achieving their mission vary materially. This course will focus on the analytics health insurers utilize to facilitate affordable, quality healthcare. We will discuss and analyze the approaches health insurers take to discover and communicate meaningful patterns in data from historical information reporting to future predictive modeling. Upon completion of this course, the student will have been exposed to key payer analytic frameworks and tool sets used to drive success within a health insurer.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Business - CRC Healthcare Management - Subject: Health Management**

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HC 617(3) Course ID:012438 2022-10-13

**Healthcare Finance**

[Cross-listed with FN 607, FN 608] [Formerly HCM 617] This course covers financial management in a regulated healthcare environment. Topics include cost-finding and third-party reimbursement, contemporary issues in healthcare financing, sources of capital, capital budgeting, financial planning and analysis, cost accounting, and managed care issues.

**Components:** Lecture

**Course Equivalents:** FN 607, FN 608, FN 608

**Attributes:** Offered Winter and Spring

**Requirement Group:** Prerequisites: AC604

**Req. Designation:** Technology

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HC 620(3) Course ID:012439 2023-05-30

**Health Economics**

[Cross-listed with EC 604, EC 605] [Formerly HCM 620] This course is intended for students entering the health field and investigates economic approaches to problems and solutions. Students obtain an understanding of how economics contributes to public and private decision-making in healthcare, and learn to properly interpret economic research results and apply them to work performed by health planners and administrators.

**Components:** Lecture

**Course Equivalents:** EC 604, EC 605, EC 605

**Attributes:** Offered Spring and Summer

**Req. Designation:** Technology

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HC 626(3) Course ID:012431 2022-10-13

**Health Systems Marketing**

[Cross-listed with MK 609, MK 610] [Formerly HCM 526] This course introduces students to the principles of marketing and their application to healthcare settings. At the end of this course, students should a.) Understand what marketing can do for the healthcare organization in terms of contribution to strategic planning, building business, strengthening relationships between the organization and its constituents, and achieving competitive advantage. b.) Clearly understand how to use health data in marketing planning and implementation. c.) Appreciate the challenges of evaluating the effectiveness of marketing communications investments made by healthcare organizations. d.) Understand the relationship between patient/customer satisfaction and service quality in health organizations. e.) Understand how to judge marketing communications quality, both qualitatively and quantitatively. f.) Demonstrate effective communications skills through in-class participation, writing assignments, and class presentations. g.) Analyze marketing

**Components:** Lecture

**Course Equivalents:** MK 609, MK 610, MK 610

**Attributes:** Offered Winter and Spring

**Req. Designation:** Technology

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**Business - CRC Business - Subject: Health Management**

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HC 630(3) Course ID:012506 2016-07-01

**LIM Introduction to Health Systems**

[Formerly LIM 500] This course examines the determinants of health, illness, and medical care utilization, institutional arrangements and settings for the delivery of acute and chronic care, the doctor-patient relationship, resource allocation and financing, and measuring and evaluating system performance.

**Components:** Lecture

**Course Equivalents:** HC 600, HC 600

**Attributes:** Offered Fall Term

**Requirement Group:** Restriction: Open to LIM students only

**Req. Designation:** Technology

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HC 633(3) Course ID:012508 2016-07-02

**LIM Healthcare Leadership**

[Formerly LIM 503] This course examines managerial roles and processes within health service organizations - organization design, managerial epidemiology, governance, total quality management, human resource management, labor relations and ethics.

**Components:** Lecture

**Attributes:** Offered Winter Term

**Requirement Group:** Restriction: Open to LIM Students only Prerequisites: HC630

**Req. Designation:** Technology

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HC 637(3) Course ID:012512 2023-05-30

**LIM Research Practicum**

A course designed to integrate the concepts and skills associated with healthcare research-based managerial problem solving learned throughout the LIM program in Healthcare Management. The objective of this course is to assist students with a level of professional maturity, confidence and strategic thinking to become a successful physician leader.

**Components:** Practicum

**Attributes:** Offered Spring Term

**Requirement Group:** Restriction: Open to LIM students only

**Req. Designation:** Technology

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HC 643(3) Course ID:012781 2023-05-30

**Advanced Applications in Data Analytics**

This course takes an advanced approach to healthcare data analytics using cutting-edge software and technical practices to facilitate business process improvement using data to track success of projects and programs. This course covers data visualization, literacy, and governance through the use of case studies, real world examples, and authentic data sources.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: HC 647 and HC 648

**Req. Designation:** Technology

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**Business - CRC Healthcare Data Analytics - Subject: Health Management**

HC 647(3) Course ID:012443

2022-05-04

**Statistical Foundations of Data Analytics**

[Formerly HCM 647] [Cross Listed with IS647] This course covers fundamental methods in statistical analysis and data visualization as applied in healthcare. A holistic problem-solving approach is taken covering problem formulation, data acquisition and preparation, selection of appropriate statistical methods, and effective communication of analytic results. Topics covered include data visualization, data description methods, statistical inference, and model building. Examples are drawn from a variety of healthcare applications. Data visualization and analysis will be performed using statistical software.

**Components:** Lecture**Course Equivalents:** IS 647, IS 647**Attributes:** Offered Winter and Summer**Req. Designation:** Technology

**Business - CRC Healthcare Management - Subject: Health Management****HC 648(3)** Course ID:012444 2022-10-13**Health Informatics**

[Cross-listed with IS 605, IS 606] This course will introduce students to the concepts and practices of health informatics. Topics include: a) an introduction to information systems and specifically to the health informatics field; b) major applications and commercial vendors; c) decision support methods and technologies; d) system analysis, design, implementation, and evaluation of healthcare information systems; and e) new opportunities and emerging trends.

**Components:** Lecture**Course Equivalents:** IS 605, IS 606, IS 606**Attributes:** Offered Fall and Summer**Req. Designation:** Technology**HC 650(3)** Course ID:012445 2023-05-30**Health Policy Dynamics**

Through the application of public policymaking process and organization theory, this course examines topics associated with health policymaking process and external competitiveness of modern health care organizations. Course topics include policy formulation, agenda-setting, policy implementation, policy modification, organizational design & structure, organizational environment, strategic planning, and managerial ethics. The course covers theoretical, conceptual, and practical foundations of the macro aspects of health policymaking process and healthcare management.

**Components:** Lecture**Attributes:** Offered Winter and Summer**Requirement Group:** Prerequisites: HC600**Req. Designation:** Technology

**Business - CRC Business - Subject: Health Management****HC 651(3)****Course ID:012427****2022-10-12****Health Systems Management**

[Cross-listed with OS 608, OS 603] [Formerly HCM 501] This course examines the various aspects of managing in the modern health care environment. A variety of methods including lectures, case studies, in-class exercises, and student presentations will be used. Topics covered include quality improvement, ethical management, managing diversity, communications, leadership, motivation, team building, and conflict resolution.

**Components:** Lecture**Course Equivalents:** OS 608, OS 603**Attributes:** Offered Fall and Winter**Req. Designation:** Technology

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**Business - CRC Healthcare Management - Subject: Health Management**

**HC 656(3)** Course ID:012446 2022-10-13

**Group Practice Administration**

The objective of this course is to introduce students to the organization and management of private group practice through seminar and practical experience. It is intended that this course will prepare students for employment in private group practices and/or other ambulatory care organizations.

**Components:** Lecture

**Attributes:** Offered Winter and Summer

**Req. Designation:** Technology

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**HC 657(3)** Course ID:012429 2017-10-02

**Healthcare Leadership Proseminar**

[Formerly HCM 507] This Proseminar will provide students with an introduction to the role of management and leadership in healthcare. It includes a preliminary overview of the U.S. health system and changes occurring in the healthcare environment, as well as an introduction to ethical reasoning and ethics as they apply to the healthcare industry. Students will also learn communications concepts and skills required of leaders. The course will involve an intensive three-day on-campus residency, in which students will receive classroom lectures, participate in exercises, hear guest speakers from healthcare organizations, and complete projects as assigned. After completing the 3-day on-campus residency, students will continue the course independently and online, completing an assignment by the end of the Fall term. The Proseminar is designed to provide students with a framework with which they can interpret material to be covered in successive courses. In addition, they will have a unique opportunity to meet and network with healthcare leaders, faculty members,

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**HC 674(3)** Course ID:012158 2017-10-02

**Legal Aspects of Healthcare**

[Formerly HCM 674] This course is designed to familiarize students with basic legal issues involved in managing healthcare systems. Antitrust, consent, labor law, malpractice, professional rights and other problems are explored using actual and hypothetical case studies.

**Components:** Lecture

**Attributes:** Offered Spring and Summer

**Req. Designation:** Technology

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**HC 680(3)** Course ID:012448 2023-05-30

**Managerial Epidemiology**

[Formerly HCM 680] This 10-week course focuses on applying basic epidemiological methodologies in healthcare management. Epidemiological problems are formulated and described in terms of person, place, and time. Health care planning relies on needs assessments to allocate resources to epidemiological and population health issues. A variety of study designs are used to generate data to analyze causes or patterns of disease frequency. Epidemiological methods employed in infectious disease and disaster are examined. Data collection systems specific to public health applications are reviewed. The ethical principles applied in public and population health settings are covered.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**HC 681(3)** Course ID:012449 2022-10-13

**Strategic Issues for Healthcare Organizations (Health Capstone)**

[Cross-listed with OS 681] [Formerly HCM 681] This course is designed to integrate the concepts and skills associated with managerial problem-solving learned throughout the MBA in Healthcare Management program. Students analyze case studies addressing the strategic realignment of health service organizations in today's healthcare environment. A variety of expert practitioners present their views on this topic. This course begins with a 3-day in-person session that takes place during the first week of the Spring Quarter, beginning Friday at 8:00 am and ending Sunday at 12:00 pm. The remaining coursework is completed working independently in student teams on consulting projects for healthcare organizations under the supervision of faculty mentors.

**Components:** Lecture

**Course Equivalents:** SB 609, SB 610, OS 681, OS 681

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**Business - CRC Business - Subject: Health Management**

HC 683(0)

**MBA Internship**

[Formerly HCM 683] An Internship for the MBA or Healthcare MBA program. Provides practical, hands-on experience that focuses on an area directly related to the student's field of study.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology

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**Business - CRC Healthcare Management - Subject: Health Management**

HC 999(0 - 10)

Course ID:012921

2009-01-01

**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Transfer Credit Only**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: History**

HIST 1(2 - 4) Course ID:008511 2015-01-19

**History Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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HIST 2(2 - 4) Course ID:008512 2015-01-19

**History Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Humanities or Social Science Foundation Curriculum Requirement, depending on the specific designator.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: History**

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HIST 100(3) Course ID:011438 2015-01-19

**European History Survey**

Credit for this course is awarded only in the following cases: 1) receipt of a 4 or 5 on the AP European History Exam, 2) receipt of a score of 5 through 7 on the International Baccalaureate European History Higher-Level Examination, or 3) satisfactory completion of a college-level European History survey course.

**Components:** Independent Study

**Attributes:** Cultures and Societies, Individual and Group Behavior, University Course, Transfer

Credit Only

**Req. Designation:** Technology

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HIST 101(3) Course ID:011439 2015-01-19

**World History Survey**

Credit for this course is awarded only in the following cases: 1) receipt of a 4 or 5 on the AP World History Exam, 2) receipt of a score of 5 through 7 on the International Baccalaureate History Higher-Level Examination, or 3) satisfactory completion of a college-level World History survey course.

**Components:** Independent Study

**Attributes:** Cultures and Societies, Individual and Group Behavior, University Course, Transfer

Credit Only

**Req. Designation:** Technology

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HIST 102(3) Course ID:011440 2015-01-19

**History of the Americas Survey**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 5 through 7 on the International Baccalaureate History of the Americas Higher-Level Examination or 2) satisfactory completion of a college-level History of the Americas survey course.

**Components:** Independent Study

**Attributes:** Cultures and Societies, Individual and Group Behavior, University Course, Transfer

Credit Only

**Req. Designation:** Technology

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HIST 103(3) Course ID:011441 2015-01-19

**Islamic History Survey**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 5 through 7 on the International Baccalaureate Islamic History Higher-Level Examination or 2) satisfactory completion of a college-level Islamic History survey course.

**Components:** Independent Study

**Attributes:** Cultures and Societies, Individual and Group Behavior, University Course, Transfer

Credit Only

**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: History**

HIST 210(3) Course ID:010880 2022-02-11

**The Ancient World**

This course traces the birth and development of civilization in the ancient world from the 3rd millennium BC in Mesopotamia to the height of the Roman Empire in the 3rd century AD. Students will study the cultural values, economic organization and political systems of Mesopotamia, Egypt, Greece and Rome. Students will also consider the processes of social, cultural and geopolitical change in the ancient world and critically evaluate primary sources from each area in terms of their original function, and what types of information we can glean from them.

**Components:** Lecture

**Attributes:** Cultures and Societies, Given When Needed

**Req. Designation:** Technology

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HIST 220(3) Course ID:008519 2015-01-23

**America: 1776 - 1877**

[Formerly LC250] This course will survey developments in American history from the American Revolution to post-Civil War Reconstruction. Topics for special consideration will include: the American Revolution and its aftermath, the economic and political 'revolutions' of the first half of the 19th century, immigration and the opening of the West to settlement, the critical decade of the 1850's, and the Civil War and its aftermath. The focus of the course will be on the larger political and economic trends of this transformative period, but some attention will be paid to the social and intellectual developments as well. The course will alternate between lecture and discussion. A comprehensive text may be used but discussion will center on interpretive texts and primary documents. This is an entry-level course for people who want to prepare for more advanced work in American history at the upper division level.

**Components:** Lecture

**Attributes:** Cultures and Societies, Individual and Group Behavior, University Course, Given When Needed

**Req. Designation:** Technology

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HIST 221(3) Course ID:008520 2022-02-11

**America: 1877 - Present**

[Formerly LC251] A social, political, cultural and economic survey of the United States from Reconstruction through the present.

**Components:** Lecture

**Attributes:** Cultures and Societies, Individual and Group Behavior, University Course, Offered Even Falls

**Req. Designation:** Technology

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HIST 230(3) Course ID:010739 2019-03-04

**Science and Society**

This course will acquaint students with the multifaceted ways in which science and society interface in the modern world. It will discuss important developments in the history of modern science (17th century-present). But examining the conceptual development of scientific theories is only part of the story. The course will also explore the broader institutional, cultural and political contexts of the theories in question. It will analyze how science influenced the societies which nurtured it as well as how societal values impact the nature and practice of science. Relationships between religion and science, science and political authority as well as the social and ethical responsibility of the scientist will be explored. Students will understand science, not as a collection of disembodied ideas about the natural world, but as a historically and socially situated activity best understood in relation to the historical contexts in which it occurs.

**Components:** Lecture

**Attributes:** One communication unit, Science, Technology and Society

**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: History****HIST 235(3)** Course ID:013176

2022-11-09

**Flight in History**

This is a course about flight. Flying has fascinated everyday people for literally thousands of years, but only in the past three centuries or so have humans successfully enrolled technologies to help them accomplish it. This course will address the ways that technologies of flight, such as hot air balloons, blimps, powered aircraft, space shuttles, and satellites, have affected and been affected by the goals of cultures and societies across time and space. It will use these flying machines and the cultures surrounding them to address two sets of questions. First, how do changes in flight technologies and flight cultures reflect the priorities of the societies in which they are embedded? From the use of hot air balloons for aerial surveying during the French Revolution to aircraft as a tool of settler colonialism in Russia, Brazil, and Canada to the religious endowment of commercial airliners in late twentieth-century Indonesia to the "billionaire space race" of the twenty-first century, the way societies and cultures across space and time have embraced (or

**Components:** Lecture**Attributes:** Cultures and Societies, Science, Technology and Society, University Course, Given When Needed**Req. Designation:** Technology**HIST 240(3)** Course ID:010804

2015-01-23

**War and Society**

[Formerly LP398] War is as old as society, and from earliest times, changes in warfare have reflected changes in society. Through primary source material (eyewitness accounts and descriptions) and selected historical writings, we will study the battle experience of soldiers and civilians, and the shifting relationship between the military and society. The course will concentrate on four stages of military/ cultural experience: 'the army of heroes' in which the warrior fights for personal honor; 'the professional army' in which training comes to the fore; 'the gentleman's war', in which the professional soldier follows a strict code of moral behavior; and 'the modern war', in which technology changes conventional warfare with dire consequences to the military and society.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology**HIST 241(3)** Course ID:008594

2020-02-19

**War Stories I**

[Formerly LF392] [Cross-listed with LIT241] The oldest and most enduring stories describe war and its consequences. Reading these stories helps us see how different societies valued leadership, honor, loyalty, courage, and death on the battlefield. Not all war literature, however, glorifies heroic warriors and their exploits. Some war stories, even in the distant past, question martial codes imposed on men. Others examine what is worth dying or killing for, and still others lament the inevitable wastage and brutality of war, of the costs to individuals, civilizations, and the environment. Most of them are ambivalent. Text will range from the ancient world to the Renaissance and from Asia to Europe.

**Components:** Lecture**Course Equivalents:** LIT 241**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Given When Needed**Req. Designation:** Technology**HIST 245(3)** Course ID:012977

2019-10-21

**Introduction to Environmental History**

In this class, students will be introduced to the major problems, current trends, and ""classic"" issues in the study of North American environmental history. Topics may include: climate changes and society, environments and technologies, parks and conservation, the history of environmental racism, gender and the environment, indigenous environmental knowledge, animals, pests, and animal control, water studies, and the history of Arctic environments. By the end of the course, students will have a basic understanding of what environmental history is and how it is conducted, and will be encouraged to think like historians in their everyday lives.

**Components:** Lecture**Attributes:** Cultures and Societies, Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: History****HIST 251(3)** Course ID:013181 2022-11-09**Sport, Health and Citizenship**

This history course is about the relationship of sport and health to citizenship in the English-speaking world from the 1850s to now. Since the 1800s, sport and health have defined cultural ideas about citizenship. People understood sport as a civilizing activity, one instilling good values and teaching important life lessons for citizens. Health, likewise, was a requirement of good citizenship. Being a healthy citizen meant pursuing a physically fit and morally upstanding life. This course explores these issues and asks questions such as: Why is suffering for sport noble and virtuous individually and collectively? How did medicine racialize athletic bodies and did that do cultural harm? How did medicine navigate the irony that often it healed bodies to put them back into harms way? Why did athleticism become dominated by a desire for everyone to achieve their best rather than enjoy the most? Has historically the emphasis on sport and athleticism resulted in a healthier society? Or has it made athleticism and sport appear unachievable for the many and

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Offered Spring Term**Req. Designation:** Technology**HIST 253(3)** Course ID:012985 2019-10-21**Greek Mythology**

[Cross-listed with LIT253] This course will explore the beginnings of Greek culture through its myths, recorded primarily in Homer, Hesiod, the Greek dramatists of the 5th century BCE, and by later writers of the classical period, such as Apollonius of Rhodes, the Roman poet Ovid, and mythographers such as Apollodorus. As important as this rich textual record is the physical evidence of ancient Greek society. Since the late nineteenth century, archaeological excavations of sites associated with the ancient myths have steadily increased our understanding of their meaning and significance, as well as their relationship to ancient Greek religion and ritual. Finally, visual representations of the figures from myth and legend, found in vase paintings and sculptures, are essential to our full comprehension of the role of myth in the lived lives of Greeks.

**Components:** Lecture**Course Equivalents:** LIT 253**Attributes:** Two communication units, Cultures and Societies, Imaginative Arts, University Course, Given When Needed**Req. Designation:** Technology**HIST 255(3)** Course ID:011485 2022-02-11**Introduction to Global History**

Introduction to Global History is a course that looks at global patterns through time, and attempts to see history as an integrated whole. Topics are studied in a general chronological order, but each is examined through a thematic lens, showing how people and societies experience exchanges, integration and differences. The course consists of lectures that allow exploration of these issues at either introductory levels or at a more advanced level.

**Components:** Lecture**Attributes:** Cultures and Societies, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology**HIST 260(3)** Course ID:012883 2018-09-17**The Soviet Union at War**

The Soviet Union engaged in war throughout its 74-year history. This course will address the experience of World War One as a contributing factor to the Russian Revolution, the Russian Civil War (1918-1921), the Russo-Polish War (1919-21), intervention in the Spanish Civil War (1936-9), the Winter War (1939-40), the Great Patriotic War (1941-45), the Cold War including proxy wars and Soviet interventions during the period, the Soviet-Afghan War (1979-89) and the Gulf War (1990-91). Aspects to be considered include the conduct of and experience of war, development of Soviet defense capabilities, the diplomacy of war and peacemaking, the impact of war on Soviet society, and the international reactions to the Soviet Union.

**Components:** Lecture**Attributes:** Cultures and Societies, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: History****HIST 270(3)** Course ID:011756 2022-02-11**Introduction to Society, Culture & Biology**

This course welcomes students into the interdisciplinary world of the human and biological sciences. In this class we will encounter the myriad ways in which the human and biological sciences were constituted, defined, and intertwined in the nineteenth and twentieth century. Students will learn to place ideas and controversies within a broad historical and cultural context. They will gain experience evaluating and interpreting historical texts. They will evaluate scientific theories, controversies, and ethical failures.

**Components:** Lecture  
**Attributes:** Cultures and Societies, Science, Technology and Society, University Course, Given When Needed  
**Req. Designation:** Technology

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**HIST 280(3)** Course ID:012084 2022-02-11**The Renaissance**

This course surveys the age of European Renaissance from the late fourteenth century to the age of Galileo, including the cultural exchange between Europe and the Near East. Studying the process of rapid religious and geopolitical change provides the historical context for analyzing the works of the master painters, sculptors, and architects of the Renaissance.

**Components:** Lecture  
**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Given When Needed  
**Req. Designation:** Technology

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**HIST 290(3)** Course ID:013163 2022-03-21**Intro. to Africana Studies**

This introduction to Africana Studies offers critical inquiry into the discipline of Pan-African (African and African American) Studies. It considers the historical and intellectual life of Africans and members of the African Diaspora from an "Afrocentric" perspective. Africana Studies offers an interrogation of: social and political systems, resistance and anti-colonial movements, and paradigms for cultural reclamation, transformation, and liberation. Students will be introduced to Africology and to Kawaida methodology.

**Components:** Lecture  
**Attributes:** One Design Credit, Contemporary and Global Issues, Cultures and Societies, University Course, Offered Every Other Term  
**Req. Designation:** Technology

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**HIST 310(3)** Course ID:013138 2022-02-11**Indigenous People's History of New York State**

A historical look into the Indigenous People's history within and with what is today called New York State. This course will focus on the specific interactions between Indigenous and non-indigenous peoples and their reflective influences on the history of the State, Federal and International Levels. Providing additional views on the Indigenous historical narrative as it relates to the more common New York State history.

**Components:** Lecture  
**Attributes:** One communication unit, Contemporary and Global Issues, Cultures and Societies, University Course, Offered Even Springs  
**Req. Designation:** Technology

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**HIST 321(3)** Course ID:012027 2020-02-26**History of Public Health in America**

This course surveys the history of public health in the United States from the colonial period to the late twentieth century, with the aim of providing students with an understanding of how history may inform twenty-first century challenges regarding the health of populations. We will explore public health responses to diseases such as smallpox, tuberculosis, typhoid, syphilis, and HIV/AIDS and examine the ways in which those responses actually framed the conceptions of disease. Some of the questions we will address include: Who is responsible for the public's health? To what extent has the responsibility for the public's health changed over time? What rights should individuals have if they endanger the health of others? How have class, race, ethnicity, gender, and sexuality shaped public responses to and understandings of disease?

**Components:** Lecture  
**Attributes:** One communication unit, Cultures and Societies, Science, Technology and Society, University Course, Given When Needed  
**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: History****HIST 322(3)** Course ID:012976

2019-10-21

**Indigenous North America Post-Contact**

This course studies the history of North America—what some Indigenous peoples call “Turtle Island”—from contact to present. This course will introduce students to the historical processes that shaped Indigenous and settler history in North America. Throughout this course, students will analyse Indigenous history through a variety of historical lenses, including those of ethnohistory, environmental history, political history, and legal history.

This course will cover a variety of themes including the nature of contact between Indigenous peoples and settlers, treaties, land claims, and education.

The course explores a variety of sources for studying and engages with Indigenous-centered perspectives that challenge conventional histories of colonialism, focusing on human migrations, economic expansions, and cultural developments.

**Components:** Lecture**Attributes:** Cultures and Societies, Given When Needed**Req. Designation:** Technology**HIST 327(3)** Course ID:008527

2022-02-11

**History of Women and Gender in America**

This course focuses on the historical experiences of American women from the seventeenth-century era of colonization to the modern era (with an emphasis on the nineteenth and twentieth centuries), and it explores the role gender plays in shaping and defining American history. A separate investigation of women's experiences provides an understanding of 1) the distinct contributions of women to the American heritage, and 2) the ways in which gender intersects with race, ethnicity, class, sexuality, region, and religion in explaining social, cultural, and political developments in the United States.

**Components:** Lecture**Course Equivalents:** HIST 527**Attributes:** One communication unit, Cultures and Societies, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology

**Liberal Arts - Humanities & Social Sciences - Subject: History****HIST 328(3)****Course ID:011383****2022-02-11****History of Gender and Sexuality in the Transatlantic World**

This is a historical look at the constructions of gender and sexuality throughout the Transatlantic world. Chronologically, it will focus on the period of 1492-1999. Topics to be covered include the constructions of genders in Europe, the Americas and Africa. The course will progress chronologically, however it will cover certain topics in depth and other topics as part of a broad overview. Students will come to understand how cultures and societies shape and are shaped by gender constructions. In addition, students will come to appreciate the historical individual's negotiation of gender within a social grouping.

**Components:** Lecture**Attributes:** Cultures and Societies, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: History****HIST 329(3)** Course ID:010454

2022-02-11

**History of the American Family**

What is a family? How have social, political, and economic forces shaped American families? How has the family changed throughout history? Did the end of the twentieth century see the demise of the American family, as some social critics have claimed? Focusing on the United States, this course will examine the history of marriage, divorce, childrearing, sexuality, families of different races, ethnicities, religions, classes, and regions, and the portrayal of the family in the media, as well as controversial issues concerning the American family today.

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Cultures and Societies, University Course, Offered Odd Springs**Req. Designation:** Technology**HIST 331(3)** Course ID:010453

2022-02-11

**Ancient Medicine and Magic**

[Formerly LC331] In a seemingly hostile world controlled by unseen forces, ancient man fought to gain the upperhand in a daily struggle against illness and death. Using magic and medicine (both thought to be equally valid) he sought to understand his body and maintain his health. Primary written sources and information gleaned from skeletal and mummified human remains allow us to trace the development of medicine from its earliest appearance in Mesopotamia and Egypt to its more advanced form in Greece and Rome. Topics will include: disease, wounds, cures, surgery, the interplay between the supernatural and the mundane, physiology, life expectancy, nutrition, gynecology, and hygiene.

**Components:** Lecture**Attributes:** Science, Technology and Society, Offered Odd Falls**Req. Designation:** Technology**HIST 332(4)** Course ID:011594

2022-02-11

**Documenting Social Activism**

The course explores social movements in Untied States after World War II and allows students to describe and interpret the complex nature of cultures and societies in historical context. The movements will focus on issues of racial civil rights, workers' rights, the women's movement, the gay rights movement, the American Indian Movement and the Students' Movements. Ranging from 1945 until the present day the course illustrates the process of social, cultural, and geopolitical change over time. This is a team taught course in which students will be required to create a documentary film. Therefore students will split their time between history lectures, seminar style discussion and documentary film production. The course has 3 hours of class and 3 hours of lab per week, and students should expect to do extensive out-of-class work. Limit of 20 students. Permission of one of the instructors required.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Given When Needed**Req. Designation:** Technology**HIST 333(3)** Course ID:010808

2016-09-12

**Science, Technology, and Society in the Renaissance**

[Formerly LC395] Guns and printing were among the many revolutionary technological developments in Renaissance Europe. With the increased scale of war, feudal structures gradually dissolved and nationalism began to emerge. At the same time, religious reformation, with its theses disseminated through the printed page, helped shift the balance of power among states and individuals. Meanwhile, banking, commerce, and colonization, fueled by advances in navigation, promoted the beginning of capitalism. The theories of Copernicus, Kepler, and Galileo irreversibly changed ideas about man's place in the universe. Beginning with mathematical perspective and ending with the new scientific method, this courses will chart the extraordinary technological and scientific advances and profound economic and social changes that together mark the birth of the modern world.

**Components:** Lecture**Attributes:** Cultures and Societies, Science, Technology and Society, University Course, Given When Needed**Req. Designation:** Technology**HIST 335(3)** Course ID:011511

2022-02-11

**History of Medicine in Europe and North America**

History of medicine is important even to those who think of themselves primarily as scientists or historians of science. Much of what we might initially see as biology, chemistry or physics was done within medicine, and even today a great deal of science either goes on in hospitals and the associated laboratories, or is at least nominally directed towards medical ends.

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Science, Technology and Society, University Course, Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: History**

**HIST 337(3)** Course ID:012036 2015-03-05

**Medicine in Europe and America**

From a distance, the study of medical history might appear little more than an idle pursuit - perhaps only a study of great men and their discoveries. However, even slight reflection on the social, institutional, and cultural features of medicine will lead us to reconsider much about medicine that we might before have taken for granted. Enrollment is limited to students participating in the Trudeau Semester.

**Components:** Lecture

**Attributes:** One communication unit, Cultures and Societies, Science, Technology and Society, University Course, Given When Needed

**Requirement Group:** Enrollment is limited to students participating in the Trudeau Semester.

**Req. Designation:** Technology

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**HIST 338(3)** Course ID:011954 2022-02-11

**Women, Gender and Science in American History**

Why have science, medicine, and technology traditionally been the domains of men? What are the consequences of that? What has motivated women to become scientists, health care practitioners, and engineers? Has their growing participation changed the cultures of science, medicine, and technology? Focusing on the United States, this course examines (1) how preconceived notions about women, men, gender, and sexuality have shaped scientific ideas, and (2) the history of women as actual participants in science, medicine, and technology. We will use a historical perspective to shed light on current discussions about the gender dimensions of science.

**Components:** Lecture

**Attributes:** One communication unit, Cultures and Societies, Science, Technology and Society, University Course, Offered Even Springs

**Req. Designation:** Technology

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**HIST 339(3)** Course ID:013029 2020-02-18

**Engineering and the Environment in the Ancient World**

Since earliest times humans have attempted to improve their lives by controlling their environments, often with unintended consequences. This course explores the impact of engineering on the environment in ancient Mesopotamia, Egypt, Greece and Rome. Students will consider such topics as irrigation and agricultural practices, exploitation of natural resource, water supply and management, fortifications, communication pathways (roads and shipping), sewage systems, and mining. We will also learn about the effects of climate change on human populations and productivity.

**Components:** Lecture

**Attributes:** One communication unit, Cultures and Societies, Science, Technology and Society, University Course, Offered Even Falls

**Req. Designation:** Technology

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**HIST 340(3)** Course ID:011219 2022-02-11

**Warfare in Ancient Greece**

Study the major conflicts and conquests from the late Bronze Age to the founding of the Roman Empire. Topics include: weaponry and technological advances; reconstructions and battle-plans of specific engagements; combatants, non-combatants, and leaders; motivations, causes, and consequences; empire-building.

**Components:** Lecture

**Attributes:** Cultures and Societies, Offered Odd Springs

**Req. Designation:** Technology

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**HIST 341(3)** Course ID:011000 2022-02-11

**War in Ancient Rome**

The Romans developed the most successful military organization of the ancient world, but it took a great deal of painful experience, political maneuvering, and reform to move from volunteer citizen-soldiers to the highly trained professional legionaries of the Empire. This course traces the history of the Roman military from the inception of the Republic to the height of the Empire. Using primary and secondary sources, we will study the major wars of the Republic and early Empire: the Punic Wars, Caesar's Gallic Wars, the Civil Wars, and the wars of Imperial expansion. Specific topics will include weapons and armor, tactics, strategy, fortifications, artillery, leadership, and the campaign experience of legionaries. We will also consider the social, political, and economic consequences of warfare, and the impact of the Roman army on non-Roman cultures.

**Components:** Lecture

**Attributes:** One communication unit, Cultures and Societies, Individual and Group Behavior, University Course, Offered Even Springs

**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: History**

HIST 343(3) Course ID:010806 2015-01-23

**War in the Middle Ages**

[Formerly LC392] One popular image from the Middle Ages is the brightly armored knight, charging into battle on his steed and performing brave deeds of arms. While war was a defining force in the medieval era, the picture is somewhat more complex. This course will consider European warfare from the Carolingian period to the dawn of the Renaissance, including the origins of feudalism, the Crusades, and the Hundred Years War. Using primary and secondary sources, we will look at developments in arms, armor, training, strategy, tactics, logistics, and battlefield experience. Our problem will be to determine the relationship between warfare and the economic, social, religious, and political culture of medieval Europe.

**Components:** Lecture

**Attributes:** Cultures and Societies, Given When Needed

**Req. Designation:** Technology

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HIST 347(3) Course ID:008530 2020-09-21

**World War I**

This course offers an in-depth examination of the World War I of 1914-18, its causes, campaigns, and consequences. Taking into account long-term and short-term factors, the war is considered as the first truly 'modern' war with new technologies playing a role in a conflict of truly catastrophic scale. While many of the histories of World War I focus on Western Europe, this course will consider the war in global context, provide an insight into how great power politics was changed by it, an examination of strategy and campaigns, and a consideration of scientific and technological development. Students will engage with both primary and secondary sources relating to the war including government documents, diaries, letters, artistic and literary depictions, film, as well as considering how the war has been and can be represented in various ways.

**Components:** Lecture

**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Given When Needed

**Req. Designation:** Technology

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HIST 348(3) Course ID:011218 2022-02-11

**World War II**

World War II was one of the pivotal events of the twentieth century, and its legacies remain important to this day. The course will address the origins, outbreak, course, impact, and resolutions of the war. Taking a global perspective, the course goes beyond simply a study of battles and addresses all aspects of the war, from great civilian and military leaders to the common soldiers, along with social, cultural, and economic changes on the various home fronts. Students will engage with a range of primary and secondary material relating to World War II, including texts, film, novels, and material artifacts.

**Components:** Lecture

**Attributes:** One communication unit, Cultures and Societies, Individual and Group Behavior, University Course, Given When Needed

**Req. Designation:** Technology

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HIST 349(3) Course ID:008529 2016-09-08

**The Cold War Era: War and Society in the Era of the American-Soviet Rivalry, 1945-1991**

This course is intended to provide a general history of the Cold War, 1945-1991. We will discuss not only the evolution of the Soviet-American rivalry, but also the many smaller wars which emerged out of this larger conflict. Special attention will be paid throughout to the social, political, and cultural aspects of the Cold War. We will consider how the conflict was driven by social and political currents within the contending parties, and how the war shaped and transformed the societies that were a part of it.

**Components:** Lecture

**Attributes:** One communication unit, Cultures and Societies, Individual and Group Behavior, University Course, Offered Spring Term

**Req. Designation:** Technology

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HIST 362(3) Course ID:013139 2022-02-11

**Public History**

This course provides students with knowledge of best practices in the presentation of public history while providing students with the skills and aptitudes for the preservation of African American, Indigenous American, and Ethnic Group History. Public history students learn basic archival theory and methodology and how documents and artifacts are preserved. The course teaches students to analyze, interpret, and evaluate historical evidence, to apply historical perspectives to contemporary issues, and include diverse cultural values. Students explore issues of ethics and politics, interpretation and access. The course provides students with an introduction to fields of inquiry which support preservation and historic interpretation including: museum studies, special collections, historic preservation, oral history and historic archeology. Students of public history gain historical and specialized knowledge and skills through site work and participation in interactive events with the goal that they will be able to convey historical understanding

**Components:** Lecture

**Attributes:** One communication unit, Contemporary and Global Issues, Offered Even Springs

**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: History**

HIST 363(3) Course ID:013140 2021-11-10

**Africana Biography**

This course examines the lives of African Americans in various modes of work and being. Students will study the life of an African American scientist, journalist, concert singer-humanist, and civil rights leader among others. Each of the biographies selected represent individuals who command respect within their political, scientific, spiritual, or artistic realm. This course allows for exploration of nuances in the Ethos of the people of the African Diaspora. Students will have the opportunity to understand the challenges of being an Africana/ African American Intellectual in the Americas.

**Components:** Lecture

**Attributes:** One communication unit, Contemporary and Global Issues, Imaginative Arts, University Course, Given When Needed

**Req. Designation:** Technology

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HIST 365(3) Course ID:012984 2019-10-21

**Technology and the Modern State**

In this course, students will explore how technologies of various types have been used in service of, or against, the modern state in the 19th-21st centuries. Topics may include: mega-projects and national identity, military technology, narratives of "invention" and "firsts," gender, race, and technology, technological modernity, technological discourses, and bodily experiences of everyday technology. At the end of the semester, students will create a public-facing project using primary and secondary historical sources.

**Components:** Lecture

**Attributes:** Cultures and Societies, Science, Technology and Society, University Course, Given When Needed

**Req. Designation:** Technology

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HIST 370(3) Course ID:013090 2022-02-11

**Extreme Science: Marginal Environments in the History of Science**

In this class, students will learn about the history of how science has been practiced in "extreme" environments at the limits of the geographic and environmental imagination since the seventeenth century. Topics may include: the microscopic world and the development of scientific instruments; empire, colonialism, and the sciences of oceanic and terrestrial exploration; geopolitics and international scientific cooperation; the "space race" and the "races" for the North and South Poles; and "extreme environments" in culture, art, and literature. By the end of the course, students will have a basic understanding of the connections between science, the environment, and the larger socio-cultural imagination, and will be encouraged to think like historians in their everyday lives.

**Components:** Lecture

**Attributes:** Cultures and Societies, Science, Technology and Society, University Course, Given When Needed

**Req. Designation:** Technology

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HIST 394(3) Course ID:010878 2016-10-04

**Special Topic: History of Social Activism after WWII**

The course explores social movements in United States after World War II. The movements will focus on issues of race and ethnicity, poverty, civil rights, civil liberties and gender discrimination. The social movements explored will cover the main organizations and key individuals. Special attention will be paid to the religious liberal tradition and grass roots activism.

**Components:** Lecture

**Attributes:** Liberal Arts-Soc Foundation Curriculum Course, Cultures and Societies, Given When Needed

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HIST 420(3) Course ID:013194 2023-04-03

**Wargaming**

This course provides a basic introduction to the field of wargaming, emphasizing its use in military strategy, defense policy, and the understanding of the history of warfare. The course will examine the fundamental principles of wargaming and game design. Students will be exposed to a range of design philosophies, varying in purpose, style, and format. The course centers on student teams researching, designing, developing, and play-testing an original educational wargame on a topic related to historical war. Course instruction will be a combination of lecture, gameplay, and discussion - drawing upon both professional and commercial wargames.

Overall, the course will address a wide range of questions in order to provide students with a deeper understanding of wargaming and its uses. Among the questions it examines are: What makes a good or bad

**Components:** Lecture

**Attributes:** Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: History**

**HIST 459(3)** Course ID:011214 2022-02-11

**Neuroscience and Society**

[Cross-listed with PY 459] The word 'neuroscience' is of recent origin. Yet we can trace neuroscientific ideas back to Rene Descartes. Since Descartes, social understanding of madness, the relationship between mind and brain, and the nature of sensation and perception has changed frequently. Beginning in the Age of Mechanical Man and ending in the Age of Prozac, our course focuses mainly on ways contemporary society has influenced neuroscientific thought and, in turn, the ways neuroscience has influenced society.

**Components:** Lecture

**Course Equivalents:** PY 459

**Attributes:** One communication unit, Science, Technology and Society, Given When Needed

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**HIST 490(1 - 10)** Course ID:008550 2015-02-03 Department Consent Required

**Independent Study**

Designed primarily for an advanced student who wishes to pursue special interests in history for one or more semesters, this series allows students to design and conduct independent study projects under faculty guidance.

Prerequisite: consent of the instructor.

**Components:** Independent Study

**Attributes:** Offered Each Term

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**HIST 498(1 - 3)** Course ID:008557 2015-01-23

**Undergraduate TA**

A student assists a faculty member in teaching a course. The student engages in substantial pedagogical work beyond mastery of the course material. Such activities may include mentoring students in course work, leading class discussions, designing and presenting course modules, etc. The primary objective is for the students to work with a faculty member to learn and practice pedagogical approaches in the discipline.

**Components:** Independent Study

**Attributes:** Given When Needed

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**HIST 499(0)** Course ID:008558 2015-02-09

**Minor Portfolio**

In this course, students complete their Liberal Arts Minor Portfolios under the direction of their minor advisor. The course is graded on a Pass-No Credit Basis.

**Components:** Independent Study

**Attributes:** Offered Each Term

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**HIST 527(3)** Course ID:012953 2019-09-02

**History of Women and Gender in America**

This course will cover the same subject area and topics as HIST 327. Additional materials at the graduate level will be expected of those who register under this catalog number.

**Components:** Lecture

**Course Equivalents:** HIST 327

**Attributes:** Cultures and Societies, Individual and Group Behavior, Given When Needed

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**Other - Honors Program - Subject: Honors Program**

**HP 100(3)** Course ID:008386 2023-05-31

**Interdisciplinary Approaches to Big Ideas**

Because learning happens in a variety of ways, and we employ diverse tools when we solve problems, it is crucial for us to acquire skills and gain knowledge beyond our chosen majors. In this first-semester writing course, Honors students approach a big idea or significant issue through a variety of disciplinary perspectives and practices. The course is designed to strengthen students™ writing and critical thinking skills and build Honors™ students interdisciplinary vocabulary. The instructor will introduce students to at least two different disciplinary approaches to a chosen topic or theme. All courses will require students to write two papers exploring the same issue from different disciplinary practices and then complete a final paper, presentation, or project that integrates these perspectives. This seminar-style writing-intensive course will emphasize small group and whole class discussion, critical thinking, writing, and analysis, extensive written and oral communication, and collaborative work.

**Components:** Discussion, Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisite: Open to Honors Program Students only.

**HP 101(3)** Course ID:008387 2022-05-19

**Introduction to Professional and Research Ethics**

This course aims to introduce Honors Program students to various ways of thinking about the ethical issues and moral dilemmas that they will encounter in their future careers, and to organize their thinking about what they should value and what principles they should act upon in order to act ethically. The first section of the course will focus on foundational issues in philosophical ethics, and the second section will focus on applications of these ethical theories to real-world professional and research settings.

**Components:** Discussion, Lecture

**Attributes:** One communication unit, Individual and Group Behavior, Science, Technology and Society, University Course, Offered Spring Term

**Requirement Group:** Prerequisite: Open to Honors Program Students only.

**HP 102(1)** Course ID:011194 2015-02-19

**Introduction to Programming I**

This lab section will teach the computer competencies necessary for work at Clarkson and eventual research at the University.

**Components:** Laboratory

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisite: Open to Honors Program Students only.

**HP 103(1)** Course ID:011210 2014-11-20

**Introduction to Programming II**

[Cross-listed with ES 100] This lab section will teach the computer competencies necessary for work at Clarkson and eventual research at the University.

**Components:** Laboratory

**Course Equivalents:** ES 100

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisite: Open to Honors Program Students only.

**HP 200(3)** Course ID:008389 2022-06-10

**Introduction to Community Engagement**

This course will employ methodologies from multiple fields and from diverse perspectives to help students develop an understanding of the social impacts of engagement through community-based service partnerships.

**Components:** Seminar

**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Offered Fall Term

**Requirement Group:** Prerequisite: Open to Honors Program Students only.

**HP 201(3)** Course ID:008390 2022-06-10

**A Matter of Perspective: Reframing, Retelling, and Revision**

In this course, we'll first explore how narratives represent points of view. We will situate the narratives we've received within their particular social and historical contexts. Then, we'll examine the ways in which writers, directors, historians, or political scientists reconfigure, revise, and reimagine narratives in order to shift dominant ways of knowing.

**Components:** Seminar

**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Offered Spring Term

**Requirement Group:** Prerequisite: Open to Honors Program Students only.

Other - Honors Program - Subject: Honors Program**HP 280(1 - 10)** Course ID:008396 2015-02-09**Honors Independent Study**

Designed for Honors Program sophomores who wish to pursue special interests that are consistent with the goals of the Honors Program. This series allows students to design and conduct independent study projects under faculty guidance.

Prerequisites: Consent of the Honors Director is required.

Components: Independent Study

Attributes: Offered Each Term

**HP 300(3)** Course ID:008397 2023-02-20**Philosophy and Epistemology of Science and Technology**

This course acquaints Honors Program students with the philosophy of science and epistemology. On the theoretical side, students will investigate how scientific knowledge is created, whether there is a method that is particular to science, whether objectivity is possible, and what the limitations of science might be. On the practical side, students will be introduced to various forms of thinking and reasoning that aid in science, and will explore the responsible conduct of the scientist in navigating research practices such as mentoring, authorship, peer review, and collaboration.

Components: Seminar

Attributes: One communication unit, Science, Technology and Society, Offered Fall Term

**HP 390(3)** Course ID:008401 2023-03-03**Honors Capstone Proposal Seminar**

The main goal of this course is to guide honors program students through the capstone project proposal process leading to an approved capstone project proposal. Students will be exposed to the expected components of a capstone project through workshops on the elements of a capstone project proposal introduction, literature review, methodology/approach, expected results, and logistics sections. After each workshop, students draft these individual sections and garner feedback from the course instructor. After revising each section, students then will integrate individual sections into a full draft of their proposal which will be reviewed for feedback by their capstone project advisors, peer-reviewed by their classmates, and reviewed by the course instructor. This will result in a final draft of their capstone project proposal which will be sent out for independent evaluation, a required component, for feedback, with the ultimate goal of having an approved capstone project proposal. Other activities in the course include workshops on formal and informal

Components: Research

Attributes: Offered Each Term

**HP 391(1 - 0)** Course ID:009667 2022-08-01**Honors Undergraduate Thesis**

Components: Research

Attributes: Offered Each Term

**HP 400(3)** Course ID:008402 2022-06-10**Solving for System Failures**

This course explores failures in order to demonstrate analytical and practical skills in systems thinking. The first unit will explore how we define failure. The second unit will explore what we can learn from examining major system failures. Students will use transdisciplinary case studies to investigate how and why notable contemporary or historical failures occurred. The final unit will use a design approach and employ our own disciplinary and transdisciplinary expertise to propose possible solutions.

Components: Lecture

Attributes: One communication unit, Individual and Group Behavior, Offered Spring Term

Requirement Group: Prerequisite: Open to Honors Program Students only.

**Other - Honors Program - Subject: Honors Program****HP 490(3)** Course ID:008405 2023-03-03**Honors Capstone Report Seminar**

This course will guide honors program students through the first draft of their capstone project final report; in most cases, this first draft will be revised and approved as a capstone project final report in the following spring semester. However, students graduating a semester early may finalize their document during the course. In this course, students will be exposed to the overall organization of an expected capstone project final report through a variety of workshops and will use their capstone project proposal to update their introduction, literature review, and methodology/approaches sections. Students then will write up the additional expected sections of results/outcomes and implications and conclusion or equivalent sections depending on the type of project they are pursuing. This first draft of their capstone project report is based on capstone project progress at that time of the course and will garner input from the student's capstone project advisor, peers, and course instructor. Other activities in the course may include

**Components:** Research**Attributes:** Offered Each Term**HP 491(1 - 0)** Course ID:009668 2017-01-13**Honors Undergraduate Thesis****Components:** Research

**School of Arts and Sciences - Lewis School - Subject: Health Sciences**

**HS 1(1 - 4)** Course ID:011631 2022-03-18

**Health Science Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

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**HS 200(2)** Course ID:012089 2022-03-18 **Instructor Consent Required**

**Health Coaches I: Introduction to Community Healthcare**

In a new collaboration with Canton-Potsdam Hospital, HS 200 is the first in a 2-semester sequence that trains students to become Health Coaches in the Potsdam community. Students will attend a weekly 2-hour seminar class in which they learn about key issues in current healthcare policy, management, and delivery. Each week, different healthcare practitioners will discuss a variety of topics, including healthcare delivery challenges in the community, ethical concerns regarding insurance, and heart disease. The end of the course focuses on patient care and skill building. The course will culminate in a group presentation of a case study. By the conclusion of this course, students will be equipped to begin health coaching with continued guidance.

Application required. Contact the instructor for more information.

**Components:** Lecture

**Attributes:** Offered Fall Term

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**HS 210(2)** Course ID:012768 2022-03-18 **Instructor Consent Required**

**Health Coaches II: Community Healthcare Practicum**

HS210 is the second in a 2-semester sequence that trains students to become Community Health Coaches in the Potsdam area. This course is offered in collaboration with the Canton Potsdam Hospital, part of the St. Lawrence Health System. During this practicum, each student will be assigned a patient to work with and will visit the patient in their home and maintain phone contact. The Health Coach will help the patient manage their health and navigate the healthcare system. The Health Coach will also meet regularly with a Canton-Potsdam Hospital healthcare team to discuss their coaching approach and gain knowledge on how to best manage the particular situation of their patient. All HS210 students must have access to personal transportation.

**Components:** Practicum

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: HS200 and approval of instructor(s). Requirement: Access to transportation

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**HS 220(1)** Course ID:012905 2022-03-18

**Medicine & Healthcare Profession Seminar**

Organized by the Career Center with assistance of the Pre-Health Advising Coordinator and in consultation with the Clarkson Health Professions Committee Chair, this course meets semi-weekly, and uses the seminar format to bring in human health professionals from a diversity of fields to discuss their professions, including what their professions encompass, the academic and experiential track they followed to become medical professionals, their perspective on the future directions of their fields, and opportunities for Clarkson students to pursue these fields. It will also bring representatives of different professional schools to discuss admission, expenses, and career opportunities.

**Components:** Seminar

**Attributes:** Offered Spring Term

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**HS 405(1)** Course ID:012904 2022-03-18

**Experiential Learning in Medicine & Healthcare**

This is an independent study course under the mentorship of a member of the Health Professions committee. The student is required to complete at least 50 hours of work in a health profession setting. The work must include some form of interaction with health professionals and with patients or analogous health-service recipients. Examples include healthcare internships or volunteer positions at a hospital or clinic, completions of HS 210 Health Coaches II, serving as an EMT or emergency first-responder, serving as an athletic trainer. Conducting research with medical applications that does not involve working with patients/health-service recipients will not meet the requirements for this course. Upon completing the experience, the student will prepare a short (around 3 page) self-reflective essay on what the student did and learned during the experience, and how the experience has affected the student's professional goals and preparation.

**Components:** Independent Study

**Attributes:** Offered Fall and Spring

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Humanities & Social Sciences**

HSS 120(1) Course ID:010998 2020-06-05

**Introducing the Liberal Arts**

This course welcomes new Liberal Arts majors to Clarkson with a combination of activities designed to orient them to the disciplines represented in the department (Literature, Philosophy, Film, History, Political Science, Anthropology, Sociology and American Studies), with a particular emphasis on their differing perspectives and ways of thinking critically and solving problems. Students will gain hands-on experience in research methods, and the course will also explore the wide variety of career options open to those who graduate with a Liberal Arts degree. Finally, students will have the opportunity to get to know Clarkson, the North Country, the Liberal Arts faculty and each other better during the course of the semester.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: Freshman or Sophomore standing in a Humanities and Social Science major

HSS 210(3) Course ID:012990 2019-10-29

**Professional and Technical Writing**

HSS 210 is an introduction to technical and professional writing. This course provides students with practical information about communicating in different kinds of workplace environments and professional/technical discourse communities. Throughout the semester students will produce and analyze common technical writing genres, including emails, letters, resumes, memos, reports, proposals, technical descriptions, technical definitions, technical manuals, and proposals. Students will work toward understanding how to analyze and react to rhetorical situations each genre and writing situation presents, including issues of audience, organization, visual design, style, and the material production of documents.

**Components:** Lecture

**Attributes:** Two communication units, Given When Needed

HSS 220(3) Course ID:013041 2020-04-28

**Writing Across the Disciplines**

The overall goal of this online course is to enable students to be successful writers and scholars in the academy and to help students produce genres of writing used in their professions. Students will learn how to research and analyze in their chosen academic disciplines and how to use writing as a tool for discovery, thinking, and problem-solving. They will identify the conventions of their discourse communities and use these conventions in their own writing. While we will address the differences and similarities between writing in varying academic disciplines, most of the work in this course will be devoted to the study of students' own disciplinary groups and chosen fields. Where possible, students will work in smaller disciplinary cohorts to foster collaborative research and writing skills. Through flexible and rigorous research, students will be able to locate and define various genres of writing in their disciplines and gain the skills to become confident and competent writers.

**Components:** Lecture

**Attributes:** Two communication units, Given When Needed

HSS 310(1 - 6) Course ID:012828 2017-08-15 Instructor Consent Required

**Undergraduate Research**

This is an opportunity to work one-on-one with a faculty member on an area of shared interest. It provides a chance to be involved in cutting-edge original research, practice research methods central to the relevant discipline, and become part of the research community in that field. The student will undertake research directed by the faculty member and related to the faculty member's research agenda, and will document the research through a formal research paper. Undergraduate research may lead to a presentation at Clarkson's RAPS conference, other academic conferences, and/or joint publication.

Requirement: Permission of the instructor

**Components:** Research

**Attributes:** Given When Needed

**Liberal Arts - Humanities & Social Sciences - Subject: Humanities & Social Sciences****HSS 410(2 - 12) Course ID:011353 2015-02-09 Department Consent Required****Humanities/Social Science Internship**

Students gain experience in applying humanities and social science concepts and methods to issues, problems, or projects in professional contexts that are external to the Department of Humanities and Social Sciences. Internships typically occur during the fall or spring semester, but summer employment and co-op positions also can provide students with an internship experience depending on the type of work done. Students will work closely with a Faculty Supervisor to develop the academic component of the internship, which may take the form of outside readings, journal-writing as well as a major paper, project or exhibit related to or stemming from the work being done in the internship itself.

**Components:** Independent Study**Attributes:** Offered Each Term**Requirement Group:** Prerequisite: Consent of the Internship Director in the Department of Humanities and Social Sciences.

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Humanities & Social Sciences****HSS 480(3)****Course ID:010961****2015-03-03****Instructor Consent Required****Major Research Seminar**

This senior seminar is the capstone course for all students majoring in Humanities and Social Sciences. Taught every semester by a different member of the HSS faculty, the seminar focuses on broad-based interdisciplinary themes, including, for example, war and peace, poverty and social justice, cross-cultural issues, and the environment. Students will engage in readings and class discussions in preparation for writing their senior research papers. Significant portions of the seminar will be devoted to producing these research papers.

**Components:** Seminar**Attributes:** Two communication units, Offered Each Term**Requirement Group:** Prerequisites: Must be in History, Humanities, Interdisciplinary Social Sciences, Political Science or

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**HSS 498(1 - 2)****Course ID:013177****2022-08-10****Undergraduate TA**

Assisting a faculty member in an interdisciplinary HSS course as an undergraduate teaching assistant.

**Components:** Independent Study**Attributes:** Given When Needed

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**Institute for STEM Education - CRC Education Program - Subject: History**

**HST 575(3)** Course ID:012907 2022-04-08

**Interdisciplinary Connections of History and Multicultural Literature**

Framed around universal concepts of humanity (change, diversity, intolerance, ethics, creativity, freedom, and legacy), this course is designed to illustrate the interdisciplinary connections between secondary social studies and English language arts. Recognition that these key concepts span time and place, and are applicable to every period in history, will help to develop a broad understanding of the human experience, and the unity of humanity, through the study of history and multicultural literature. In addition to the historic and literature specific content of the course, other goals include development of empathy and a respect for diversity, as well as learning how to guide discussions that value different points of view.

**Components:** Seminar

**Course Equivalents:** EGL 575

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**HST 580(3)** Course ID:012477 2021-10-08

**MAT Project in History (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**HST 587(3)** Course ID:012881 2022-07-01

**Reel History**

Reel History is an examination of themes and concepts related to the study of history. A range of historical topics across the New York state 7th-12th grade social studies curriculum will be examined. Students will view and research films to analyze and evaluate the historical accuracy portrayed in film. Emphasis will be placed on determining the degree to which film can be used as a source for understanding history. Student research, presentations, and the development of curricular materials related to the use of film as a documentary evidence will be the basis of course assessments.

**Components:** Seminar

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**HST 988(3)** Course ID:012496 2017-07-01

**Independent Study in History**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**HST 989(3)** Course ID:012497 2017-07-01

**Independent Study in History**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Humanities**

HUM 1(2 - 4) Course ID:010950 2015-01-19

**Humanities Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

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HUM 490(1 - 10) Course ID:011225 2015-02-09 Department Consent Required

**Independent Study**

Designed primarily for an advanced student who wishes to pursue special interests in Humanities for one or more semesters, this series allows students to design and conduct independent study projects under faculty guidance.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Offered Each Term

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**Graduate Interdisciplinary - Data Science - Subject: Interdisciplinary Analytics**


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**IA 501(2)** Course ID:012103 2018-01-16

**Calculus**

This course serves as a prerequisite course for MS Data Analytics students who do not have calculus background. Functions and graphs; derivative concept and formulas, including chain rule and implicit differentiation; integral concept; the Fundamental Theorem of Calculus; properties and applications of the derivative, including max-min problems and graph sketching; exponential, logarithmic, and inverse trigonometric functions.

**Components:** Lecture

**Attributes:** Given When Needed

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**IA 502(2)** Course ID:012104 2023-05-24

**Probability and Statistics**

Prerequisite course for MS Data Analytics students who do not have calculus-based statistics and probability background. A calculus based introduction to topics in probability and statistics. Probability content includes events and sample spaces, the basic axioms of probability, discrete and continuous random variables (definitions and basic characterizations such as the means and variances) including binomial, Poisson, normal, exponential, student-t, and uniform distributions. Topics in statistics include the central limit theorem, statistical inference including confidence intervals and hypothesis testing for one and two sample data, and linear regression. Students will use statistical software to read data and interpret software generated output.

**Components:** Lecture

**Same As Offering:** IA 502

**Attributes:** Given When Needed

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**IA 502(2)** Course ID:012104 2023-05-24

**Probability and Statistics**

Prerequisite course for MS Data Analytics students who do not have calculus-based statistics and probability background. A calculus based introduction to topics in probability and statistics. Probability content includes events and sample spaces, the basic axioms of probability, discrete and continuous random variables (definitions and basic characterizations such as the means and variances) including binomial, Poisson, normal, exponential, student-t, and uniform distributions. Topics in statistics include the central limit theorem, statistical inference including confidence intervals and hypothesis testing for one and two sample data, and linear regression. Students will use statistical software to read data and interpret software generated output.

**Components:** Lecture

**Same As Offering:** IA 502

**Attributes:** Given When Needed

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**IA 503(2)** Course ID:012105 2022-01-11

**Introduction to Programming**

Prerequisite course for MS Data Analytics students who do not have programming background. This course introduces students to programming fundamentals and standard components, features and practices. Main programming concepts are introduced in an applied context. Practical emphasis is on sound programming practices and development methods.

**Components:** Lecture

**Same As Offering:** IA 503

**Attributes:** Given When Needed

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**IA 503(2)** Course ID:012105 2022-01-11

**Introduction to Programming**

Prerequisite course for MS Data Analytics students who do not have programming background. This course introduces students to programming fundamentals and standard components, features and practices. Main programming concepts are introduced in an applied context. Practical emphasis is on sound programming practices and development methods.

**Components:** Lecture

**Same As Offering:** IA 503

**Attributes:** Given When Needed

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**IA 507(1)** Course ID:012773 2017-01-24

**Spreadsheet Analytics**

The main purpose of this course is to enable students to acquire understanding and applicable knowledge of conducting exploratory analysis across different disciplinary fields using modern spreadsheet based tools and techniques. This course focuses on critical skills and tools for using the spreadsheet software packages for the purpose of conducting a variety of analytics tasks and operations to improve gathering, generation and presentation of organizational intelligence.

**Components:** Lecture

**Attributes:** Offered Spring Term

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**Graduate Interdisciplinary - Data Science - Subject: Interdisciplinary Analytics**

IA 510(3) Course ID:011987

2022-01-21

**Database Modeling, Design & Implementation**

This course is focused on key concepts of database modeling, design, and management, utilizing a variety of relational database management systems. Students will acquire understanding of proper data modeling approaches, grounded in underlying rationale for creating well-designed and efficient data repositories. They will be introduced to the variety of modeling and implementation approaches, and will gain understanding of unique advantages leading to the prevalence of the relational database model in today's systems. Students will learn to properly utilize basic methods and techniques for conceptually envisioning as well as designing databases which include Entity-Relationship (ER) modeling, relational modeling, normalization, and Structured Query Language (SQL).

**Components:** Lecture**Same As Offering:** IA 510**Attributes:** Offered Winter Term

IA 510(3) Course ID:011987

2022-01-21

**Database Modeling, Design & Implementation**

This course is focused on key concepts of database modeling, design, and management, utilizing a variety of relational database management systems. Students will acquire understanding of proper data modeling approaches, grounded in underlying rationale for creating well-designed and efficient data repositories. They will be introduced to the variety of modeling and implementation approaches, and will gain understanding of unique advantages leading to the prevalence of the relational database model in today's systems. Students will learn to properly utilize basic methods and techniques for conceptually envisioning as well as designing databases which include Entity-Relationship (ER) modeling, relational modeling, normalization, and Structured Query Language (SQL).

**Components:** Lecture**Same As Offering:** IA 510**Attributes:** Offered Winter Term

IA 520(3) Course ID:011989

2017-01-24

**Optimization Methods for Analytics**

Optimization is a structured approach to determining the best values for a set of decision possibilities given constraints and an objective expressed as a function of these decision variables. This course focuses on the design, development, and analysis of optimization models while using canned software to solve them. The students will solve a wide variety of optimization problems applicable to a wide variety of industries: manufacturing, distribution, health care, finance, marketing, etc. Students will develop optimization models using Microsoft Excel.

Prerequisites: An undergraduate course in probability and statistics, and an undergraduate course in introductory computer science or programming.

**Components:** Lecture**Attributes:** Offered Fall Term

IA 530(3) Course ID:011990

2019-11-05

**Probability & Statistics for Analytics**

Probability theory is presented as a mathematical foundation for statistical inference. Axiomatic probability is introduced; standard discrete and continuous probability distributions are presented. Joint distributions and transformations are discussed. Probabilistic convergence concepts are introduced. The key objectives of this course are to formulate statistical models and find optimal solutions for statistical problems in economics, business, engineering, and science, have a global overview of the interplay between probability and statistics as well as master the art of writing statistical proofs well, consistent with the written tradition of the discipline, and have the skills to communicate statistical ideas effectively.

**Components:** Lecture**Same As Offering:** IA 530**Attributes:** Offered Winter Term

IA 530(3) Course ID:011990

2019-11-05

**Probability & Statistics for Analytics**

Probability theory is presented as a mathematical foundation for statistical inference. Axiomatic probability is introduced; standard discrete and continuous probability distributions are presented. Joint distributions and transformations are discussed. Probabilistic convergence concepts are introduced. The key objectives of this course are to formulate statistical models and find optimal solutions for statistical problems in economics, business, engineering, and science, have a global overview of the interplay between probability and statistics as well as master the art of writing statistical proofs well, consistent with the written tradition of the discipline, and have the skills to communicate statistical ideas effectively.

**Components:** Lecture**Same As Offering:** IA 530**Attributes:** Offered Winter Term

**Graduate Interdisciplinary - Data Science - Subject: Interdisciplinary Analytics****IA 605(3)** Course ID:011991

2022-11-15

**Data Warehousing**

This course examines how data warehouses are used to successfully gather, structure, analyze, understand, and act on information. The components and design issues related to data warehouses and business intelligence techniques for extracting meaningful information from data warehouses are emphasized. The emphasis is on proper modeling techniques as well as the techniques for Extraction, Transformation and Loading (ETL) process. Various software tools will be used to demonstrate design, implementation, and utilization of data warehouses.

**Components:** Lecture**Same As Offering:** IA 605**Attributes:** Offered Fall Term**IA 605(3)** Course ID:011991

2022-11-15

**Data Warehousing**

This course examines how data warehouses are used to successfully gather, structure, analyze, understand, and act on information. The components and design issues related to data warehouses and business intelligence techniques for extracting meaningful information from data warehouses are emphasized. The emphasis is on proper modeling techniques as well as the techniques for Extraction, Transformation and Loading (ETL) process. Various software tools will be used to demonstrate design, implementation, and utilization of data warehouses.

**Components:** Lecture**Same As Offering:** IA 605**Attributes:** Offered Fall Term**IA 626(3)** Course ID:012107

2022-08-08

**Big Data Processing and Cloud Services**

This course will enable students to gain understanding of critical components and the processes of Big Data architecture. The course will take a hands on approach, enabling students to develop critical skills by creating data processing pipelines and procedures to transform and integrate structured, semi-structured and unstructured data . The course will provide students with understanding of web service based systems architecture and best practices for deployment of scalable applications for data analytics.

This class will also teach students practical fundamentals of Cloud Computing and how it relates to Big Data. The class will cover both Apache Hadoop implementation as well as usage of leading industry solutions such as Elastic MapReduce. Throughout the class students will be taught how to recognize opportunities in big data analytics and how to match those opportunities with the most appropriate big data software.

Students will learn the various data formats and be taught when to utilize each one. The course will take an

**Components:** Lecture**Same As Offering:** IA 626**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: IA 503, or IS 237, or CS 141, or equivalent**IA 626(3)** Course ID:012107

2022-08-08

**Big Data Processing and Cloud Services**

This course will enable students to gain understanding of critical components and the processes of Big Data architecture. The course will take a hands on approach, enabling students to develop critical skills by creating data processing pipelines and procedures to transform and integrate structured, semi-structured and unstructured data . The course will provide students with understanding of web service based systems architecture and best practices for deployment of scalable applications for data analytics.

This class will also teach students practical fundamentals of Cloud Computing and how it relates to Big Data. The class will cover both Apache Hadoop implementation as well as usage of leading industry solutions such as Elastic MapReduce. Throughout the class students will be taught how to recognize opportunities in big data analytics and how to match those opportunities with the most appropriate big data software.

Students will learn the various data formats and be taught when to utilize each one. The course will take an

**Components:** Lecture**Same As Offering:** IA 626**Attributes:** Offered Fall Term

**Graduate Interdisciplinary - Data Science - Subject: Interdisciplinary Analytics**

IA 628(3) Course ID:012130 2017-01-24

**Introduction to Big Data Architecture and Applications**

The objective for this course is to provide an in-depth discussion of the big data architecture and its applications. The following topics will be covered: big data architecture from a data pipeline perspective; distributed file systems; massively scalable processing of big data, using the map and reduce model; access to big data via SQL-like interface; running search engines over big data; scripting over big data; and real-time access to big data. The course will be taught using the Hadoop ecosystem as a reference platform. The course will use a projects-driven approach where students will have ample opportunities to practice essential skills needed by a big data analyst, from cluster planning, through the development of data analytics, to the designing and building of big data applications.

**Components:** Lecture**Attributes:** Offered Summer Term**Requirement Group:** Prerequisites: IA 503, IA 510, and IA 626 (or equivalent)

IA 630(3) Course ID:011992 2017-01-24

**Modeling for Insight**

Although mathematical models have a long and compelling history of application in science and engineering, they are becoming increasingly important in the world of business. Some problems are well described by statistical (curve fitting models), but analyzing a business problem generates significant complexities that are often not well described by simply analyzing the historical data. In particular, to be able to answer questions of 'what if...?' often requires an understanding of system behaviors when we specifically to to depart from previous (historical) practices. The critical contribution of these models is that they may allow the analyst to arrive at compelling insights to contribute to development of a reasoned action plan. This class will enable students to develop familiarity and facility in generating insightful models via modeling in realistic situations. Key skills to be developed include recognizing the key problem, developing a model structure for an unstructured problem, and intelligent analysis and interpretation of model results.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: IA 505, IA 510, IA 520, and IA 530 (or equivalents)

IA 640(3) Course ID:011993 2019-08-05

**Information Visualization**

The science of Information Visualization (InfoVis) seeks to understand the best way to achieve synergistic interaction of the human visual perception system and data. Data visualizations focus on two general application areas: (1) Enhancing the ability of the visual system to discover structure in the data leading to new insight and knowledge, and (2) Taking advantage of the visual display to support rapid diffusion of complex information throughout the organization achievable by the visualization applications. This class will study the techniques, systems, software, algorithms, and design principles that allow for maximal information transmission and knowledge discovery when working with complex data sets. Students will learn the key principles involved in information visualization through a project driven course, with students gaining background skills in design and application of innovative visualizations.

**Components:** Lecture**Same As Offering:** IA 640**Attributes:** Offered Spring Term

IA 640(3) Course ID:011993 2019-08-05

**Information Visualization**

The science of Information Visualization (InfoVis) seeks to understand the best way to achieve synergistic interaction of the human visual perception system and data. Data visualizations focus on two general application areas: (1) Enhancing the ability of the visual system to discover structure in the data leading to new insight and knowledge, and (2) Taking advantage of the visual display to support rapid diffusion of complex information throughout the organization achievable by the visualization applications. This class will study the techniques, systems, software, algorithms, and design principles that allow for maximal information transmission and knowledge discovery when working with complex data sets. Students will learn the key principles involved in information visualization through a project driven course, with students gaining background skills in design and application of innovative visualizations.

**Components:** Lecture**Same As Offering:** IA 640**Attributes:** Offered Spring Term

**Graduate Interdisciplinary - Data Science - Subject: Interdisciplinary Analytics****IA 650(3)**  
**Data Mining****Course ID:011988****2017-01-24**

Recent advances in information technology, together with the growth of the Internet have resulted in an explosion of data collected, stored, and disseminated. Because of its massive size, it is difficult for analysts to sift through the data even though it may contain useful information. Data mining holds great promise to address this problem by providing efficient techniques to uncover useful information hidden in large data repositories. Awareness of the importance of data mining is becoming widespread. Industry is creating more job opportunities for people who have interdisciplinary data analytic skills. The key objectives of this course are to teach the fundamental concepts of data mining and provide extensive hands-on experience in applying the concepts to real-world applications.

Students will have opportunities to learn both domain and technical knowledge to face the big data challenges

**Components:** Lecture**Attributes:** Offered Summer Term**Requirement Group:** Prerequisite: IA 530 or equivalent**IA 651(3)****Course ID:012851****2020-04-23****Applied Machine Learning**

The objective of this course is to provide in-depth coverage of major supervised machine learning algorithms from an applied perspective, using a case studies approach. The following topics will be covered: machine learning paradigms; process and measurement of supervised learning; support vector machines; neural networks; other selected machine learning algorithms; feature engineering; case studies selected from different domains, such as text and natural language processing, electrical engineering, business, and vision and image processing. The course will be taught using an industry accepted language, such as Python or R, and associated machine learning packages. The course will use a projects-driven approach where students will have ample opportunities to practice essential skills needed by a machine learning practitioner, from the preparation and planning of data for training and testing, through feature selection, to the deployment of machine learning based applications.

**Components:** Lecture**Same As Offering:** IA 651**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: IA 530**IA 651(3)****Course ID:012851****2020-04-23****Applied Machine Learning**

The objective of this course is to provide in-depth coverage of major supervised machine learning algorithms from an applied perspective, using a case studies approach. The following topics will be covered: machine learning paradigms; process and measurement of supervised learning; support vector machines; neural networks; other selected machine learning algorithms; feature engineering; case studies selected from different domains, such as text and natural language processing, electrical engineering, business, and vision and image processing. The course will be taught using an industry accepted language, such as Python or R, and associated machine learning packages. The course will use a projects-driven approach where students will have ample opportunities to practice essential skills needed by a machine learning practitioner, from the preparation and planning of data for training and testing, through feature selection, to the deployment of machine learning based applications.

**Components:** Lecture**Same As Offering:** IA 651**Attributes:** Offered Spring Term**IA 690(6)****Course ID:011995****2017-01-24****Instructor Consent Required****Analytics Capstone Project**

This course is based on a semester-long sponsored project that utilizes a variety of expertise areas, methods, and skills in data analytics. Students participating in this course will be divided into inter-disciplinary teams charged with planning, designing, and implementing an analytics solution for the organization that sponsors the project. In addition to the continuous interaction with the sponsoring organization representatives, students will be required to report and consult with the faculty project supervisor on a regular basis. Depending on the nature of the capstone and its sponsorship, projects could be on-site fieldwork intensive. Final deliverables include written reports and oral presentations.

**Components:** Independent Study**Attributes:** Offered Summer Term

**School of Arts and Sciences - Communication, Media & Design - Subject: Ignite**

IGN 120(1) Course ID:013078

2021-10-15

**Making and Communicating Innovation**

[Cross Listed with COMM120] This course will provide a high level overview of prototyping digital and physical innovations and will provide instruction on communicating innovations. Making topics covered include but are not limited to 3D modeling/printing, audio and video principles/recording/editing, basic video shooting/editing. Communication topics include but are not limited to context, audience, and purpose analysis, genres in business and technical communication, pitching, writing style, and writing and revision processes. This is a hybrid course that will include in person and virtual sessions

**Components:** Lecture**Course Equivalents:** COMM 120**Attributes:** Given When Needed

**Business - School of Business - Subject: Information Systems**

**IS 1(2 - 4)** Course ID:008422 2015-06-30

**Information Systems Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

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**IS 2(2 - 4)** Course ID:008423 2015-06-30

**Information System Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

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**IS 110(3)** Course ID:008425 2022-02-10

**Introduction to Business Intelligence and Data Analytics**

This course is an introduction to the underlying technology components of modern information systems used in businesses. It is important for organizations to utilize technology to collect data and use modern analysis tools and techniques to transform that data into tactical and strategic information. Emphasis is on introducing students to the main building blocks of information systems in organizations, and how such systems can be used to support individual and organizational decision making. Students will gain hands on experience in using data gathering and analysis tools such as Microsoft Excel and Enterprise Resource Planning software. Offered Fall and Spring semesters.

**Components:** Lecture

**Attributes:** Offered Fall and Spring

**Requirement Group:** Prerequisite: Freshman or Sophomore standing.

**Req. Designation:** Technology

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**IS 200(1)** Course ID:008424 2015-06-30

**ERP Fundamentals**

The course serves as an introduction to enterprise resource planning (ERP) concepts and navigation using SAS R/3 software. This course is a co-requisite for non-CUSB or iE&M students taking MK320, OM331, or OS352 who have not taken IS211.

**Components:** Lecture

**Attributes:** Offered Each Term

**Requirement Group:** Restriction: Students may not receive credit for IS200 as well as IS211.

**Req. Designation:** Technology

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**IS 237(3)** Course ID:011760 2016-04-06

**Introduction to Application Development**

This course will enable students to gain the knowledge and necessary skills required to develop standard software applications. Students will learn object oriented application development and programming principles and how they are applied through all the stages of software development, from requirements to testing and deployment. Students will learn programming syntax and best programming practices including documenting, testing, and error correction. Offered Spring semesters.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**IS 301(3)** Course ID:008427 2022-02-10

**Applied Data Analytics**

[Cross listed with EM301] Proper utilization of modern analytical tools is a critical component of effective and timely creation and use of organizational intelligence in a variety of fields of human endeavor: management, social science, health care, engineering etc. This course focuses on critical skills for using software tools such as Excel, SQL, and Tableau (or their equivalents) for the purpose of conducting a variety of analytics tasks and operations to improve gathering, generation and presentation of organizational intelligence. Focus is on proper data gathering and preparation, followed by the use of key analysis grouping and summation tools as well as data presentation and visualization.

**Components:** Lecture

**Course Equivalents:** EM 301

**Attributes:** Offered Fall and Spring

**Requirement Group:** Prerequisite: IS110. Students may not receive credit for IS200 as well as IS211.

**Req. Designation:** Technology

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**Business - School of Business - Subject: Information Systems**


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IS 314(3) Course ID:008438 2015-06-30

**Database Design & Management**

[Cross-listed with EM 314] This course provides the student with in-depth knowledge of database analysis, design, and implementation principles. Students who successfully complete this course will be able to use the entity-relationship data model to represent business data requirements, to translate that model into a relational schema, to normalize this schema and to build and use a relational database that implements the schema, using the Standard Query Language (SQL).

**Components:** Lecture

**Course Equivalents:** EM 314

**Req. Designation:** Technology

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IS 400(3) Course ID:008436 2023-07-11

**Applied Machine Learning**

This course is focused on providing students with the skills to apply machine learning algorithms and techniques to solve real-world problems. Topics include data preparation, feature engineering, model selection and fitting, evaluation metrics, and optimization. Students will learn how to use popular machine-learning tools and libraries like Python, sci-kit-learn, and TensorFlow to apply machine-learning techniques to real-world datasets.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: IS237 or CS141 or EE261

**Req. Designation:** Technology

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IS 415(3) Course ID:008439 2016-11-08

**Data Warehousing for Analytics**

[Cross-listed with EM 415] This course covers the fundamental concepts, design, management and application of data warehouses and business/enterprise intelligence systems. Specific topics covered include the logical design of a data warehouse, the data staging area and extraction-transformation-loading process, the design, implementation and utilization of multi-dimensional data analysis systems, as well as key business/enterprise intelligence concepts, processes and techniques including knowledge discovery and exploratory analysis.

Offered Fall semesters.

**Components:** Lecture

**Course Equivalents:** EM 415

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: IS314 or CS460/EE468

**Req. Designation:** Technology

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IS 426(3) Course ID:011274 2019-10-22

**Big Data Architecture**

This course will enable students to gain understanding of critical components and the processes of big data architecture. The course will take a hands-on approach, enabling students to develop skills for creating data processing pipelines and procedures to transform and integrate structured, semi-structured and unstructured data. The course will provide students with an understanding of web service based systems architecture and best practices for deployment of scalable applications for data analytics. Offered Fall semesters.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: IS211, & IS314, & IS237, CS141 or EE261, or IS110

**Req. Designation:** Technology

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IS 428(3) Course ID:008441 2016-11-08

**Information Systems for Supply Chain Management**

This course will be focused on information systems that enable supply chain integration. Redesign of core intra and inter-enterprise business processes will be discussed in detail. Students will be introduced to and will get hands-on experience with latest technologies such as Extended Enterprise Systems. The trend of outsourcing of business and supply chain processes to distant geographical locations and its impact on business practices and strategies will be discussed in detail. Course material will be comprises of book chapters, cases, labs, and project work to apply concepts learned in the course, and to include hands-on experience with business process driven enterprise software (e.g. SAP Advanced Planner & Optimizer).

**Components:** Lecture

**Attributes:** Offered Fall and Spring

**Requirement Group:** Prerequisite: OM331.

**Req. Designation:** Technology

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**Business - School of Business - Subject: Information Systems****IS 437(3) Course ID:008442 2017-07-06****Data Analytics Project: Planning, Development, and Data Analysis**

This course highlights the development of business intelligence applications which use remote data and web services for the purpose of presentation to organizational decision makers. As an experiential course, students will be required to engage in all stages of planning, analyzing and building a complete connected software application stack for data analytics. Students will use the stack to analyze a real-life data set, delivering insight and recommendations based on the analysis. Offered Spring semesters.

Prerequisites: IS314 and, IS237 or CS141 or EE261

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: IS314 and, IS237 or CS141 or EE261

**Req. Designation:** Technology

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**IS 487(1 - 3) Course ID:008445 2017-01-13****Special Project in Information Systems**

An investigation of a problem or in-depth topic undertaken by the student under the guidance of a faculty member. Permission of the instructor required.

**Components:** Research

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Business - CRC Business - Subject: Information Systems****IS 501(0)** Course ID:012515 2017-06-21**Mathematics of Management**

[Formerly MBA 1] This course focuses on mathematics useful in modeling management processes. Fundamental concepts of differential and integral calculus and their applications to management are addressed.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**IS 502(0)** Course ID:012516 2017-06-21**Introduction to Probability**

[Formerly MBA 2] This course covers marginal, joint and conditional probability; random variables, expected value and variance; selected probability distributions and their uses in management; and sampling distributions and the Central Limit Theorem.

**Components:** Lecture**Req. Designation:** Technology

**Business - School of Business - Subject: Information Systems****IS 605(2) Course ID:008454 2015-06-30****Information Systems (MBA Module)**

[Cross-listed with IS 606] In this course the role of information systems and information technology in managing modern information age enterprises is explored. The focus of the course is on (a) establishing the basic knowledge of information systems (b) strategic significance of information systems to various businesses and industries (c) role of information systems as a strategic weapon to compete in the global marketplace and (d) role of information systems in transforming modern business organizations. Advanced topics of enterprise resources planning and emergent visions and practices such as electronic commerce, web-based information systems, and corporate intranets and extranets are reviewed in a framework of strategic information planning. Real life cases of information systems are analyzed and discussed to reinforce the understanding of concepts introduced in the course.

Prerequisites: completion of all CUSB MBA foundation requirements admission to the MBA program.

**Components:** Lecture

**Course Equivalents:** IS 606, IS 606, HC 648

**Req. Designation:** Technology

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**Business - CRC Business - Subject: Information Systems****IS 606(3)****Course ID:008455****2021-06-01****Business Information Systems**

[Cross-listed with IS 605, HC 648] This course explores the role of information technology and systems (IT/IS) in today's organizations. The focus of this course is on the fundamentals of information systems and investigating the strategic importance of information systems to various businesses and industries as well as the role of information systems in transforming modern business organizations. Topics will include: Planning an IT application portfolio, system implementation, IT driven process redesign, IT governance and IT/IS as a source of competitive advantage. We will examine specific information technologies and applications such as: enterprise systems, cloud computing, social media, and business intelligence. The structure of the course will include readings, group work / discussions and case studies highlighting the IT/IS related issues faced by organizations.

**Components:** Lecture**Same As Offering:** IS 606**Course Equivalents:** IS 605, HC 648**Attributes:** Offered Winter Term**Req. Designation:** Technology**IS 606(3)****Course ID:008455****2021-06-01****Business Information Systems**

[Cross-listed with IS 605, HC 648] This course explores the role of information technology and systems (IT/IS) in today's organizations. The focus of this course is on the fundamentals of information systems and investigating the strategic importance of information systems to various businesses and industries as well as the role of information systems in transforming modern business organizations. Topics will include: Planning an IT application portfolio, system implementation, IT driven process redesign, IT governance and IT/IS as a source of competitive advantage. We will examine specific information technologies and applications such as: enterprise systems, cloud computing, social media, and business intelligence. The structure of the course will include readings, group work / discussions and case studies highlighting the IT/IS related issues faced by organizations.

**Components:** Lecture**Same As Offering:** IS 606**Course Equivalents:** IS 605, HC 648**Attributes:** Offered Winter Term**Req. Designation:** Technology**IS 642(3)****Course ID:013079****2021-04-21****Applications in Business Analytics**

This course provides an introduction to Big Data and Analytics and examines a set of systems and applications, which specifically are supporting the Big Data World. Students will learn the basic concepts behind data retrieval and analytics, explore and discuss the development of these systems. Data analytics applications will be applied to current business problems, to illustrate how organizations can gain a competitive advantage with the implementation and usage of such applications. Students will gain the conceptual knowledge for business analytics concepts as well as practical experience with the structural dimension for data analytics. The main focus of this course will be to collect, preprocess, analyze and present structured and unstructured data, using advanced Data Analytics software.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**IS 647(3)****Course ID:012524****2018-09-17****Statistical Methods for Data Analytics**

[Formerly MBA 506] [Cross Listed with HC647] This course covers the analytic process that supports data-driven decision-making in business. Emphasis is placed on problem formulation, data acquisition, selection of appropriate statistical approaches, and effective communication of analytic results. Topics covered include data visualization, data description methods, statistical inference, and model building. Examples are drawn from quality management, finance, operations, supply chain management, marketing and healthcare. Data visualization and analysis will be performed using statistical software.

**Components:** Lecture**Same As Offering:** IS 647**Course Equivalents:** HC 647**Req. Designation:** Technology

**Business - School of Business - Subject: Information Systems****IS 647(3)** Course ID:012524 2018-09-17**Statistical Methods for Data Analytics**

[Formerly MBA 506] [Cross Listed with HC647] This course covers the analytic process that supports data-driven decision-making in business. Emphasis is placed on problem formulation, data acquisition, selection of appropriate statistical approaches, and effective communication of analytic results. Topics covered include data visualization, data description methods, statistical inference, and model building. Examples are drawn from quality management, finance, operations, supply chain management, marketing and healthcare. Data visualization and analysis will be performed using statistical software.

**Components:** Lecture**Same As Offering:** IS 647**Course Equivalents:** HC 647**Req. Designation:** Technology**IS 687(1 - 3)** Course ID:008470 2022-06-13**Independent Project in Information Systems**

Practical application of information systems concepts in an independent research or development project conducted under the guidance of a CUSB faculty member.

**Components:** Independent Study**Same As Offering:** IS 687**Attributes:** Offered Each Term**Req. Designation:** Technology**IS 687(1 - 3)** Course ID:008470 2022-06-13**Independent Project in Information Systems**

Practical application of information systems concepts in an independent research or development project conducted under the guidance of a CUSB faculty member.

**Components:** Independent Study**Same As Offering:** IS 687**Attributes:** Offered Each Term**Req. Designation:** Technology

**School of Arts and Sciences - School of Business - Subject: Information Systems**

IS 999(1 - 10) Course ID:012738

2016-08-29

**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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**Science - Provost - Subject: Information Technology**

IT 2(2 - 4) Course ID:011468 2015-01-19

**Information Technology Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.  
This course may be used to satisfy a Technology Requirement.

**Components:** Independent Study**Attributes:** Transfer Credit Only**Req. Designation:** Technology

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**Graduate Interdisciplinary - Computer Science - Subject: Information Technology****IT 501(3)** Course ID:008481 2018-10-22**Software Systems**

This course is an introduction to software design and implementation. After a review of basic programming concepts, students will be introduced to procedural and data abstraction, object-oriented design, recursion and dynamic data structures. Abstract data types such as lists, stacks, queues, and trees will be studied. Algorithms for searching and sorting will be explored along with methods for comparative analysis. Programming concepts will be demonstrated in a language like C++. The course will also include an introduction to the Unix operating system.

Prerequisite: programming experience.

**Components:** Lecture

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**Graduate Interdisciplinary - - Subject: Information Technology****IT 521(1 - 10)** Course ID:010326 2017-01-12**Information Technology Independent Project**

Independent project under the direction of a Clarkson professor.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology

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**Graduate Interdisciplinary - Computer Science - Subject: Information Technology**

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IT 522(1 - 4) Course ID:010996 2022-07-22

**Information Technology Independent Project**

Independent project under the direction of a Clarkson professor.

Components: Independent Study  
Same As Offering: IT 522  
Attributes: Given When Needed  
Req. Designation: Technology

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IT 522(1 - 4) Course ID:010996 2022-07-22

**Information Technology Independent Project**

Independent project under the direction of a Clarkson professor.

Components: Independent Study  
Same As Offering: IT 522  
Attributes: Given When Needed  
Req. Designation: Technology

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IT 620(1 - 9) Course ID:008484 2021-12-14

**Information Technology Project**

Independent project work in IT under the supervision of a Clarkson professor.

Components: Independent Study  
Attributes: Offered Each Term  
Req. Designation: Technology

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IT 621(1 - 9) Course ID:008485 2021-12-14

**Information Technology Project**

Independent project work in IT under the supervision of a Clarkson professor.

Components: Independent Study  
Attributes: Offered Spring Term  
Req. Designation: Technology

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**School of Arts and Sciences - - Subject: Information Technology**

IT 999(1 - 10) Course ID:011099 2017-01-12

**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Language**

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LANG 1(2 - 4) Course ID:008487 2015-01-19

**Language Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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LANG 2(2 - 4) Course ID:008488 2015-01-19

**Language Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

This course may be used to satisfy a Humanities Foundation Curriculum Requirement.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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LANG 10(2 - 0) Course ID:011912 2015-01-19

**LANG Elective**

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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LANG 12(2 - 0) Course ID:011913 2015-01-19

**LANG Elective**

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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LANG 14(2 - 0) Course ID:011914 2015-01-19

**LANG Elective**

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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LANG 16(2 - 0) Course ID:011915 2015-01-19

**LANG Elective**

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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LANG 18(2 - 0) Course ID:011916 2015-01-19

**LANG Elective**

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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LANG 20(2 - 0) Course ID:011917 2015-01-19

**LANG Elective**

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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LANG 22(2 - 0) Course ID:011918 2015-01-19

**LANG Elective**

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: Language**

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**LANG 100(3)** Course ID:011442 2015-01-19**Introductory French Language**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 5 through 7 on the International Baccalaureate French B Higher-Level Examination or 2) satisfactory completion of a college-level Introductory French course.

**Components:** Independent Study  
**Attributes:** Transfer Credit Only  
**Req. Designation:** Technology

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**LANG 101(3)** Course ID:011443 2015-01-19**Introductory German Language**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 5 through 7 on the International Baccalaureate German B Higher-Level Examination or 2) satisfactory completion of a college-level Introductory German course.

**Components:** Independent Study  
**Attributes:** Transfer Credit Only  
**Req. Designation:** Technology

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**LANG 102(3)** Course ID:011444 2015-01-19**Introductory Italian Language**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 5 through 7 on the International Baccalaureate Italian B Higher-Level Examination or 2) satisfactory completion of a college-level Introductory Italian course.

**Components:** Independent Study  
**Attributes:** Transfer Credit Only  
**Req. Designation:** Technology

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**LANG 103(3)** Course ID:011445 2021-06-01**Introductory Spanish Language**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 5 through 7 on the International Baccalaureate Spanish B Higher-Level Examination or 2) satisfactory completion of a college-level Introductory Spanish course.

**Components:** Independent Study  
**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Language**

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**LANG 104(3)** Course ID:012123 2015-08-23**Introductory English Language**

Credit for this course is awarded only in the following case: Receipt of a score of 5 through 7 on the International Baccalaureate English B Higher-Level Examination.

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology

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**LANG 110(3)** Course ID:011446 2020-07-15**Chinese Language and Culture**

An Introductory Language course that covers both Chinese language and culture. No previous knowledge of Chinese language is required. Not open to native speakers of Chinese.

**Components:** Lecture**Attributes:** Cultures and Societies**Req. Designation:** Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: Language**

LANG 111(3) Course ID:011447 2015-01-19

**Japanese Language and Culture**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 5 or 6 on the AP Japanese Language & Culture Examination or 2) satisfactory completion of a comparable college-level course that covers both Japanese language and culture.

**Components:** Independent Study**Attributes:** Cultures and Societies, Transfer Credit Only**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Language**

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**LANG 112(3)** Course ID:012128 2015-10-27

**Spanish Language and Culture**

An Introductory Language course that covers both Spanish language and culture. No previous knowledge of Spanish language is required. Not open to native speakers of Spanish.

**Components:** Lecture

**Attributes:** Cultures and Societies, Given When Needed

**Req. Designation:** Technology

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**LANG 113(3)** Course ID:013160 2022-03-18

**French Language and Culture**

An Introductory Language course that covers both French language and culture. No previous knowledge of French language is required. Not open to native speakers of French.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: Language**

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**LANG 150(3)** Course ID:011448 2015-01-19**Intermediate French Language**

Credit for this course is awarded only in the following cases: 1) receipt of a 4 or 5 on the AP French Language Exam, 2) receipt of a score of 5 through 7 on the International Baccalaureate French A1 or A2 Higher-Level Examination, or 3) satisfactory completion of a college-level Intermediate French course.

**Components:** Independent Study**Attributes:** Cultures and Societies, Transfer Credit Only**Req. Designation:** Technology

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**LANG 151(3)** Course ID:011449 2015-01-19**Intermediate German Language**

Credit for this course is awarded only in the following cases: 1) receipt of a 4 or 5 on the AP German Language Exam, 2) receipt of a score of 5 through 7 on the International Baccalaureate German A1 or A2 Higher-Level Examination, or 3) satisfactory completion of a college-level Intermediate German course.

**Components:** Independent Study**Attributes:** Cultures and Societies, Transfer Credit Only**Req. Designation:** Technology

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**LANG 152(3)** Course ID:011450 2015-01-19**Intermediate Italian Language**

Credit for this course is awarded only in the following cases: 1) receipt of a 4 or 5 on the AP Italian Language & Culture Exam, 2) receipt of a score of 5 through 7 on the International Baccalaureate Italian A1 or A2 Higher-Level Examination, or 3) satisfactory completion of a college-level Intermediate Italian course.

**Components:** Independent Study**Attributes:** Cultures and Societies, Transfer Credit Only**Req. Designation:** Technology

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**LANG 153(3)** Course ID:011451 2015-01-19**Intermediate Spanish Language**

Credit for this course is awarded only in the following cases: 1) receipt of a 4 or 5 on the AP Spanish Language Exam, 2) receipt of a score of 5 through 7 on the International Baccalaureate Spanish A1 or A2 Higher-Level Examination, or 3) satisfactory completion of a college-level Intermediate Spanish course.

**Components:** Independent Study**Attributes:** Cultures and Societies, Transfer Credit Only**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: Latin Language**

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LAT 580(3) Course ID:012500 2021-10-08

**MAT Project in Latin (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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LAT 988(3) Course ID:012504 2017-07-01

**Independent Study in Latin**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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LAT 989(3) Course ID:012505 2017-07-01

**Independent Study in Latin**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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**Other - Provost - Subject: Library Services****LIB 201(3) Course ID:012988 2019-10-23****Digital Citizenship & Information as Power**

How has our access to and consumption of information changed over time? How will it change in the future? How can we be responsible citizens and media consumers in today's information landscape? This discussion-based course will consider the history and analysis of information creation and use, with an emphasis on the news media and scholarly publishing. Students will learn to analyze the source, purpose, and quality of information and consider the ethical implications of information collection and use. Topics will include the history of the news media and propaganda, information production and ethics, evaluation of information, the movement toward a participatory culture, social media and the news, fake news and "alternative facts," media consumption, and the 1st Amendment and media regulation. Students will also be given an in-depth introduction to the college level research process, focused on a topic of their own choosing. Students will leave the course comfortable with using library resources and able to excel at

**Components:** Lecture**Attributes:** Offered Each Term**Req. Designation:** Technology**LIB 202(3) Course ID:013102 2021-04-13****Digital Citizenship & Information as Power: True Crime**

Do you find yourself drawn to the latest true crime documentary, book, or podcast? Are you intrigued by stories of infamous bad acts and their impact on society? Throughout history people have been captivated by stories of true crime in all formats. This discussion-based course will consider the history and analysis of information creation and use with an emphasis on true crime media and scholarly publishing in all aspects of criminology. Topics will include a history of true crime media, information production and ethics, evaluation of true crime information resources, the 1st Amendment and media regulation, and the movement toward a participatory culture (web sleuthing, etc.). Students will be given and in-depth introduction to the college level research process, focused on a true crime aspect of their choosing. Students will leave the course comfortable with using library resources and able to excel at college level research. All majors are encouraged to enroll, and there are no prerequisites.

**Components:** Lecture**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Literature**

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LIT 1(2 - 4) Course ID:008559 2015-01-19

**LIT Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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LIT 2(2 - 4) Course ID:008560 2015-01-19

**LIT Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Humanities or Social Science Foundation Curriculum Requirement, depending on the specific designator.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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LIT 101(3) Course ID:011181 2015-01-19

**Literature & Writing**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 4 or 5 on the AP English Literature & Composition Exam; 2) receipt of a score of 5 through 7 on a designated International Baccalaureate Higher Level Examination; or 3) satisfactory completion of an approved college-level course. The University Registrar in Student Administrative Services maintains the current lists of the designated IB Exams and approved college-level courses.

Components: Lecture

Attributes: One communication unit, Imaginative Arts, Transfer Credit Only

Req. Designation: Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: Literature****LIT 102(3)** Course ID:011452 2015-01-19**French Literature**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 4 or 5 on the AP French Literature Examination or 2) satisfactory completion of a third-year college French Literature course.

**Components:** Independent Study**Attributes:** Cultures and Societies, Imaginative Arts, University Course, Transfer Credit Only**Req. Designation:** Technology**LIT 103(3)** Course ID:011453 2015-01-19**The Works of Vergil**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 4 or 5 on the AP Latin: Vergil Examination or 2) satisfactory completion of a third-year college Latin Literature course that focuses on the works of Vergil.

**Components:** Independent Study**Attributes:** Cultures and Societies, Imaginative Arts, University Course, Transfer Credit Only**Req. Designation:** Technology**LIT 104(3)** Course ID:011454 2015-01-19**Latin Literature**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 4 or 5 on the AP Latin: Literature Examination or 2) satisfactory completion of a third-year college Latin Literature course.

**Components:** Independent Study**Attributes:** Cultures and Societies, Imaginative Arts, University Course, Transfer Credit Only**Req. Designation:** Technology**LIT 105(3)** Course ID:011455 2015-01-19**Spanish Literature**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 4 or 5 on the AP Spanish Literature Examination or 2) satisfactory completion of a third-year college Spanish Literature course.

**Components:** Independent Study**Attributes:** Cultures and Societies, Imaginative Arts, University Course, Transfer Credit Only**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Literature****LIT 106(3)** Course ID:012124 2015-08-23**Chinese Literature**

Credit for this course is awarded only in the following case -- Receipt of a score of 5 through 7 on the International Baccalaureate Chinese A: Literature Higher-Level Examination

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology**LIT 220(3)** Course ID:008566 2022-02-11**American Gods**

This course focuses on the gods of American literature: Emerson, Hawthorne, Douglass, Melville, Whitman, Dickinson, Twain, and Poe. These authors and the themes they wrote about run so deep in the American psyche that they seem immortal. Foremost among those themes are spirituality and American individualism, the intertwined themes of Transcendentalist literature and its legacy. We will focus primarily on the mid-nineteenth century period of the American Renaissance, the efflorescence of American literature that produced the greatest number of authors in the American pantheon.

**Components:** Lecture**Attributes:** One communication unit, Imaginative Arts, Offered Fall Term**Req. Designation:** Technology**LIT 221(3)** Course ID:008567 2022-02-11**Great American Authors**

[Formerly LF231] This course surveys great American authors of the "long" twentieth-century. Readings include such writers as Crane, London, Pound, Fitzgerald, Hemingway, Faulkner, Ellison, and Cisneros.

**Components:** Lecture**Attributes:** Two communication units, Imaginative Arts, Offered Odd Springs**Req. Designation:** Technology**LIT 222(3)** Course ID:012120 2022-02-11**Philosophy for Life**

[Cross-Listed as PHIL 222] In this course, we will learn to think philosophically (which is to say: critically, rigorously, and reflectively) about complex and difficult questions. We will study practical life philosophies from both the Eastern and Western traditions, from the Tao Te Ching to Marcus Aurelius, and from Plato to the Dalai Lama. We will reflect on the ontological, epistemological, rhetorical, and ethical perspectives of each of these philosophers and schools of thought. We will note striking similarities and important distinctions between them. Ultimately, we will reflect on our own life philosophies as well--each of us refining our personal life philosophy through reading, reflection, and discussion of these classic texts from the wisdom literature tradition.

**Components:** Lecture**Course Equivalents:** PHIL 222**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Offered Even Springs**Req. Designation:** Technology**LIT 223(3)** Course ID:013180 2022-11-09**Dystopian Fiction**

Dystopian fictions imagine worlds where things have gone badly wrong: societies characterized by danger, violence, tyranny, and loss. Yet dystopias are not just imagined worlds. They are almost always warnings about the consequences of real or possible events. This course explores how dystopian fictions comment on issues such as injustice, mass consumerism, and environmental crises. It examines portraits of courage in the face of danger and considers what dystopian literature can teach us about ways of working toward better futures.

**Components:** Lecture**Attributes:** One communication unit, Imaginative Arts, Given When Needed**Req. Designation:** Technology**LIT 225(3)** Course ID:008578 2022-02-11**American Short Story**

[Formerly LF351] Seeing short fiction as a distinct art form, this course will introduce students to selected masters of the short story. It will include works of short fiction by established authors as well as contemporary ones, and it will include stories by ethnic and racial minorities. It will introduce students to the key elements of fiction, such as character, theme, point of view, and symbolism, as a way to help students evaluate and interpret literature. Occasionally, filmed versions of short stories will be used for comparison.

**Components:** Lecture**Attributes:** One communication unit, Imaginative Arts, Offered Odd Springs**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Literature****LIT 226(3)** Course ID:008579 2022-02-11**Modern Fiction**

This course focuses on fiction of the 20th and 21st centuries. We will explore literary challenges to previous ways of writing and understanding the world. Typical topics include modernism and postmodernism, science fiction, magic realism, and the graphic novel.

Components: Lecture

Attributes: One communication unit, Imaginative Arts, Offered Odd Springs

Req. Designation: Technology

**LIT 227(3)** Course ID:012894 2022-02-11**Tales from the Tropics**

This course will examine short stories from Southeast Asian. Students will read and engage with texts by writers from Burma, Cambodia, Indonesia, Laos, Malaysia, Negara Brunei Darussalam, Singapore, Thailand, the Philippines, and Vietnam. We will explore topics such as race, family, tradition, modernity, marginality, displacement, intergenerational conflict, religion, and resistance. We will also pay close attention to the intended audience, implied author, and historical and cultural contexts of the texts.

Components: Lecture

Attributes: One communication unit, Cultures and Societies, Imaginative Arts, University Course, Offered Odd Springs

Req. Designation: Technology

**LIT 229(3)** Course ID:011863 2015-01-23**American Weird Fiction**

This course will introduce students to that curious type of fiction known as ""weird fiction"" (also sometimes called slipstream fiction), which overlaps with a number of other genres such as science-fiction, fantasy, and horror. Weird stories often lack an explanation for the strange events they depict, and so the genre offers writers and readers a new perspective on the sometimes odd world in which we find ourselves. The course will introduce students to the most important American authors of weird fiction from the 20th and 21st Centuries, included H.P. Lovecraft, Joyce Carol Oates, Caitlin R. Kiernan, Thomas Ligotti, and Laird Barron.

Components: Lecture

Attributes: One communication unit, Imaginative Arts, Given When Needed

Req. Designation: Technology

**LIT 230(3)** Course ID:011932 2015-03-03**Monsters in the House**

To label something monstrous may be to identify a primal source of fear or to construct a social barrier, deliberately marginalizing people who do not fit into the mainstream. This course explores portrayals of the monstrous across centuries, considering how they reflect and shape social norms. Texts may include, for example, fairy tales, Disney movies, horror films, and dystopian novels.

Components: Lecture

Attributes: One communication unit, Imaginative Arts, Offered Even Springs

Req. Designation: Technology

**LIT 235(3)** Course ID:012013 2022-02-11**Science Fiction**

Introduction to the genre of science fiction and, more broadly, speculative fiction as well as a survey of representative literary texts, including readings from such writers as Philip K. Dick, Margaret Atwood, Octavia Butler, and Orson Scott Card. Works of speculative fiction often serve as an allegory for, or social commentary of, existing cultural views and social structures. The genre's focus on imagining other worlds and alternative realities make it particularly well-suited for viewing our own biases, prejudices, and social assumptions through the mirror of alien cultures.

Components: Lecture

Attributes: One communication unit, Imaginative Arts, Offered Even Springs

Req. Designation: Technology

**LIT 240(3)** Course ID:012072 2015-03-27**Gender and Popular Culture**

This interdisciplinary multi-media course explores the ways conceptions of gender are constructed and challenged by popular culture, including literature, film, TV, and advertising. It considers the complex ways in which social perceptions of gender intersect with constructions of race, class, and sexuality to affect relations of power. It looks at pop culture not simply as entertainment but as something that contributes to collective identities and influences our ways of seeing ourselves and others, often unconsciously. And it explores means of 'talking back,' challenging dominant portrayals of gender to open up more liberating possibilities for imagining selves.

Components: Lecture

Attributes: One communication unit, Contemporary and Global Issues, Imaginative Arts, University Course, Given When Needed

Req. Designation: Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Literature****LIT 241(3)****Course ID:013024****2020-02-19****War Stories I**

[Cross-listed with HIST241] The oldest and most enduring stories describe war and its consequences. Reading these stories helps us see how different societies valued leadership, honor, loyalty, courage, and death on the battlefield. Not all war literature, however, glorifies heroic warriors and their exploits. Some war stories, even in the distant past, question martial codes imposed on men. Others examine what is worth dying or killing for, and still others lament the inevitable wastage and brutality of war, of the costs to individuals, civilizations, and the environment. Most of them are ambivalent. Text will range from the ancient world to the Renaissance and from Asia to Europe.

**Components:** Lecture**Course Equivalents:** HIST 241**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Given When Needed**Req. Designation:** Technology**LIT 248(3)****Course ID:013084****2022-02-11****Nobel Prize Winners in Literature**

"Nobel Prize Winners in Literature" course offers a grand tour of world literature through the writings of Nobel Prize winners. It features different authors from a range of countries, languages, and traditions, and includes works of prose, poetry, and drama. Students will also study literary techniques and the cultural background and significance of each work. Possible authors include Alice Munro, Orhan Pamuk, Dario Fo, Seamus Heaney, Toni Morrison, Derek Walcott, WB. Yeats, and Rabindranath Tagore.

This is a Clarkson Common Experience University (UNIV) course. This course fulfills the learning outcomes of both the Imaginative Arts (IA) and Cultures and Societies (CSO) Knowledge Areas. This course also fulfills the requirements for a one-unit communication-intensive (C1) credit and will require at least 10-20 pages of graded writing.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Offered Odd Falls**Req. Designation:** Technology**LIT 250(3)****Course ID:011486****2022-02-11****World Literature**

An introduction to representative works of world literature, other than British and American, including fiction, poetry, drama and film.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Offered Even Falls**Req. Designation:** Technology**LIT 252(3)****Course ID:011487****2022-02-11****African Literature**

A study of African literary works from the 19th century, to the present. In this course, students will read memoirs, songs, stories, novels, poems, and plays written by authors from the continent of Africa, considering thematic and stylistic trends and transformations over time.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Given When Needed**Req. Designation:** Technology**LIT 253(3)****Course ID:008570****2019-10-21****Greek Mythology**

[Cross-listed with HIST253] This course will explore the beginnings of Greek culture through its myths, recorded primarily in Homer, Hesiod, the Greek dramatists of the 5th century BCE, and by later writers of the classical period, such as Apollonius of Rhodes, the Roman poet Ovid, and mythographers such as Apollodorus. As important as this rich textual record is the physical evidence of ancient Greek society. Since the late nineteenth century, archaeological excavations of sites associated with the ancient myths have steadily increased our understanding of their meaning and significance, as well as their relationship to ancient Greek religion and ritual. Finally, visual representations of the figures from myth and legend, found in vase paintings and sculptures, are essential to our full comprehension of the role of myth in the lived lives of Greeks.

**Components:** Lecture**Course Equivalents:** HIST 253**Attributes:** Two communication units, Cultures and Societies, Imaginative Arts, University Course, Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Literature****LIT 255(3)****Course ID:011779****2022-02-11****Close Encounters of the X Kind**

This course will examine Anglophone plays and other plays in English translation. The selected texts revolve around close' encounters with the unknown or the foreign, and the impacts of such encounters on all parties involved. The course will expose students to different cultures and theatrical traditions, with playwrights hailing from, among others, Kenya, South Africa, Indonesia, India, the Caribbean, and Irlandia.

Possible readings might include Wole Soyinka' s Death and the King' s Horseman, Athol Fugard' s Boesman and Lena, Arifin C. Noer' s Moths, Girish Karnad' s Tughlaq, Derek Walcott' s Dream on Monkey Mountain, and Brian Friel' s Translations.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Offered Even Springs**Req. Designation:** Technology**LIT 262(3)****Course ID:012895****2022-02-11****Women Acting Out**

This course will examine dramatic texts by women playwrights. The selected texts revolve around issues pertinent to gender and women's issues such as family, love, employment, empowerment, and abuse/violence. Students will read and engage with plays from different cultures and theatrical traditions, and with playwrights hailing from Argentina, England, India, Indonesia, and the United States. Possible readings include Caryl Churchill's Top Girls, Griselda Gambaro's Antigona Furiosa, Maria Irene Fornes' Conduct of Life, Mahasweta Devi's Bayen, Ntozake Shange's for colored girls, Sarah Daniels's The Gut Girls, Susan Glaspell's Trifles, Spiderwoman Theater's Sun, Moon, and Feather, and Tsitsi Dangarembga's She No Longer Weeps.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Offered Even Falls**Req. Designation:** Technology**LIT 265(3)****Course ID:008583****2022-02-11****Creative Writing**

[Formerly LF365] This course is designed to introduce students to the main genres of imaginative writing and the basic techniques of those genres. Students will work primarily within the genres of fiction and poetry, though the course will also include brief sections on drama and memoir. Coursework will consist of reading examples and producing exercise in fiction, poetry, and (optionally), drama or memoir. The goal of the course is to make students familiar with the techniques of literary practice and to provide hands-on experience using those techniques.

**Components:** Lecture**Attributes:** Two communication units, Imaginative Arts, Offered Even Springs**Req. Designation:** Technology**LIT 270(3)****Course ID:012933****2022-02-11****Comics of Conscience**

Comics of Conscience will examine graphic novels or book-length comics which raise important social and political issues. It will explore how graphic novels are built and told—we will learn to use a conceptual vocabulary so we can discuss how the graphic novel achieves its objective of obtaining the reader's attention and engagement. We will learn how to read them, how to talk about how they get made and how they work, how to understand—and how to enjoy—some of the kinds of comics and graphic novels. Emphasis in our studies will examine the co-mixing of genres within telling a visual story: we will look at journalism comics, memoir comics, realistic fiction comics, and fantasy comics. The overall objective is to learn how to read graphic novels—e.g., how to understand the way the verbal and the non-verbal/graphic work together—and how to write about them.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Offered Odd Springs**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Literature****LIT 275(3)****Course ID:012979****2022-02-11****Demons and Witches**

"Demons and Witches among Us" will help you to develop skills in reading and analyzing fiction, as well as introduce you to the fascinating world of horror fiction. We will explore the genre of ghost story or horror literature in contemporary Asian literature, including short stories, novels, and comic books. How do Asian writers utilize elements of conventional horror, and to what effect? Can horror literature be used to address important issues such as abuse of power by authoritarian regimes, conflicts between the traditional and the modern, gender discrimination, urban alienation, and environmental destruction? We will examine supernatural motifs, including ghosts, zombies, witches, demons, and psychopaths, in fiction by writers from India, China, Japan, Cambodia, Malaysia, Singapore, and Indonesia. We will investigate how horror holds power over us the reader and what is the place of horror in society. We will also discuss the various elements of fiction: character analysis, plot, use of symbols, theme, tone, and style.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Offered Even Springs**Req. Designation:** Technology**LIT 280(3)****Course ID:013064****2021-01-14****Disaster Lit**

Disaster Lit forces us to confront our own mortality and to ask ourselves how we would respond if facing a similar crisis, threat, or catastrophe. The genre also offers social commentary by extrapolating current trends to disastrous conclusions, and showing how our political and social institutions might respond—or fail to respond—during extraordinary situations. We will consider both fiction and nonfiction depictions of catastrophes and disasters, and natural as well as political or socioeconomic disasters. Possible readings include: Albert Camus's *The Plague*, Robert Harris's historical thriller *Dictator*, Walter Miller's post-apocalyptic novel *A Canticle for Leibowitz*, and H.G. Wells's alien invasion novel *War of the Worlds*.

**Components:** Lecture**Attributes:** One communication unit, Imaginative Arts, Given When Needed**Req. Designation:** Technology**LIT 285(3)****Course ID:013195****2023-04-03****Creative Writing Genres: Nature Writing**

In this hybrid literature and creative writing class, students will study the various ways that American literature across genres has represented and continues to represent natural environments like wilderness, farms, gardens, and even cities. One main focus will be on the "crossroads" where perceptions of land and identity meet both in literature and within ourselves and our cultures. Students will further consider the ways in which nature writers persuade their readers to perceive the environment differently. In other words, how does literary art shape our perceptions of the natural world? Readings will include foundational texts like Ralph Waldo Emerson's "Nature" and Aldo Leopold's "The Land Ethic," as well as diverse and contemporary texts like excerpts from William Least Heat-Moon's (*Osage*) Prairy Erth (a deep map), Robin Wall Kimmerer's (*Potawatomi*) Braiding Sweetgrass, and selections from the anthology Black Nature: Four Centuries of African American Nature Poetry. Finally, and perhaps most importantly, students will craft original works of nature

**Components:** Lecture**Attributes:** Two communication units, Imaginative Arts, Offered Odd Falls**Req. Designation:** Technology**LIT 328(3)****Course ID:008573****2015-01-29****African-American Literature**

[Formerly LF335] This course will survey African-American novelists, dramatists, and poets of the twentieth century in their social and political context and in their own sense of their literary tradition. It will begin, however, by looking back, (to the slave narrative of Frederick Douglass for instance), before moving into the four stages, broadly speaking, of African-American literature: The Harlem Renaissance: 1915-1935 (e.g., Zora Neale Hurston, Langston Hughes, Alain Locke); The Age of Protest: 1935-1955 (e.g., Richard Wright, James Baldwin, Gwendolyn Brooks); African-American Militant Literature: 1955-1970 (e.g., Amiri Baraka, Ishmael Reed, Nikki Giovanni); and Literature by African-American Women: 1970-1991 (e.g., Alice Walker, Toni Morrison, Toni Cade Bambara, Maya Angelou). Because in the 1950s and 1960s there is a 'rediscovery' of Africa, the survey will also include such influential African writers as Chinua Achebe. The course will be conducted as an exploration, mainly in class discussions, but also in formal written analysis,

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Offered Odd Falls**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Literature****LIT 335(3)****Course ID:011933****2022-02-11****Violence and Reconciliation**

[Cross-listed with POL 335] While scholars have labeled the 20th century 'the century of genocide,' the past two decades have catalyzed global changes in the ways we think about peace-building and reconciliation. But reconciliation after mass conflict remains a difficult process. Can you forgive someone who has done irreparable harm to you or your loved ones? Can you reconcile -literally, return to a previous state of harmony- with someone if you never shared a harmonious relationship with that person? Is reconciling with a whole community the same as reconciling with an individual? This course examines the challenges to reconciliation after political trauma and assesses the strengths and weaknesses of major reconciliation mechanisms. Through the lens of two case studies, South Africa and Northern Ireland, and the disciplines of film, fiction, and political theory, students will compare the consequences of criminal trials, truth commissions, and informal efforts at communal healing. As a final project, the class will participate in a

**Components:** Lecture

**Course Equivalents:** POL 335

**Attributes:** One communication unit, Contemporary and Global Issues, Imaginative Arts, University Course, Offered Odd Springs

**Req. Designation:** Technology

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**LIT 355(3)****Course ID:012891****2022-02-11****Power, Exploitation, and Freedom: Postcolonial Literature**

Colonialism is the process of one country taking political, economic, and cultural control of another country. From the 15th-20th centuries, European countries colonized swathes of Asia, Africa, and South and Central America. They exploited the economic resources of those countries, subjugated their populations, and labeled indigenous cultures "inferior." In the mid-20th century, independence movements led to the decolonization of many countries and gave rise to an important body of literature. Postcolonial literature explores the effects of colonialism and challenges the misrepresentation of colonized countries by colonizing powers. It helps readers understand the cultures of colonized countries, their fight for independence, and their evolution after decolonization. This course examines postcolonial literature from a wide range of countries and cultures, including India, Nigeria, South Africa, and the Caribbean.

**Components:** Lecture

**Attributes:** One communication unit, Imaginative Arts, Offered Odd Falls

**Req. Designation:** Technology

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**LIT 380(3)****Course ID:008603****2022-02-11****Shakespeare's Game of Thrones: Blood, Lust, and Power**

[Formerly LF480] While Shakespeare's plays are unquestionably part of our literary heritage, there were also written by a practical man of the theater who was fully engaged in the changing culture of late Elizabethan and early Jacobean England. During the semester, students will read Shakespeare's plays for their literary values and their theatrical values, while placing them specifically in their historical context. Class discussion will involve literary analysis, questions or effective staging and stage history, and the most pressing social and political issues of Renaissance England. Students will read, see, and hear a representative selection of plays.

**Components:** Lecture

**Attributes:** Two communication units, Imaginative Arts, Offered Spring Term

**Req. Designation:** Technology

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**LIT 490(1 - 10)****Course ID:008604****2015-02-09****Department Consent Required****Independent Study**

[Formerly LF490] Designed primarily for an advanced student who wishes to pursue special interests in literature for one or more semesters, this series allows students to design and conduct independent study projects under faculty guidance.

Prerequisite: consent of the instructor.

**Components:** Independent Study

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**LIT 499(0)****Course ID:008613****2015-02-09****Minor Portfolio**

[Formerly LF499] In this course, students complete their Liberal Arts Minor Portfolios under the direction of their minor advisor. The course is graded on a Pass-No Credit basis.

**Components:** Independent Study

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**Business - School of Business - Subject: Law****LW 1(2 - 4)****Course ID:008716****2015-07-06****Law Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Discussion**Attributes:** Transfer Credit Only**Req. Designation:** Technology**LW 2(2 - 4)****Course ID:008717****2015-07-06****Law Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

This course may be used to satisfy a Business Foundation Curriculum Requirement.

**Components:** Independent Study**Attributes:** Transfer Credit Only**Req. Designation:** Technology**LW 270(3)****Course ID:008718****2015-07-06****Law and Society I**

A course designed to provide a basic understanding of (1) the nature, functions and limitations of law and legal systems; (2) the basic relationship among justice, ethics, legal systems and social structure; and (3) the relationship among society, law and business activity. Further, it is designed to enlighten with respect to rules, principles, standards and doctrines of law fundamental to a free enterprise system. The course covers the substantive areas of constitutional law, torts, contracts, and property and estate law.

**Components:** Lecture**Attributes:** Offered Each Term**Requirement Group:** Prerequisite: at least sophomore standing.**Req. Designation:** Technology

**School of Arts and Sciences - School of Business - Subject: Law**

LW 352(3) Course ID:012825 2022-02-10

**Reading for the Law: Legal Issues Through Non-Fiction Literature**

Understanding ""black letter law"" is but one window into legal understanding. In order to contextualize the law, we must understand the social and political issues which have given rise to, and are affected by, the statutes and judicial decisions that shape our legal system.

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Given When Needed**Requirement Group:** Prerequisites: LW270**Req. Designation:** Technology

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**Business - School of Business - Subject: Law**

**LW 466(3)**                   **Course ID:008719**                   **2015-07-06**

**The Law of the Workplace**

This course is designed to review areas of law affecting the workplace both from the perspective of the employer as well as the employee. The students will study the environment of the workplace from a legal perspective. Topics will include the National Labor Relations Act and the jurisdiction of the National Labor Relations Board, the rights and obligations of management and labor under the Act. The course will also review the law which governs the public employer in the form of federal, state and local governments. Finally, the course will review other areas of law which affect the workplace such as the doctrine of 'employment at will,' Worker's Compensation and Disability Law, Social Security Law, the law governing discriminatory practices, the Americans with Disabilities Act, the law of the Occupational Safety and Health Agency and developing topics such as drug testing in the workplace and pay equity issues.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: LW270 or consent of the instructor.

**Req. Designation:** Technology

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**LW 471(3)**                   **Course ID:008720**                   **2022-02-10**

**Law and Society II**

A continuation of LW 270, including the substantive areas of agency law, business organizations (including the law of partnerships, corporations and the limited liability company), negotiable instruments, sales and secured transactions.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisite: LW270.

**Req. Designation:** Technology

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**LW 487(1 - 3)**                   **Course ID:012149**                   **2016-04-05**                   **Instructor Consent Required**

**Special Project in Law**

An investigation of a problem or in-depth topic undertaken by the student under the guidance of a faculty member.

Prerequisites: Permission from the instructor.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**LW 490(1 - 3)**                   **Course ID:008721**                   **2016-04-05**                   **Instructor Consent Required**

**Internship**

An unpaid internship that is related to the student's professional goals.

Prerequisite: consent of the instructor.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**LW 499(0)**                   **Course ID:011209**                   **2015-07-08**

**Law Studies Minor Portfolio**

A student completing the Law Studies Minor will compile a portfolio that manifests his or her learning experience in the minor. In this course, students complete their Law Studies Minor portfolio under the direction of their minor advisor. The course is graded on a Pass-No Credit basis.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics**

**MA 1(2 - 4)** Course ID:008723 2017-09-28

**Mathematics Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may not be used to satisfy the requirements of the Mathematics or Applied Mathematics and Statistics major. Check with major department to determine whether credits count toward graduation.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**MA 2(2 - 4)** Course ID:008724 2017-09-28

**Mathematics Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy the requirements of the Mathematics or Applied Mathematics and Statistics major.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**MA 30(2.5)** Course ID:011281 2022-05-23 **Instructor Consent Required**

**Introductory Mathematics Summer Program**

This course is intended primarily as a preparation for students who will be starting their Clarkson careers in MA 180, Introduction to College Mathematics. Course topics include: a brief review of elementary algebra, linear, quadratic, exponential, logarithmic, and trigonometric functions. The course emphasizes an applied approach to all topics through real-life examples. You should check with your major department to determine whether this course can be used to satisfy your degree requirements in specific majors.

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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**MA 31(2.5)** Course ID:008725 2020-05-17 **Instructor Consent Required**

**Pre-Calculus Mathematics**

This course is a comprehensive review of the high school level mathematics whose mastery is necessary for success in calculus. Topics include: Elementary algebra, geometry and trigonometry; coordinate geometry; linear, quadratic, trigonometric, exponential and logarithmic functions. Check with major department to determine whether credits count toward graduation.

**Components:** Lecture

**Attributes:** Offered Fall and Summer

**Req. Designation:** Technology

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**MA 41(2)** Course ID:008726 2022-07-28

**Co-Calculus Mathematics**

This course provides support for students in Calculus I by reviewing topics from algebra, functions, geometry and trigonometry as they are being used in calculus. Enrollment is by invitation of the Mathematics Department. Check with major department to determine whether credits count toward graduation.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**MA 42(0)** Course ID:010149 2015-12-15

**Co-Calculus II**

This course provides help sessions for students in Calculus II by reviewing carefully selected examples as the corresponding topics are being studied in calculus. Review of background topics from Calculus I will also be included as needed. Enrollment is by invitation of the Mathematics Department. Given Pass/No Credit only.

**Components:** Discussion

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics**

**MA 120(4)** Course ID:012091 **2021-09-22**

**Introduction to STEM Mathematics**

Prepares students for Calculus and higher mathematics in the science, technology, and engineering majors. Topics include algebraic concepts, lines and quadratic equations; functions; exponential and logarithmic functions and equations, trigonometry and trigonometric functions, identities and equations; systems of equations and inequalities. This course will focus on illustrating these mathematical topics from pre-calculus within the context of applications taken from the sciences and engineering.

Grading for this course is done using Mastery Based Assessment.

This course is normally taken for 4 credits. However, students joining after normal add period may be directed by the Math Department Chair to take this course for fewer than 4 credits. Under these conditions

**Components:** Discussion, Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Restriction: This course is not available for students who already have credit for any one of the following courses:

**Req. Designation:** Technology

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**MA 125(4)** Course ID:013189 **2022-10-19**

**Introduction to STEM Math II**

This course is a continuation of MA 120, Introduction to STEM Math. This course covers derivatives concepts, formulas and applications, including chain rule and implicit differentiation; the Fundamental Theorem of Calculus, the concept of integration, and basic integral formulas. Applications of these concepts, to include optimization, related rates, and problems of accumulations from rates. This course covers transcendental functions from a calculus viewpoint.

Note: Satisfactory completion of both MA 120 and MA 125 will be treated as equivalent to MA 131, Calculus I.

**Components:** Discussion, Lecture

**Course Equivalents:** MA 131

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: MA 120 (3 credits)

**Req. Designation:** Technology

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**MA 131(3)** Course ID:008732 **2022-10-19**

**Calculus I**

Functions and graphs; derivative concept and formulas, including chain rule and implicit differentiation; integral concept; the Fundamental Theorem of Calculus; properties and applications of the derivative, including max-min problems and graph sketching; exponential, logarithmic, and inverse trigonometric functions.

Prerequisites: high school algebra and trigonometry.

**Components:** Discussion, Lecture

**Course Equivalents:** MA 125

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**MA 132(3)** Course ID:008733 **2022-12-19**

**Calculus II**

A continuation of MA 131. Properties and applications of the integral, including areas, volumes, arc length and differential equations; integration techniques, including parts, partial fractions, trigonometric substitution, and numerical integration; indeterminate forms; improper integrals; infinite series and Taylor series; introduction to polar coordinates, complex numbers, and parametric equations.

**Components:** Discussion, Lecture

**Attributes:** Offered Fall, Spring, and Summer

**Requirement Group:** Prerequisite: C- or better in MA131

**Req. Designation:** Technology

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**MA 180(4)** Course ID:010506 **2016-11-04**

**Introductory College Mathematics**

Review of basic algebra and functions, differences, an introduction to discrete calculus, rates of growth, introduction to the derivative. This course is not available for students who already have credit for any one of MA131, MA132, or MA181.

**Components:** Discussion, Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Restriction: Not open to students who have taken, or are taking MA120, MA181, MA131, or MA132

**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics****MA 181(3)** Course ID:010507

2022-02-11

**Basic Calculus**

The fundamentals of differential calculus with applications to business, life and social sciences, optimization, the fundamental theorem of calculus, introduction to the concept of the integral.

**Components:** Discussion, Lecture**Attributes:** Offered Fall and Spring**Requirement Group:** Prerequisites: MA180 or MA120**Req. Designation:** Technology**MA 200(3)** Course ID:011229

2015-01-20

**Introduction to Mathematical Modeling and Software**

Introduction to the use of mathematics in solving real-life problems. Basics of using mathematical software (such as MATLAB and Maple) to apply calculus and other methods. Group projects. Communication skills including ethical considerations, presentation and mathematical exposition. Introduction to mathematical professions.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: MA131.**Req. Designation:** Technology**MA 211(3)** Course ID:008740

2018-10-18

**Discrete Mathematics and Proof**

A transitional course between the technique-oriented lower-level courses and the concept-oriented upper-level courses in both mathematics and computer science. Topics include logic, quantifiers, proof techniques (including mathematical induction), integers, sets, functions, equivalence relations, and basic combinatorics. A major emphasis of the course is learning to write mathematical proofs. This course is intended for students majoring in Mathematics, Computer Science, and related fields.

**Components:** Lecture**Attributes:** Two communication units, Offered Each Term**Requirement Group:** Prerequisites: MA132**Req. Designation:** Technology

**Science - Mathematics - Subject: Mathematics**

MA 222(3) Course ID:008741 2022-06-02

**Differential Equations without Linear Algebra**

A college level Ordinary Differential Equation course for which there is no comparable Clarkson course. Solutions and applications of first-order differential equations and linear differential equations with constant coefficients. Laplace transform methods, systems of differential equations. Other topics may include modeling, engineering applications or numerical methods.

Used for transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics**

**MA 230(3)** Course ID:010518 2016-10-18

**3-D Space and Projective Geometry**

An introduction to the mathematics of 3 dimensional space, including vector functions, elementary vector calculus and partial derivatives, introductory projective geometry especially as applied to projections of 3-D images on two dimensional media, translations, rotations and an introduction to their matrix representations. A student may not receive credit for both MA230 and MA231. MA231 satisfies any requirement for MA230.

**Components:** Discussion, Lecture  
**Attributes:** Offered Spring Term  
**Requirement Group:** Prerequisite: MA131  
**Req. Designation:** Technology

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**MA 231(3)** Course ID:008742 2015-02-12

**Calculus III**

Vectors and vector-valued functions; functions of several variables; partial differentiation, including the chain rule, gradients, and maxima and minima; multiple integration, including polar, cylindrical, and spherical coordinates; vector calculus, including Green's, Divergence, and Stokes's Theorems. A student may not receive credit for both MA230 and MA231. MA231 satisfies any requirement for MA230.

**Components:** Discussion, Lecture  
**Attributes:** Offered Fall, Spring, and Summer  
**Requirement Group:** Prerequisites: MA132  
**Req. Designation:** Technology

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**MA 232(3)** Course ID:008743 2015-02-12

**Elementary Differential Equations**

Solutions and applications of first-order differential equations and linear differential equations with constant coefficients. Laplace transform methods. Introduction to matrix algebra, systems of algebraic equations, eigenvalues and eigenvectors, with application to systems of differential equations. Other topics may include modeling, engineering applications or numerical methods.

**Components:** Discussion, Lecture  
**Attributes:** Offered Fall, Spring, and Summer  
**Requirement Group:** Prerequisites: MA132  
**Req. Designation:** Technology

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**MA 239(3)** Course ID:010191 2017-01-17

**Elementary Linear Algebra**

Introduction to matrices and matrix operations, Linear systems of equations, Elementary treatment of eigenvalues, parameter estimation by least squares, Introduction to linear programming, MATLAB will be used throughout (Instruction in MATLAB is included.)

**Components:** Lecture  
**Requirement Group:** Prerequisites: MA 131 or MA181 Not open to Mathematics or Applied Math and Stats majors; not open to students who have credit for MA230.  
**Req. Designation:** Technology

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**MA 277(3)** Course ID:012864 2018-02-26

**Elementary Numerical Methods**

An introductory course on numerical methods as applied in scientific computing. Topics include application of Taylor polynomials and representations of functions, numerical calculus, solving linear systems, and interpolation. Optional topics may include numerical solution of differential and difference equations and solutions to nonlinear equations. This course is intended for students outside of engineering/math/physics that seek to expand their skill set in applying computational tools. Students may not receive credit for both MA277 and MA377.

**Components:** Lecture  
**Attributes:** Offered Even Falls  
**Requirement Group:** Prerequisites: MA239, and MA230 or permission of the instructor Not open to students who have credit for MA230.  
**Req. Designation:** Technology

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**MA 300(1)** Course ID:008748 2016-12-06

**Instructor Consent Required**

**Seminar in Actuarial Mathematics**

Seminar for students with interest in an actuarial career. Especially recommended for those preparing for the actuarial exams.

Requisite: Permission of the Instructor

**Components:** Seminar  
**Attributes:** Given When Needed  
**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics****MA 301(3 - 4)** Course ID:008749 2017-09-28**Mathematics Elective**

An upper-division mathematics course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy the requirements of the Mathematics or Applied Mathematics and Statistics major or the Mathematics minor.

**Components:** Independent Study**Attributes:** Transfer Credit Only**Req. Designation:** Technology**MA 311(3)** Course ID:008755 2015-01-29**Abstract Algebra**

A study of mathematical systems, including an introduction to the theory of groups, rings, ideals and fields. Polynomials over a field; matrix polynomials.

**Components:** Lecture**Attributes:** One communication unit, Offered Odd Falls**Requirement Group:** Prerequisites: MA211**Req. Designation:** Technology

**Science - Mathematics - Subject: Mathematics**

MA 312(3) Course ID:008756

2022-10-19

**Introduction to Differential Geometry**

In this course, we develop the basic concepts of differential geometry in the context of curves and surfaces in three dimensional Euclidean space. Topics covered include the local theory of surfaces in Euclidean space, the first and second fundamental forms, Gaussian and mean curvature, isometries, geodesics, parallel translation, covariant differentiation, and the Gauss-Bonnet Theorem.

Students should have a good knowledge of multivariable calculus and linear algebra, as well as tolerance for a definition-theorem-proof style of exposition.

Multivariate Calculus (MA231) should be considered as essential. For some majors, the partial exposure to key ideas from linear algebra aggregated across multiple courses may be sufficient for the instructor to

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: MA231 and MA339, or consent of instructor. MA211 is a recommended but not required pre-

**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics**

**MA 313(3)** Course ID:008757 2015-03-03

**Abstract Linear Algebra**

A proof-oriented introduction to linear algebra. Vector spaces, linear transformations, determinants, eigenvalues, canonical forms and inner-product spaces.

**Components:** Lecture  
**Attributes:** One communication unit, Offered Even Falls  
**Requirement Group:** Prerequisites: MA211 and MA339.  
**Req. Designation:** Technology

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**MA 314(3)** Course ID:008758 2015-03-05

**Number Theory and Its Applications**

Divisibility; the fundamental theorem of arithmetic; linear diophantine equations; fundamentals of congruences; prime numbers and factoring; the theorems of Fermat and Wilson; quadratic residues. Additional topics may include arithmetic functions, the Möbius inversion formula; geometric number theory; partitions; continued fractions; primality testing and factoring; applications to crystallography and cryptography.

**Components:** Lecture  
**Attributes:** One communication unit, Offered Odd Springs  
**Requirement Group:** Prerequisites: MA211  
**Req. Designation:** Technology

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**MA 315(3)** Course ID:013154 2022-03-17

**Introduction to Complex Networks**

This course will introduce the student to the new, burgeoning field of Complex Networks, their analysis and applications to everyday-life. Elementary concepts from Graph Theory, Statistical Physics and Discrete Math techniques will be taught as demanded by the material. Covered topics will include: Basic concepts from Graph Theory, Global vs. local algorithms of analysis, Erdős-Renyi Random Graph, Small-World model of Watts & Strogatz, Scale-free networks, Barabasi-Albert and Krapivsky-Redner models, Recursive scale-free models and their applications; The percolation problem and its applications to epidemic spreading, vaccination strategies, etc. and Kleinberg navigation.

**Components:** Lecture  
**Course Equivalents:** PH 315  
**Attributes:** Offered Fall Term  
**Requirement Group:** Prerequisite: MA132  
**Req. Designation:** Technology

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**MA 321(3)** Course ID:008760 2015-02-19

**Advanced Calculus I**

A rigorous course in analysis on the real line and calculus of functions of one variable.

**Components:** Lecture  
**Attributes:** One communication unit, Offered Fall Term  
**Requirement Group:** Prerequisites: MA231 and MA211  
**Req. Designation:** Technology

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**MA 322(3)** Course ID:008761 2015-03-03

**Advanced Calculus II**

Continuation of MA321 and extension to functions of several variables.

**Components:** Lecture  
**Attributes:** One communication unit, Offered Even Springs  
**Requirement Group:** Prerequisites: MA321  
**Req. Designation:** Technology

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**MA 330(3)** Course ID:008762 2017-01-17

**Advanced Engineering Mathematics**

Introduction to linear algebra. Review of ordinary differential equations and Laplace transforms; ordinary boundary value problems. Fourier analysis; overview of partial differential equations. Introduction to probability and statistics. Modeling and applications to engineering problems will be emphasized throughout. This course is intended principally for Mechanical and Aeronautical Engineering majors; not open to Mathematics majors.

**Components:** Discussion, Lecture  
**Attributes:** Offered Fall and Spring  
**Requirement Group:** Prerequisites: MA231 and MA232  
**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics****MA 331(3)** Course ID:008763 2015-01-20**Fourier Series and Boundary Value Problems**

Review of ordinary boundary value problems. Fourier series and integral. Derivation of heat, wave and potential equations with boundary and initial conditions. Solution by separation of variables. Additional topics may include multidimensional problems, Bessel functions, Laplace transforms, numerical methods.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: MA231 and MA232**Req. Designation:** Technology**MA 332(3)** Course ID:008764 2014-12-05**Intermediate Differential Equations**

Theory of linear differential equations; oscillation and boundedness. Nonlinear differential equations: stability, phase-plane analysis, exact solutions. Additional topics may include control theory, theory of first-order equations, singularities.

**Components:** Lecture**Requirement Group:** Prerequisites: MA231 and MA232**Req. Designation:** Technology**MA 339(3)** Course ID:008768 2015-02-12**Applied Linear Algebra**

This course is an introduction to matrices and linear algebra with applications in engineering and science. Algebra of matrices and systems of linear algebraic equations. Rank, inverse, eigenvalues, eigenvectors, vector spaces, subspaces, basis, independence, orthogonal projection, determinant. Other topics may include: systems of differential equations, numerical methods, linear programming.

**Components:** Lecture**Attributes:** Offered Fall, Spring, and Summer**Requirement Group:** Prerequisites: MA132; MA230/231 recommended but not required**Req. Designation:** Technology

**School of Arts and Sciences - Computer Science - Subject: Mathematics**

MA 345(3) Course ID:011628

2019-04-03

**Automata Theory and Formal Languages**

[Cross-listed with CS 345] This course gives an introduction to formal languages and their relation to automata. Topics include deterministic and non-deterministic finite automata, regular expressions and languages, closure properties and decision procedures for context-free languages, recursive and recursively enumerable sets, Turing machines, and decidability. Some aspects of computational complexity may also be explored.

**Components:** Lecture**Course Equivalents:** CS 345, CS 541**Requirement Group:** Prerequisites: CS 142, EE262, or EE361, and MA211**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics****MA 362(3)** Course ID:008774 2014-12-05**Complex Analysis with Applications**

Complex numbers and functions, conformal mapping and applications, derivative, Cauchy-Riemann equations, real and complex line integrals, Fundamental Theorem, Cauchy and Poisson formulas, Taylor series, analytic continuation, special functions, Laurent series, residues. Applications to partial differential equations.

**Components:** Lecture**Requirement Group:** Prerequisites: MA231**Req. Designation:** Technology**MA 363(3)** Course ID:008775 2015-08-14**Mathematical Modeling**

Introduction to the use of mathematics in solving real-life problems. Topics include: formulation and refinement of models, different types of models, application of results to prediction and design.

Mathematical methods beyond the prerequisite courses will be presented as needed.

**Components:** Lecture**Attributes:** Two communication units, Offered Spring Term**Requirement Group:** Prerequisites: MA231, MA232 and PH132

Corequisites: MA330, or MA381, or S

**Req. Designation:** Technology**MA 368(1)** Course ID:011578 2021-04-12 **Instructor Consent Required****Mathematical Biology Seminar**

[Cross-listed with BY 368] The objective of this course is to present recent advances in research that combines biological and mathematical analysis, and to describe opportunities for interdisciplinary summer research in biology and mathematics. Students will receive one credit for attending seminars (6 per semester), reading a journal article prior to each presentation, writing a short review of each seminar, and participating in discussions. This course can be taken for credit more than once.

**Components:** Seminar**Course Equivalents:** BY 368**Req. Designation:** Technology**MA 377(3)** Course ID:008776 2015-02-19**Numerical Methods**

Floating-point numbers and sources of error, direct solution of linear systems, nonlinear equations, interpolation, numerical integration and numerical solution of initial value problems in ordinary differential equations.

**Components:** Laboratory, Lecture**Attributes:** Two communication units, Offered Fall Term**Requirement Group:** Prerequisites: MA230 or MA231**Req. Designation:** Technology**MA 381(3)** Course ID:008777 2016-08-15**Probability**

[Cross-listed with STAT 381] Sample spaces; axioms of probability; basic theorems; random variables (discrete and continuous); combinatorial methods; Bayes' Theorem and conditional probability; expected values and variances; distribution functions, including: binomial and multinomial, Poisson, normal and bivariate normal distributions, and others such as geometric, hypergeometric, negative binomial, exponential, gamma and beta; joint distributions; covariance and correlation; central limit theorem; geometric probability; method of transformations; introduction to stochastic processes.

**Components:** Lecture**Course Equivalents:** MA 581, STAT 381, STAT 581**Requirement Group:** Prerequisite: MA231 or MA230 (MA211 Recommended)**Req. Designation:** Technology**MA 400(1 - 6)** Course ID:008781 2015-01-28**Undergraduate Seminar**

This seminar will emphasize recreational mathematics and problem solving on the advanced undergraduate level. It is particularly recommended for those who are interested in preparing for the Putnam Undergraduate Mathematics Competition or the Mathematical Contest in Modeling.

**Components:** Seminar**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Mathematics - Subject: Mathematics**

**MA 401(1 - 10)** Course ID:008782 2017-01-13

**Directed Study in Mathematics**

Prerequisite: consent of the instructor.

Components: Research

Attributes: Given When Needed

Req. Designation: Technology

**MA 405(1 - 10)** Course ID:008786 2017-01-13

**Directed Study in Applied Mathematics**

Prerequisite: consent of the instructor.

Components: Research

Attributes: Given When Needed

Req. Designation: Technology

**MA 407(1 - 10)** Course ID:008788 2015-01-28 Instructor Consent Required

**Directed Study in Numerical Analysis**

A directed study in Numerical Analysis, intended to give a student the opportunity to further explore an area of interest to them under the supervision of a faculty member.

Components: Independent Study

Req. Designation: Technology

**MA 409(1 - 10)** Course ID:008790 2014-12-04

**Directed Study in Probability and Statistics**

[Cross-listed with STAT 409] A directed study in Probability and Statistics, intended to give a student the opportunity to further explore an area of interest to them under the supervision of a faculty member.

Components: Independent Study

Course Equivalents: STAT 409

Req. Designation: Technology

**MA 431(1 - 3)** Course ID:008804 2015-02-19

**Mathematics Course Assistance**

Assisting a faculty member in a mathematics course or project. Credit can be used as free electives to meet baccalaureate degree requirements, up to a maximum of 6 hours for MA431. This course is offered on a Pass/No-Credit basis only. (May be taken more than once for credit.)

Components: Independent Study

Attributes: Offered Fall Term

Req. Designation: Technology

**MA 442(3)** Course ID:011629 2019-04-24

**Computational Complexity**

The complexity of a computational problem is the amount of computer resources it requires. Computational complexity theory studies the complexity of computational problems as well as relationships between different types of resources. This course will cover both classical and research-related topics in computational complexity, such as: complexity measures and complexity classes for sequential machines and Boolean circuits, reductions and completeness, hierarchy theorems, relativization, circuit complexity, and proof complexity.

Components: Lecture

Course Equivalents: CS 442

Attributes: Given When Needed

Requirement Group: Prerequisites: CS345 or equivalent MA345.

Req. Designation: Technology

**School of Arts and Sciences - Computer Science - Subject: Mathematics****MA 447(3)** Course ID:008809 2019-04-03**Computer Algorithms**

[Cross-listed with CS 447] This course will study and contrast a variety of computational algorithms and develop tools for algorithm analysis. Methods and topics such as dynamic programming, greedy algorithms, graph algorithms, circuits, parallel algorithms, matrix and polynomial algorithms, string matching, and geometrical algorithms will be explored. The theory of NP-completeness and methods of managing NP-complete problems will also be covered.

**Components:** Lecture**Course Equivalents:** CS 447**Requirement Group:** Prerequisites: CS344 and MA211**Req. Designation:** Technology**MA 449(3)** Course ID:011626 2015-08-15**Computational Learning**

[Cross-listed as CS 449] Computational learning studies algorithmic problems for inferring patterns and relations from data. This course describes the mathematical foundations of learning and explores the important connections and applications to areas such as artificial intelligence, cryptography, statistics, and bioinformatics. A list of relevant topics may include perceptron and online learning, graphical models and probabilistic inference, decision tree induction and boosting, analysis of Boolean functions, sample complexity bounds, cryptographic and complexity hardness, and reinforcement learning. Basic ideas from computer science and mathematics are employed to describe the main ideas and major developments in computational learning.

**Components:** Lecture**Course Equivalents:** CS 449**Attributes:** Given When Needed**Requirement Group:** Prerequisites: CS344 and CS345, or consent of the instructor.**Req. Designation:** Technology

**School of Arts and Sciences - Mathematics - Subject: Mathematics****MA 451(2)** Course ID:011187

2017-01-17

**Introduction to Mathematical Research**

Introduction to the methods and tools needed to prepare mathematical research papers and presentations. Course instruction includes an introduction to research journals, including databases and search tools; mathematical writing; mathematical authoring and presentation software; professionalism, diversity, and ethics in the mathematical professions. Elements of the student grade will be drawn from performance in this class, from peer-evaluations and from self-assessment through surveys.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Only open to Math or Applied Math and Statistics majors with at least junior standing, or by permission of instructor**Req. Designation:** Technology**MA 453(1 - 3)** Course ID:011186

2018-01-17

**Introduction to Mathematical Instruction**

Introduction to mathematical pedagogy. Students majoring in Math or Applied Math and Statistics register for 2 credits, consisting of: classroom presentation techniques; preparation of handouts; evaluation techniques; mathematical authoring and presentation software; professionalism, diversity, and ethics in the mathematical professions. Elements of the student grade will be drawn from performance in this class, from peer-evaluations and from self-assessment. Students are required to complete a semester-long non-paid teaching experience in conjunction with this course (for example, serving as a teaching assistant or a group tutor). Students enrolled in the pre-teaching minor register for one additional credit and complete additional assignments covering a broader range of topics in education; this additional credit may be taken in the same semester or in a later semester.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: Only open to Math or Applied Math and Statistics majors with at least junior standing or by permission of instructor**Req. Designation:** Technology

**School of Arts and Sciences - Computer Science - Subject: Mathematics****MA 456(3)** Course ID:008814

2021-11-30

**Cryptography**

[Cross-listed with CS 456] Cryptography is the discipline which studies the making of 'secret' codes. This course will examine some of the methods of cryptography together with many surprising applications. The language of modern cryptography is primarily number theory, and various tools of number theory will be developed as needed. No background in number theory or cryptography will be necessary, but some mathematical sophistication and familiarity with proofs will be assumed. Topics will include: one-way functions, public-key cryptosystems, digital signatures, probabilistic encryption, primality testing, interactive proof systems, and methods of secret sharing.

**Components:** Lecture**Course Equivalents:** CS 456**Attributes:** Given When Needed**Requirement Group:** Prerequisites: CS142, EE262, or EE361, and MA211. (CS344 Recommended)**Req. Designation:** Technology

**School of Arts and Sciences - Mathematics - Subject: Mathematics****MA 497(1 - 3)****Course ID:008822****2017-01-13****Instructor Consent Required****Undergraduate Research**

Students engage in mathematical research with a faculty member. The topic will be determined by student interest and faculty research programs. This course may be repeated for credit.

**Components:** Research**Attributes:** Given When Needed**Req. Designation:** Technology**MA 499(0)****Course ID:008824****2015-02-09****Professional Experience**

This course records success in completing the requirements other than conventional course work for all mathematics majors. The student must present evidence demonstrating skill in communications and understanding the profession. The requirement can be satisfied in a number of ways including internships or co-ops with appropriate professional content, participation in REU programs, a mathematical honors thesis, teaching assistance in mathematics, active participation in professional societies including attendance at regional or national conferences and presentation of work at such. Directed study or research courses that lead to such presentations would also satisfy the requirement. Check with the Math department for specific requirements.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology

**Science - Mathematics - Subject: Mathematics**

MA 512(3)

Course ID:008828

2022-10-19

**Differential Geometry**

In this course, we develop the basic concepts of differential geometry in the context of curves and surfaces in three dimensional Euclidean space, as well as in abstract manifolds. Topics covered include the local theory of surfaces in Euclidean space, the first and second fundamental forms, Gaussian and mean curvature, isometries, geodesics, parallel translation, covariant differentiation, and the Gauss-Bonnet Theorem. Based on student interest, topics ranging from abstract manifolds, Lie groups, de Rham theory, tensors, and general relativity may also be covered.

Students should have a good knowledge of multivariable calculus and linear algebra, as well as tolerance for a definition-theorem-proof style of exposition.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics**

**MA 513(3)** Course ID:011423 2014-08-01

**Abstract Linear Algebra**

A proof-oriented introduction to linear algebra. Vector spaces, linear transformations, determinants, eigenvalues, canonical forms, and inner-product spaces. Notions of null spaces, spectral decomposition theorem, positive definiteness, and also Penrose pseudo-inverse and singular value decomposition will be included. Students will be expected to independently investigate some aspects of the course material.

Prerequisite: Linear Algebra

Components: Lecture

Req. Designation: Technology

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**MA 514(3)** Course ID:008829 2015-01-28

**Sets and Topology**

Sets and set operations. Construction of the number system. Axiom of choice and its equivalents. Transfinite numbers. Topological spaces. Separation and connectedness. Product and quotients. Compactness. Topological groups.

Prerequisite: linear algebra.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

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**MA 521(3)** Course ID:008830 2015-01-28

**Classical Complex Analysis**

Complex series and power series. Analytic functions and basic mapping properties. Cauchy's theorem and its consequences. Residue theorem and applications.

Prerequisite: advanced calculus.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

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**MA 522(3)** Course ID:008831 2015-01-28

**Classical Real Analysis**

Metric spaces and metric topology. Continuity, connectedness and compactness. Contraction mapping theorem and applications. Lebesgue measure and integral on euclidean spaces. Fourier series.

Prerequisite: advanced calculus.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

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**MA 525(3)** Course ID:011265 2015-01-28

**Functional Analysis**

This course introduces the students to the fundamental aspects of applied functional analysis. This field builds upon the concepts of real and complex analysis, developing the general theories of Banach spaces, bounded linear operators, and linear functionals. The primary focus of the course will be applications of functional analysis to other fields of mathematics, including such topics as dual spaces, weak topologies and weak convergence, approximation theory, and the applications of operator theory to the solutions of partial differential equations. Recommended prerequisites: courses in Real Analysis and Complex Analysis or consent of the instructor.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

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**MA 526(3)** Course ID:008832 2015-01-28

**Convex Optimization and Analysis**

Convex sets, functions, and optimization problems. Basics of convex analysis. Least-squares, linear and quadratic programs, semidefinite programming, minimax and extremal volume problems. Optimality conditions, Lagrange multipliers and KKT conditions, duality theory, primal and dual decomposition theorems of alternative interior point methods. Possible applications to come from signal processing, physics, control theory, mechanical engineering, image processing, manifold learning. Other topics may include epigraphs, subdifferentials and cone convexity, and multiobjective optimization.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisites: MA578; MA513 or MA573; and MA522

Req. Designation: Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics****MA 531(3) Course ID:008833 2015-01-28****Initial and Boundary Value Problems and Partial Differential Equations**

Solution techniques for ordinary differential equations. Series solutions. Boundary value problems and special functions. Classification of partial differential equations. Linear problems shall include heat equation, wave equation, and Laplace's equation. Separation of variables and boundary value problems will be presented. Nonlinear equations shall be discussed, including reaction diffusion and reaction advection. Method of characteristics will be presented and shocks and singularities shall be included, and so will Burger's equation be included.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**MA 533(3) Course ID:011581 2011-01-27****Ordinary Differential Equations**

Please check with the math department for a course description

**Components:** Lecture**Req. Designation:** Technology**MA 550(3) Course ID:011943 2015-01-28****Nonlinear Partial Differential Equations**

This course introduces the analysis of Partial Differential Equations, (PDE's). Topics include linear PDE's such as transport, Laplace, heat and wave equations. Necessary functional analysis such as  $L^p$  spaces, Hilbert spaces, linear operator theory, dual spaces and weak convergence and the theory of Sobolev spaces will be included. Methods will include classical maximum principles, Galerkin truncation methods for global existence of weak solutions, and finite time blow up. The application of Sobolev spaces for existence theory of elliptic and parabolic PDE, and certain nonlinear reaction diffusion equations, such as models for population dynamics may be covered as time allows.

Prerequisites: Basic PDE, Advanced Calculus. Real and/or functional analysis is recommended but not required.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**MA 562(3) Course ID:008840 2015-01-28****Complex Analysis with Applications**

Complex numbers and functions, conformal mapping and applications, derivative, Cauchy-Riemann equations, real and complex line integrals, Fundamental Theorem, Cauchy and Poisson formulas, Taylor series, analytic continuation, special functions, Laurent series, residues. Applications to partial differential equations.

Prerequisite: MA231.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**MA 563(3) Course ID:010538 2015-01-28****Applied Dynamical Systems**

This course will emphasize applied dynamical systems, nonlinear science, and chaos theory. The dynamical systems approach emphasizes the study of long-term evolution through geometrical and topological considerations. We will emphasize applications from mechanics, engineering, physics, biology, medicine and chemistry.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**MA 571(3) Course ID:008842 2015-01-28****Numerical Solution of Differential Equations**

Numerical solution of initial and boundary value problems in ordinary differential equations, finite difference methods for elliptic, parabolic, and hyperbolic partial differential equations. Additional topics may include introduction to finite element and spectral methods.

Prerequisites: MA377 or consent of the instructor and the ability to program.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Mathematics - Subject: Mathematics****MA 572(3)****Course ID:008843****2014-12-04****Finite-Element Methods**

[Cross-listed with CE 538, ME 515] This course is an introduction to the finite element method, from a mathematical as well as a modeling and applications point of view. The basic theory and implementation will be discussed in the context of continuum problems in linear elasticity, potential flow and plate modeling. If time permits, additional applications such as structures, electromagnetics, fluid mechanics, ground water and geotechnics will also be discussed. Topics include: weak formulations and the principle of virtual work, discretization and interpolation-function selection, assembly and solution of the system equations, error estimates and accuracy assessment. When taught in conjunction with CE 438/ME 453 the course requires additional independent work for those registered for the graduate course.

Prerequisites: MA232, MA339 or MA330, ES222, ES330, and the ability to program. Consent of the instructor may be used to replace some prerequisites.

**Components:** Lecture

**Course Equivalents:** CE 538, ME 515

**Req. Designation:** Technology

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**MA 573(3)****Course ID:008844****2015-01-28****Matrix Theory and Computations**

This course presents topics in matrix theory that are useful in applications to engineering, science and other branches of mathematics. Review of linear algebra, including vector and matrix norms and canonical forms, numerical methods for linear systems (direct and iterative methods), eigenvalue problems, singular value decomposition, orthogonal projections, matrix decompositions, generalized inverses. Additional topics may include applications to least squares and optimization.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**MA 578(3)****Course ID:008846****2015-01-28****Numerical Analysis**

Review of linear algebra and systems, solution of nonlinear equations and systems, interpolation, approximation of functions, orthogonal polynomials, numerical differentiation and integration. Additional topics may include eigenvalue problems, iterative methods for linear systems and topics from optimization. Prerequisites: linear algebra.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**MA 579(3)****Course ID:010460****2015-01-28****Introduction to Applied Optimization**

The motivation for this course is that optimization problems arise routinely in most applications -- from designing an airline schedule to minimize cost to designing a remediation strategy for a contaminated ground water site. In this course we will focus on numerical techniques to solve applied optimization problems of various formulations. Topics will include solutions to linear and nonlinear equations, nonlinear programming, unconstrained and constrained optimization, black-box formulations and a glance at sampling methods, as time allows, extra topics may include multi-objective optimization, mixed integer programming methods, and evolutionary algorithms. This course will include a computing component with MATLAB and possibly some off-the-shelf optimization packages. The objectives are (a) to become familiar with a range of optimal design formulations and techniques appropriate for those formulations, (b) to motivate the need for efficient numerical methods for optimization problems, (c) to study these methods through implementation and analysis,

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**MA 581(3)****Course ID:008847****2016-08-15****Probability**

[Cross-listed with STAT 581] Sample spaces; axioms of probability; basic theorems; random variables (discrete and continuous); combinatorial methods; Bayes' Theorem and conditional probability; expected values and variances; distribution functions, including: binomial and multinomial, Poisson, normal and bivariate normal distributions, and others such as geometric, hypergeometric, negative binomial, exponential, gamma and beta; joint distributions; covariance and correlation; central limit theorem; geometric probability; method of transformations; introduction to stochastic processes.

**Components:** Lecture

**Course Equivalents:** MA 381, STAT 381, STAT 581

**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics**

**MA 585(3)** Course ID:008850 2022-05-05

**Bayesian Data Analysis**

[Cross-Listed STAT585] This course will introduce both the principles and practice of Bayesian methods for data analysis. This is a hands-on course that will use MATLAB, R or other suitable software at instructor discretion. Students will learn to write their own Bayesian computer programs to solve problems relevant to engineering, biology, chemistry, physics, earth science, ecology, economics, signal processing and machine learning. Topics that will be included are parameter estimation, model selection, time series and error analysis. Prerequisites: MA383 or equivalent and familiarity with matrices; or consent of the instructor.

**Components:** Lecture

**Course Equivalents:** STAT 585

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**MA 601(1 - 10)** Course ID:008851 2015-01-28

**Topics in Mathematics**

Prerequisites: consent of the instructor.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**MA 701(1 - 10)** Course ID:008883 2015-01-28

**Directed Study in Mathematics**

Prerequisites: consent of the instructor.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**MA 705(1 - 10)** Course ID:008887 2015-01-28 **Instructor Consent Required**

**Directed Study in Applied Mathematics**

Directed Study in Applied Mathematics

**Components:** Independent Study

**Req. Designation:** Technology

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**MA 707(1 - 10)** Course ID:008889 2015-01-28 **Instructor Consent Required**

**Directed Study in Numerical Analysis**

A directed study in Numerical Analysis, intended to give a student the opportunity to further explore an area of interest to them under the supervision of a faculty member.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**MA 710(0)** Course ID:013039 2020-04-07

**Department of Mathematics Colloquium**

The colloquium is the sequence of talks given to the Department of Mathematics by local and visiting researchers in mathematics, statistics, and other fields of interest. This course serves to expose graduate students in mathematics to a broader range of research topics. All graduate students are expected to attend the colloquium as a part of the education toward their degree. The course does not carry a credit load, but serves to document grad student participation and avoid scheduling overlap.

**Components:** Seminar

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**MA 719(1 - 10)** Course ID:008894 2015-01-28 **Instructor Consent Required**

**Directed Study in Nonlinear Processes**

A directed study in Nonlinear Processes, intended to give a student the opportunity to further explore an area of interest to them under the supervision of a faculty member.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**MA 725(1 - 10)** Course ID:008898 2015-01-28

**Seminar in Applied Mathematics**

Prerequisites: consent of the instructor.

**Components:** Seminar

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Mathematics**

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MA 739(1 - 10) Course ID:008904 2017-01-23

**Seminar in Nonlinear Processes**

[Cross-Listed with EE739]Prerequisites: consent of the instructor.

Components: Seminar

Course Equivalents: EE 739

Attributes: Given When Needed

Req. Designation: Technology

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MA 810(1 - 0) Course ID:008905 2017-01-12

**Thesis Dissertation or Special Projects**

Components: Thesis Research

Attributes: Given When Needed

Req. Designation: Technology

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MA 999(1 - 10) Course ID:011100 2015-01-19

**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

**ME 1(2 - 4)** Course ID:008906 2015-01-19

**Mechanical & Aeronautical Engineering Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Lecture

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**ME 2(2 - 4)** Course ID:008907 2015-01-19

**Mechanical & Aeronautical Engineering Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used as a Professional Elective.

**Components:** Lecture

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**ME 201(1)** Course ID:010194 2022-03-18

**Measurement & Instrumentation**

[Cross-listed with AE 201] This course provides an introduction to measurement and instrumentation in mechanical and aerospace engineering. Fundamental components of mechanical measurement systems are studied through laboratory experiments. Tests include electromechanical instruments, circuits, actuators, controls, and data acquisition systems. First order uncertainty analysis is performed and empirical results are compared with engineering principles from material science, statics, strength of materials, rigid body dynamics and electrical science.

**Components:** Lecture

**Course Equivalents:** AE 201

**Attributes:** Two communication units, Offered Spring Term

**Requirement Group:** Corequisites: ES220, ES222, ES223

**Req. Designation:** Technology

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**ME 212(3)** Course ID:008908 2020-06-12

**Introduction to Engineering Design**

This course lays the foundation for the design curriculum of the MAE Department. Students are introduced to how to solve complex, open-ended engineering problems. Core topics covered are: the design process; engineering ethics and professional responsibilities; design for safety; mathematical and computer modeling; and written, oral and graphical communication. These topics are presented within the framework of at least two open-ended design projects which students must propose and accomplish through the completion of the preliminary design phase including a design report and presentation slides for each project.

**Components:** Lecture

**Course Equivalents:** AE 212, CE 212

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: ES100 or equivalent, PH131, or permission of the instructor.

**Req. Designation:** Technology

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**ME 301(1)** Course ID:010196 2022-04-13

**Experimental Methods**

This is a hands-on experimental methods course with applications in mechanical engineering. Mechanical measurement techniques focus on temperature, strain, force, pressure, fluid flow, friction and vibration. Course topics include workplace safety, test procedures, calibration, measurement uncertainty, error propagation, design of experiments, data acquisition, sampling, data analysis, and technical report writing.

**Components:** Lecture

**Course Equivalents:** AE 301

**Attributes:** Two communication units, Offered Fall Term

**Requirement Group:** Prerequisites: ME201 or AE201

**Req. Designation:** Technology

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**ME 310(3)** Course ID:008911 2016-11-02

**Thermodynamic System Engineering**

The preliminary design of thermodynamic systems made up of components such as turbines, pumps, compressors, boilers, evaporators, and condensers will be investigated. The major emphasis will be on the design of systems operating at steady-state, but start-up and transient operation will also be studied. Design work will consider actual, rather than ideal, thermodynamic systems, and account for the applicable combustion and psychrometric aspects of the system. Both individual and team work may be required. Open-ended problems on topics discussed will be assigned. Oral and written reports will be required. Some laboratory work may be required.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: ES340 or CH260

**Req. Designation:** Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

**ME 324(3)** Course ID:008912 2016-06-01

**Dynamical Systems**

[Cross-listed with EE 324] Dynamic systems classification, mathematical modeling of mechanical, electrical and mixed dynamic systems, state space representation, equilibrium points and linearization, solution of linear input/output and state equations, Laplace transforms, transfer functions and block diagrams, first and second order systems, stability, frequency response and simulation techniques.

**Components:** Lecture

**Course Equivalents:** EE 324

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisites: MA232.

**Req. Designation:** Technology

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**ME 326(3)** Course ID:008913 2022-03-18

**Intermediate Fluid Mechanics**

A continuation of ES 330. Topics include: deformation and stress in fluids; basic conservation laws; kinematics of fluid flow; theory of potential flow; introduction to compressible flows; isentropic flows and shock waves; compressible flows with friction and heat transfer; Navier-Stokes equation and theory of viscous flow; low Reynolds number flows with applications to hydrodynamic lubrication; laminar boundary layer theory and von Karman momentum integral method; introduction to computational fluid dynamics; applications of fluid mechanics to engineering problems including turbomachinery. Introduction to design concepts.

**Components:** Laboratory, Lecture

**Course Equivalents:** AE 425

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisites: ES330 and MA 232, and either ES340 or CH271

**Req. Designation:** Technology

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**ME 341(3)** Course ID:008914 2015-02-12

**Mechanics of Machine Elements**

The course reviews and extends the study of strength of materials and engineering materials behavior concepts with applications to mechanical design/behavior of classical machine elements. Additional coverage of multi-axial static failure theories, fatigue of materials and components and fracture mechanics is also provided. A self-directed study of a machine component is undertaken.

**Components:** Lecture

**Attributes:** Offered Fall, Spring, and Summer

**Requirement Group:** Prerequisites: ES222.

**Req. Designation:** Technology

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**ME 342(3)** Course ID:012852 2018-04-04

**Introduction to Numerical Methods with Application**

The goal of this course is to introduce the techniques needed for the numerical solution of ordinary and partial differential equations. These techniques will include the formulation of physical problems for numerical simulations, discretization and solution methods, and use of commercial software for solving engineering problems governed by differential equations. Specific topics covered are numerical differentiation, integration, interpolation, and associated errors, the solution of systems of non-linear algebraic equations, and the solution of initial and boundary value problems using finite difference and finite element methods.

**Components:** Laboratory, Lecture

**Course Equivalents:** AE 342

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisites: ES 100, or HP102 and HP103, or EM120 and EM121, or CS141, and MA 232 Corequisites: ES 222

**Req. Designation:** Technology

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**ME 365(3)** Course ID:008918 2015-02-09 **Instructor Consent Required**

**Independent Projects I**

[Cross-listed with AE 365] An opportunity for the student to become involved singly, or with a group, working on a special project under the guidance of a faculty member. Topics are often suggested by the faculty but suggestions from the students are encouraged. By permission of advisor only.

**Components:** Independent Study

**Course Equivalents:** AE 365

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

**ME 366(3)** Course ID:008919 2014-11-18 Instructor Consent Required  
**Independent Projects II**  
 [Cross-listed with AE 366] Continuation of ME 365.  
**Components:** Independent Study  
**Course Equivalents:** AE 366  
**Req. Designation:** Technology

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**ME 380(3)** Course ID:010270 2014-11-19  
**Special Topic: Biomechanics**  
 [Cross-listed with ES 380] This course will examine the application of engineering principles to biologic systems. The structure and function of biologic tissue will be examined in the context of engineering mechanics. Emphasis will be placed on the biomechanics of human movement, including the basic principles of orthopedic biomechanics. Students will develop the skills necessary to explore biomechanics in the contemporary scientific literature and will write a term paper on a biomechanics topic of their choice.  
**Components:** Discussion, Lecture  
**Course Equivalents:** ES 380  
**Requirement Group:** Prerequisites: PH131 and MA132  
**Req. Designation:** Technology

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**ME 385(3)** Course ID:011148 2022-04-05  
**Design of Electromechanical Systems**  
 This course will cover analog electronic design for purposes of controlling electromechanical systems, including electromechanical sensors and actuators, analog electronic design of filters, state space and classical controllers, and transistor-based servoamplifiers and high voltage amplifiers. The course has a significant laboratory component in which students are expected to design and fabricate circuits to control electromechanical systems. Implementation of digital controllers is also covered. Text Description: The Art of Electronics, Horowitz and Hill, Cambridge University Press, Second Edition, Mechatronics: An Integrated Approach, Clarence de Silva, CRC Press.  
**Components:** Lecture  
**Attributes:** Offered Fall Term  
**Requirement Group:** Prerequisites: ES250, MA232, and ES223  
**Req. Designation:** Technology

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**ME 390(3)** Course ID:008922 2023-03-03  
**Advanced Manufacturing Processes**  
 Brief introduction to the traditional manufacturing processes such as bulk deformation, extrusion, forging/forming, cold & hot working, and joining/welding. Emphasis will be on advanced near net shape forming/processes of engineering materials known as Additive Manufacturing/3D Materials Processing, including 3D processing for Polymers as well as metals.  
**Components:** Lecture  
**Course Equivalents:** ME 503  
**Attributes:** Offered Fall Term  
**Requirement Group:** Prerequisites: ES260  
**Req. Designation:** Technology

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**ME 401(1)** Course ID:010198 2022-01-26  
**Test Engineering**  
 [Cross-listed with AE 401] This is a test engineering course focused on measurement, test and experiment design in mechanical and aerospace engineering. The course primarily involves a semester-long team-based experimental project including a proposal, test plan, risk assessment, measurement equipment selection, procedure writing, test execution, data acquisition, analysis, and technical paper writing.  
**Components:** Lecture  
**Course Equivalents:** AE 401  
**Attributes:** Offered Spring Term  
**Requirement Group:** Prerequisites: ME/AE301  
**Req. Designation:** Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

**ME 405(3)** Course ID:013162 2022-03-23

**Geometric Dimensioning and Tolerancing**

During this course, the students will be introduced to the foundational concepts of Geometric Dimensioning and Tolerancing. It will briefly review traditional coordinate dimensioning practices and then continue with the key concepts of GD&T that address the known limitations and shortcomings of coordinate dimensioning. This course will prepare students to begin thinking of design approach with regard to defining and documenting machine component's function in addition to its size and shape. This course is instructor led with many class participation examples and hands-on student exercises. After final review and student assessments, students will be exposed to 2D and 3D CAD tools and shown how to apply the lessons learned from this course, to CAD drawings.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisite: ME 212

**Req. Designation:** Technology

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**ME 411(3)** Course ID:008925 2015-02-12

**Introduction to Heat Transfer**

Introductory treatment of steady and transient conduction, natural and forced convection and radiation heat transfer with applications to basic heat exchanger design and other multimode problems. Students will complete at least one design project. Laboratory work may be required.

**Components:** Lecture

**Attributes:** Offered Fall, Spring, and Summer

**Requirement Group:** Prerequisites: ES330 or CH301, ES340 or CH271, and MA232 or equivalent.

**Req. Designation:** Technology

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**ME 424(3)** Course ID:012986 2019-10-23

**Advanced Biomechanics**

[Cross-listed with ME524] Solid biomechanics including structure, function, and mechanical properties of biological tissues. Emphasis will be placed on cell mechanics and signalling, mechanobiology, and remodeling. Current literature topics will be covered.

**Components:** Lecture

**Course Equivalents:** ME 524

**Attributes:** Offered Spring Term

**Requirement Group:** ME424 Prerequisites: MA232 and ES222.

**Req. Designation:** Technology

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**ME 443(3)** Course ID:008935 2014-11-18

**Optimal Engineering**

[Cross-listed with AE 443] An introduction to the optimal design of mechanical systems. This course involves the application of mathematical optimization techniques, including linear and nonlinear methods, to the design of devices and systems of interest to mechanical engineers. Emphasis is placed on the formulation of problems which can be solved by these techniques. Use is made of currently available optimal design computer programs.

**Components:** Lecture

**Course Equivalents:** AE 443

**Requirement Group:** Prerequisites: AE/ME350 or ME341.

**Req. Designation:** Technology

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**ME 444(3)** Course ID:008936 2015-02-09

**Computer Aided Engineering**

An introduction to computer-aided design of mechanical and structural systems. The course deals with the use of commercially available computer-aided design software and hardware for the design of mechanical and structural assemblies. The production of engineering drawings using a CAD system will also be discussed. Hands-on experience is emphasized. Students entering the course are assumed to have a basic understanding of general computer usage and computer graphics in particular.

**Components:** Lecture

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisites: ES100 or EM121 and MA231

**Req. Designation:** Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering****ME 445(3)** Course ID:008937 2021-11-04**Integrated Design I**

This course provides a review and extension of the basic methodology and decisions surrounding design leading to the conceptual and preliminary design of mechanical systems. Topics covered included preliminary sizing, mathematical modeling, experimental evaluation, requirements and constraints, layout, fluid mechanics and thermal sciences issues, structural issues, economics, trade studies, and ethical implications of the design and decision process.

**Components:** Lecture**Attributes:** Offered Each Term**Requirement Group:** Prerequisites: AE/CE/ME212, ES330, and ES340 or CH271 Corequisites: ME341**Req. Designation:** Technology**ME 446(3)** Course ID:008938 2021-11-04**Integrated Design II**

Continuation of concepts introduced in the Integrated Design I on the basic methodology and decisions surrounding mechanical systems design including what is necessary for final detail design. The course is supplemented by lectures on various topics including conceptual design issues, detailed system considerations, trade studies, integration, structural issues, computational mechanics, testing considerations, cost, and manufacturing.

**Components:** Lecture**Attributes:** One communication unit, Offered Each Term**Requirement Group:** Prerequisites: ME445**Req. Designation:** Technology**ME 450(3)** Course ID:008940 2014-11-19**Control Systems**

[Cross-listed with EE 450] Introduction to the analysis and design of continuous-time feedback control systems. Topics include: mathematical representation of physical systems with linear differential equations, Laplace transforms, transfer functions, block diagrams and signal flow graphs, feedback, sensitivity, transient specifications, steady-state tracking errors, stability, root locus plots, compensator design, simulation.

**Components:** Lecture**Course Equivalents:** EE 450**Requirement Group:** Prerequisites: AE/EE/ME324 or Corequisite: EE321.**Req. Designation:** Technology**ME 452(3)** Course ID:008942 2021-03-03**Advanced Strength of Materials**

A study of properties of materials, general stress-strain relationships, modern strength theories, unsymmetrical bending, curved beams, beams on elastic foundations, the equations of elasticity and plasticity (1 credit of design)

**Components:** Lecture**Course Equivalents:** CE 452**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: ES222**Req. Designation:** Technology**ME 455(3)** Course ID:008944 2014-11-18**Mechanical Vibrations and Control**

[Cross-listed with AE 455] Fundamentals, free vibration, harmonically excited vibration, transient vibration, multi-degree freedom systems, vibration measurements, introduction to control theory, linear feedback control, vibration control, adaptive and optimal control, numerical methods.

**Components:** Lecture**Course Equivalents:** AE 455**Requirement Group:** Prerequisites: ES223**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Mechanical Engineering****ME 457(3)** Course ID:008945 2023-03-03**Composite Mechanics and Design**

Nature of composite materials. Classification and characteristics of composite materials, mechanical behavior of composite materials. Macromechanical and micromechanical elastic behavior of unidirectional lamina. Constitutive and transformation relations. Strength of unidirectional lamina. Composite failure theory. Mechanics of multidirectional structural laminates. Lamination theory. Strength and failure analysis of multidirectional laminates. Effect of temperature and moisture.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: ES222 and ES260**Req. Designation:** Technology

**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering****ME 465(3)** Course ID:008947 2014-11-18 Instructor Consent Required**Advanced Independent Projects I**

[Cross-listed with AE 465] An opportunity for the advanced student to undertake an independent investigation in a mechanical engineering field of his or her own choice. Assistance will be given only when the student requests it. The project may be a comprehensive literature investigation, involve laboratory experiments, or involve analytical work by permission of adviser only.

**Components:** Independent Study**Course Equivalents:** AE 465**Req. Designation:** Technology**ME 492(3)** Course ID:008952 2022-03-23**Welding Metallurgy**

Introduction to conventional and non-conventional welding processes. Weldability problems in ferrous, non-ferrous and metal-matrix composite materials will be discussed. Solidification modes and their effects on the mechanical properties of weldments will be examined. Students will perform arc welding and friction welding of alloys, and ultrasonic welding of plastics.

**Components:** Laboratory, Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: ES260**Req. Designation:** Technology

**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering****ME 500(3)****Elasticity**

[Formerly MER 500] The behavior of substances that possess the property of recovering their size and shape when forces producing deformation are removed. Review of stress and strain; study of two-dimensional problems in rectangular, polar, and curvilinear coordinates; introduction to three-dimensional problems; torsion and bending.

Prerequisites: Calculus IV, Linear Algebra and Differential Equations, and Mechanics of Materials or equivalent

**Components:** Lecture**Attributes:** Offered Winter Term**Req. Designation:** Technology**ME 501(3)****Transport Phenomena**

[Formerly MER 501] The fundamentals of momentum, energy, and mass transfer and their analogous transport mechanisms. One-dimensional transport, transport properties, transport with internal generation, transfer coefficients, convective and turbulent transport.

Prerequisites: Linear Algebra and Differential Equations, Heat Transfer Analysis and Design or equivalents

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**ME 502(3)****Engineering Analysis**

[Formerly MER 502] Topics in applied mathematics needed to analyze and model engineering problems by constructing mathematical models for a physical situation and the reduction of the ensuing mathematical problems to numerical procedures. Matrices, linear algebra, vector and tensor calculus, partial differential equations, calculus of variations, finite element and difference techniques, Fourier series and integrals.

Prerequisites: Calculus, Linear Algebra and Differential Equations or equivalents

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

ME 503(3) Course ID:012741

2021-06-01

**Advanced Manufacturing Processes**

Brief introduction to the traditional manufacturing processes such as bulk deformation, extrusion, forging/forming, cold & hot working, and joining/welding. Emphasis will be on advanced near net shape forming/processes of engineering materials known as Additive Manufacturing/3D Materials Processing, including 3D processing for Polymers as well as metals.

**Components:** Lecture**Course Equivalents:** ME 390**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering****ME 506(3)** Course ID:012593 2016-07-01**Mechanical Behavior of Materials**

[Formerly MER 506] Strain relationships in elastic and plastic behavior. Metallurgical fundamentals of plastic deformation. Dislocation theory. Materials testing. Creep and metal fatigue.

Prerequisites: Calculus, Linear Algebra, Differential Equations, and Mechanics of Materials or equivalents

Components: Lecture

Req. Designation: Technology

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**ME 507(3)** Course ID:012594 2016-07-01**Design for Manufacturing**

[Formerly MER 507] This course will introduce the student to the principles of design for manufacturing. The course will begin by examining modern manufacturing operations including machining, casting, forging, welding, brazing, soldering, finishing, heat treating, assembly, plastic materials processing, powder metallurgy, and specialized manufacturing processes. This section will also include electronics manufacturing, covering both through-hole technology and surface mount devices. For each manufacturing process, capabilities and limitations will be discussed and how they relate to part design and cost. Design for manufacturing principles will be examined, including how the designer affects manufacturing cost, lean manufacturing, six sigma, value stream analysis, manufacturing rate, the cost of quality, process flexibility, process simulation, and process economics.

Components: Lecture

Req. Designation: Technology

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**ME 508(3)** Course ID:012595 2016-07-01**Fracture Mechanics**

[Formerly MER 508] Modern theory of fracture in design. The ability to apply fracture mechanics principles to the design and analysis of engineering structures. Subjects treated include occurrence of fracture, fracture toughness, fracture resistance, and fatigue.

Prerequisites: Mechanics of Materials or equivalent

Components: Lecture

Req. Designation: Technology

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**ME 509(3)** Course ID:012596 2016-07-01**Current Approaches to Fatigue in Design**

[Formerly MER 509] To provide engineering students with an understanding of fatigue mechanisms, design criteria and realistic examples to avoid and predict fatigue/durability failures in structures and components. The major emphasis of the course is fatigue of metals as applied to a variety of engineering structures and components, including both fatigue mechanisms and design applications. The course material is applicable to ground vehicles, buildings/bridges, aerospace vehicles, ships, nuclear pressure vessels, metal implants/prostheses and others. Both constant amplitude and variable amplitude fatigue life situations are considered.

Prerequisites: Calculus, Differential Equations, Strengths of Materials

Components: Lecture

Req. Designation: Technology

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**ME 510(3)** Course ID:012597 2016-07-01**Advanced Dynamics**

[Formerly MER 510] Analytical dynamics with engineering applications to particles and rigid bodies. Topics include three-dimensional kinematics and dynamics, Lagrangian dynamics. Prerequisites: Advanced Mechanics, Rigid Body Mechanics or equivalent

Components: Lecture

Req. Designation: Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

ME 511(3)

Course ID:012782

2017-01-11

**Introduction to Acoustics**

This course covers the basic concepts of acoustical analysis for engineers. Topics covered included wave propagation, and sound radiation, absorption, and transmission. Treatment of the material is considered from the viewpoint of harmonic oscillators, and builds upon the foundation of frequency domain analysis.

**Components:** Independent Study**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: ME455 or Instructor Permission**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering****ME 512(3)** Course ID:012598 2016-07-01**Vibrations of Discrete Systems**

[Formerly MER 512] Response of single and multi-degree-of-freedom systems to harmonic, periodic and impulsive excitation. Fourier series and transforms; ideal impulse and impulse response; convolution in the time and frequency domains; matrix and modal methods; system eigenvalues and vectors; impulse testing with a spectrum analyzer.

Prerequisites: Dynamics and Kinematics or equivalent, Calculus, Differential Equations, Mat Lab helpful

Components: Lecture

Req. Designation: Technology

**ME 513(3)** Course ID:012600 2016-07-01**Processing and Selection of Engineering Materials**

[Formerly MER 515] A comprehensive examination of processing technologies for engineering materials, and the effects of selected processing routes and materials to meet and satisfy design and applications criteria.

Prerequisites: Mechanics of Materials or equivalent

Components: Lecture

Req. Designation: Technology

**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering****ME 515(3)****Course ID:008956****2014-11-20****Finite Element Methods**

[Cross-listed with CE 538, MA 572] This course is an introduction to the finite element method, from a mathematical as well as a modeling and applications point of view. The basic theory and implementation will be discussed in the context of continuum problems in linear elasticity, potential flow and plate modeling. If time permits, additional applications such as structures, electromagnetics, fluid mechanics, ground water and geotechnics will also be discussed. Topics include: weak formulations and the principle of virtual work, discretization and interpolation-function selection, assembly and solution of the system equations, error estimates and accuracy assessment. When taught in conjunction with CE 438/ME 453 the course requires additional independent work for those registered for the graduate course.

Prerequisites: MA232, MA339 or MA330, ES222, ES330, and the ability to program. Consent of the instructor may be used to replace some prerequisites.

**Components:** Lecture

**Course Equivalents:** CE 538, MA 572

**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering****ME 516(3)** Course ID:012601 2016-07-01**Finite Element Methods in Engineering**

[Formerly MER 516] This course provides an introduction to the finite element method with an emphasis for solving structural engineering problems. It will cover a review of matrix algebra and the solution to simultaneous linear equations. It will then lead to an introduction of the stiffness method, which will include a review of the equations from elasticity. The method will then be applied to bar and beam equations, followed by 2D plane strain equations. Modeling guidelines will then be covered, along with axisymmetric analysis and isoparametric formulations; finishing up with three dimensional analysis. Prerequisites: Calculus, Differential Equations, Strength of Materials or Equivalent

Components: Lecture  
Req. Designation: Technology

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**ME 517(3)** Course ID:008958 2016-09-01**Advanced Thermal Systems**

Advanced treatment of steady and transient conduction, convection and radiation heat transfer with applications to various thermal systems such as electronic circuits and HVAC.

Components: Lecture  
Same As Offering: ME 517  
Attributes: Given When Needed  
Req. Designation: Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

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ME 517(3) Course ID:008958 2016-09-01

**Advanced Thermal Systems**

Advanced treatment of steady and transient conduction, convection and radiation heat transfer with applications to various thermal systems such as electronic circuits and HVAC.

**Components:** Lecture

**Same As Offering:** ME 517

**Attributes:** Given When Needed

**Req. Designation:** Technology

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ME 520(3) Course ID:013127 2021-09-28

**Aeroelasticity**

Aeroelasticity of lifting surfaces, plates, and shells with particular emphasis on prediction of flutter, divergence, and control surface reversal. Topics will include unsteady aerodynamic effects, multiple mode interactions, prediction techniques, and reduced-order-models.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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ME 524(3) Course ID:012987 2019-10-23

**Advanced Biomechanics**

[Cross-listed with ME424] Solid biomechanics including structure, function, and mechanical properties of biological tissues. Emphasis will be placed on cell mechanics and signalling, mechanobiology, and remodeling. Current literature topics will be covered.

**Components:** Lecture

**Course Equivalents:** ME 424

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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ME 527(3) Course ID:008960 2019-03-08

**Advanced Fluid Mechanics**

An introductory level graduate course in fluid mechanics. Spatial and material coordinates, kinematics of fluid motion, continuity and momentum equations, constitutive relations, simple solutions, potential flows, boundary layer theory, creeping flow, flow through porous media, particle motion, interfacial phenomena, turbulence.

Prerequisites: CH301 or ES330 or equivalent.

**Components:** Laboratory, Lecture

**Same As Offering:** ME 527

**Course Equivalents:** CE 527

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering****ME 527(3)** Course ID:008960 2019-03-08**Advanced Fluid Mechanics**

An introductory level graduate course in fluid mechanics. Spatial and material coordinates, kinematics of fluid motion, continuity and momentum equations, constitutive relations, simple solutions, potential flows, boundary layer theory, creeping flow, flow through porous media, particle motion, interfacial phenomena, turbulence.

Prerequisites: CH301 or ES330 or equivalent.

**Components:** Laboratory, Lecture

**Same As Offering:** ME 527

**Course Equivalents:** CE 527

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

ME 529(3) Course ID:008962 2015-04-29

**Stochastic Processes in Engineering**

Review of the theory of probability. Single and multiple random variables topics, such as distributions, moments, conditioning, central limit theorem, and Laws of Large Numbers. Stochastic processes. Stationary and nonstationary processes. Time averaging and ergodicity. Correlation and power spectrum. Langevin's equation and Markov processes. Poisson and Gaussian processes. Response of linear systems. Approximate methods for analysis of nonlinear stochastic equations Application to engineering problems, such as random vibrations, turbulence, estimation theory, signal detection, and others.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

ME 531(3) Course ID:008963 2015-01-20

**Computational Fluid Dynamics**

The course will present advanced computational methods for solutions of transient and steady-state problems in fluid mechanics and in transport phenomena, including incompressible flows, compressible flows, heat transfer, transport of suspended particles, etc. The course will require programming in Fortran or other languages. Post processing of data will include the use of computer graphics. Special projects in application of the course material to research-oriented problems in engineering will be emphasized.

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

ME 533(3) Course ID:013017 2020-01-17

**Additive Manufacturing: Materials and Applications**

This course offers a broad introduction to history, current status and future trends of Additive Manufacturing process, while also comparing with other conventional manufacturing techniques. Various aspects of successful AM production process will be discussed, from raw materials to machines and techniques. While 3D printing of metallic materials will be emphasized, brief introductions to Ceramic and Polymer AM will also be provided.

Components: Lecture

Attributes: Offered Even Springs

Req. Designation: Technology

ME 535(3) Course ID:013152 2022-03-17

**Introduction to Acoustics and Voiced Speech Applications**

This course provides an introduction to acoustics. The topic is developed using a framework based on vibrations. Topics covered include transverse vibrations, the acoustic wave equation, sound sources, and reflection and transmission. Application to voiced speech production is emphasized in the second half of the course, providing an overview of the anatomy and physiology and mechanics of voiced speech production. Sound production and transmission within the vocal tract is subsequently explored.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

ME 537(3) Course ID:008967 2020-04-08

**Fluid Mechanics of Aerosol Dispersion**

Review of viscous flow theory. Creeping flows around a sphere. Drag and lift forces acting on particles. Wall effects and nonspherical particles. Diffusion of aerosols in laminar flows. Brownian motion and Langevin equation. Mass diffusion in pipe and boundary layer flows. Dispersion of particles in turbulent flows. Turbulent diffusion and wall deposition of aerosols. Effects of electrostatics, van der Waals and other surface forces. Computational aspects of aerosol dispersion in laminar and turbulent flows. Particle removal and resuspension from surfaces. Coagulation of aerosols due to Brownian movement, presence of a shear field and turbulence. Applications to microcontamination control, air pollution, and particle deposition in human lung.

Prerequisites: Consent of the instructor

Components: Laboratory, Lecture

Attributes: Given When Needed

Req. Designation: Technology

**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering****ME 538(3)** Course ID:010174 2015-01-28**Experimental Aerosol Mechanics and Instrumentation**

Introduction to the mechanics and transport of aerosols. Review of elementary particle mechanics. Brownian motion and diffusion. Particle statistics. Inertial separation of particles. Impactors - design and theory.

Periodic motion and sonic

agglomeration. Coagulation. Evaporation and condensation. Condensation nuclei counters. Filtration.

Electrical properties. Electrical aerosol analyzers. Differential mobility analyzers - theory and experiments. Aerosol sampling and transport - theory and experiments. Optical properties of aerosols - theory and experiments. Experimentation including aerosol generation, sampling, classification, and measurement.

Prerequisites: consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**ME 543(3)** Course ID:008968 2015-02-19**Advanced Optimal Design**

The optimal design of mechanical systems is studied. The optimization methods discussed in the course include: unconstrained optimization in several variables (e.g. gradient search, random search), constrained optimization in several variables (e.g. linear programming, nonlinear programming, Lagrange multipliers, geometric programming) and problems structured for multistage decision (e.g. dynamic programming). Emphasis is placed on the formulation of problems which can be solved by these techniques. A project involving the application of the methods introduced is required.

Prerequisites: ES222.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**ME 544(3)** Course ID:008969 2015-01-20**Advanced CAD (Computer Aided Design)**

This course deals with the use of commercially available CAD hardware and software for product development and design. Lectures cover the underlying theories upon which such software is based, the ways in which these theories are implemented and software limitations. Hands-on experience is emphasized. Students entering the course are assumed to have some knowledge of general computer usage and computer graphics.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**Engineering - Civil & Environmental Eng - Subject: Mechanical Engineering**

ME 551(3) Course ID:008971 2014-11-18

**Theory of Elasticity**

[Cross-listed with CE 551] A study of the mathematical theory of elasticity and its application to engineering problems; development of general stress-strain relationships, equations of equilibrium and compatibility; plane stress and plane strain; stress functions; applications to beam bending and torsion. Prerequisites: ES222 or equivalent, ME554 or consent of the instructor.

**Components:** Lecture**Course Equivalents:** CE 551**Attributes:** Offered Spring Term**Req. Designation:** Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

ME 552(3) Course ID:010536

2021-03-03

**Advanced Strength of Materials**

Discussion and theory concerning properties of materials, general stress-strain relationships, modern strength theories, unsymmetrical bending, curved beams, beams on elastic foundations, the equations of elasticity and plasticity (1 credit of design)

**Components:** Lecture**Course Equivalents:** CE 552**Attributes:** Offered Fall Term**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Mechanical Engineering**

ME 554(3)

Course ID:008973

2014-11-20

**Continuum Mechanics**

[Cross-listed with CE 554] The course involves the analysis of stress and deformation at a point, and the derivation of the fundamental equations by applying the basic laws of conservation of mass, energy and momentum and those of thermodynamics. Vector and cartesian tensors are reviewed. Relationships are then developed between stress, strain and strain rate and constitutive laws affecting stress-strain relationships. These are used to formulate the basic equations governing the behavior of any continuum with applications to solids and fluids.

**Components:** Lecture**Course Equivalents:** CE 554**Req. Designation:** Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering****ME 555(3)** Course ID:008974

2015-01-28

**Advanced Mechanical Vibrations**

A review of discrete multiple degree-of-freedom systems is presented. The equations of motion of continuous systems such as strings, rods, beams and torsion bars are studied using both classical and approximate solution methods. Hamilton's principle and nonlinear vibrating systems are also covered.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**ME 556(3)** Course ID:013016

2020-01-17

**Advanced Finite Element Methods in Engineering**

This course builds on basic concepts of spring and bar type elements, two-dimensional truss analysis, beam bending, plane stress & plane strain analysis, axisymmetric stress analysis, and isoparametric formulation of the finite element method. This course will examine topics in three-dimensional stress analysis, plate bending, heat transfer, fluid flow, electrostatics, thermal stress analysis, structural dynamics, and time-dependent stress analysis. Topics like the direct approach, the principle of minimum potential energy, and Galerkin's residual method will continue to be applied as required in developing required governing equations. This course will examine practical applications including the ability to use and apply the ABAQUS software package. This course will expand on the topics presented in a Fundamentals of Finite Element Methods course and requires knowledge in Mechanical Behavior of Materials, Linear Algebra and Differential Equations.

**Components:** Lecture**Attributes:** Offered Spring When Needed**Requirement Group:** Prerequisite: ME516**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: Mechanical Engineering**

ME 557(3) Course ID:008975

2015-01-20

**Advanced Mechanics of Composite Materials**

Nature of composite materials. Classification and characteristics of composite materials, mechanical behavior of composite materials. Macromechanical and micromechanical elastic behavior of unidirectional lamina. Constitutive and transformation relations. Strength of unidirectional lamina. Composite failure theory. Mechanics of multidirectional structural laminates. Lamination theory. Strength and failure analysis of multidirectional laminates. Effect of temperature and moisture.

Prerequisites: ES222 and ES260.

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering****ME 559(3)****Space Robotics**

This course establishes principles underpinning space robotics with a thorough and modern approach; chapters build from general physical foundations through an extensive treatment of control systems, perception challenges, and conservation principles in dynamics. After introducing the principles and governing dynamic equations of space robotic systems, the latter part of the course focuses on real-life applications related to space systems including space mechanics and the dynamics of space vehicles. It introduces supervised and unsupervised machine learning (ML) algorithms including implementations of ML techniques for perception challenges that can be applied to a wide range of space vehicles and robotic systems. Applications of dynamics and control theory to real spacecraft systems are also covered. After completing this course, the students will be able to apply basic robotic and machine learning techniques in space robotic systems.

**Components:** Lecture**Course Equivalents:** AE 459**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering**

**ME 560(3)** Course ID:012604 2016-07-01

**Linear Control Systems**

[Cross-listed as EE 657] [Formerly MER 522] This course addresses practical control system design primarily from a classical perspective. Beginning with transfer function modeling of dynamic systems, the course moves through transient, root locus, and frequency response analysis to end with frequency domain techniques for controller design.

Prerequisites: System Modeling and Analysis (Circuits and Systems or Dynamics of Physical Systems), Mat Lab/Simulink helpful

Components: Lecture

Course Equivalents: EE 657

Req. Designation: Technology

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**ME 561(3)** Course ID:012605 2018-11-06

**Engineering Optimization**

[Formerly MER 525] This course in engineering optimization studies techniques with applications in various aspects of engineering design and other disciplines including: concepts of design variables, constraints, objective functions, penalty functions, and Lagrange multipliers. Techniques for solving constrained and unconstrained optimization problems: classical approaches steepest descent, conjugate gradient, modified Newton, controlled random searches, etc. Applications and examples in the design of engineering components and systems will be presented.

Prerequisites: Calculus, Differential Equations, Mat Lab helpful

Components: Lecture

Same As Offering: ME 561

Req. Designation: Technology

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**ME 561(3)** Course ID:012605 2018-11-06

**Engineering Optimization**

[Formerly MER 525] This course in engineering optimization studies techniques with applications in various aspects of engineering design and other disciplines including: concepts of design variables, constraints, objective functions, penalty functions, and Lagrange multipliers. Techniques for solving constrained and unconstrained optimization problems: classical approaches steepest descent, conjugate gradient, modified Newton, controlled random searches, etc. Applications and examples in the design of engineering components and systems will be presented.

Prerequisites: Calculus, Differential Equations, Mat Lab helpful

Components: Lecture

Same As Offering: ME 561

Req. Designation: Technology

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**ME 562(3)** Course ID:012606 2016-07-01

**Composites**

[Formerly MER 532] This course provides a comprehensive introduction to composite materials and motivation for their use in modern applications. Topics include selection and availability of composite materials, manufacturing processes, usable theoretical concepts, testing and characterization of composites, and strength theories.

Prerequisites: Materials Science, Strength of Materials, or equivalent

Components: Lecture

Req. Designation: Technology

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**ME 563(3)** Course ID:012607 2016-07-01

**Dynamics of a Viscous Fluid**

[Formerly MER 534] Analysis of Laminar and turbulent flow fields. Approximate solutions of the NavierStokes equations according to boundary layer theory. Prerequisites: Fluid Mechanics, Thermodynamics or equivalent, Calculus, Differential Equations

Components: Lecture

Req. Designation: Technology

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**ME 564(3)** Course ID:012608 2016-07-01

**Compressible Fluid Flow**

[Formerly MER 536] Analysis of internal and external compressible flow fields. Supersonic airfoil analysis according to shock-expansion theory.

Prerequisites: Fluid Mechanics, Thermodynamics or equivalent, Calculus, Differential Equations

Components: Lecture

Req. Designation: Technology

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**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering**

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ME 565(3) Course ID:012609 2016-07-01

**Combustion Fundamentals**

[Formerly MER 537] The study of the chemical and physical processes in combustion. Analysis of thermochemistry and fuel oxidation, premixed and diffusion flame phenomena, combustion of condensed phases, detonation, combustion in practical systems, and combustion generated air pollution. Prerequisites: Thermodynamics or equivalent

Components: Lecture  
Req. Designation: Technology

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ME 567(3) Course ID:012611 2016-07-01

**Thermodynamic Analysis**

[Formerly MER 540] Consideration of various particulate and continuum bases for structuring thermodynamic principles and their application to the solution of current and prospective engineering problems.

Prerequisites: Basic Thermodynamics, Heat Transfer or equivalent

Components: Lecture  
Req. Designation: Technology

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ME 568(3) Course ID:012612 2016-07-01

**Thermal Energy Processes**

[Formerly MER 541] This course focuses on the analysis of thermal processes relevant to the renewable energy priorities of today's green economy. The underlying engineering principles of thermal processes, which make the best use of sustainable energy sources through proper acquisition, storage and conversion, will be considered. The course incorporates the fundamentals of thermodynamics and heat exchange necessary to understand the components and cycles that enable these thermal energy processes.

Prerequisites: Fluid Mechanics, Thermodynamics, Heat Transfer

Components: Lecture  
Req. Designation: Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering****ME 570(3)****Orbital Mechanics**

[Cross-Listed AE470] This course provides an overview of the fundamentals of orbital mechanics. Beginning from kinematics and rigid body dynamics, students are introduced to topics in orbital and attitude dynamics and control. In orbital dynamics and control, core topics covered include: the two-body problem, orbital motion, Kepler's Laws, orbital elements, orbital perturbations, orbital maneuvers, interplanetary trajectories, and the restricted three-body problem. In attitude dynamics and control, core topics covered include: attitude stabilization, torques on a spacecraft, torque-free motion, spin and dual-spin stabilization, gravity-gradient stabilization, and active attitude control.

**Components:** Lecture**Course Equivalents:** AE 470**Attributes:** Offered Spring Term**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering**

**ME 571(3)** Course ID:012615 2016-07-01

**Convection Heat Transfer**

[Formerly MER 552] Analysis of laminar and turbulent heat transfer processes. Approximate solutions of the energy equation according to boundary layer theory.

Prerequisites: Fluid Mechanics, Heat Transfer

Components: Lecture

Req. Designation: Technology

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**ME 572(3)** Course ID:012616 2019-09-25

**Dynamics of Inviscid Fluids**

[Formerly MER 553] Analysis of the kinematics and dynamics of inviscid fluids. Vector and Cartesian tensor notation. Potential flow theory involving sources, sinks, vortices, Rankine bodies, Joukowski airflows, jets, and channel flow. Complex potential analysis with various conformal mapping and transformations techniques.

Components: Lecture

Req. Designation: Technology

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**ME 573(3)** Course ID:012617 2016-07-01

**Flow and Heat Transfer in Multiphase Systems**

[Formerly MER 554] Analytical and empirical methods for evaluation of flow characteristics, particularly in liquid vapor systems and boiling and condensing of heat transfer.

Prerequisites: Fluid Mechanics, Heat Transfer

Components: Lecture

Req. Designation: Technology

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**ME 574(3)** Course ID:012618 2019-09-25

**Numerical Heat Transfer and Fluids Flow (CFD)**

[Formerly MER 555] Fluids Mechanics, Heat Transfer, and Numerical Methods concurrently applied to solve problems of applied engineering. Topics include: derivation, classification, and discretization of the General Transport equations pertaining to unsteady multi-dimensional physics. Computational theory and solution methods include: explicit, implicit, Crank-Nicolson, upwinding, as well as higher order approaches. Scheme stabilities and numerical results are addressed using the von Neumann stability assessment and examination of corresponding Modified equations. The coupling of pressure and velocity for incompressible flow is considered using the SIMPLE algorithm.

Components: Lecture

Req. Designation: Technology

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**ME 575(3)** Course ID:012619 2016-07-01

**Nuclear Engineering & Technology**

[Cross-listed with EE 687] [Formerly MER 560] The purpose of this course is provide students of various engineering disciplines a functional knowledge of nuclear engineering principles and those most important to the design of nuclear power generation systems. The course will focus both on the nuclear reactor core as well as plant systems. The intent is that students will gain a physical understanding of nuclear engineering principles as they relate to their own field of interest. Class participation will be highly encouraged and focused through the discussion of current events in the nuclear industry as well as proposed future nuclear technologies.

Components: Lecture

Course Equivalents: EE 687

Req. Designation: Technology

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**ME 577(3)** Course ID:012621 2016-07-01

**Engineering Statistics**

[Cross-listed with EE 602, CS 506] [Formerly MER 572] Modern engineering practice makes extensive use of statistical methods for the efficient collection and analysis of engineering data, and to support data-based decision making. This course will introduce the statistical tools that are of greatest importance for practicing engineers. Core topics to be covered will include probability and distribution theory, the construction and interpretation of statistical intervals, statistical hypothesis testing, regression analysis and empirical modeling, statistical experimental design, and statistical quality/process control. Additional specialized topics may also be covered, depending upon the interests of the class; possible topics include system reliability analysis, measurement system analysis, process capability analysis (and "six-sigma"), accelerated life testing, and acceptance sampling.

Components: Lecture

Course Equivalents: CS 506, EE 602

Req. Designation: Technology

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**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering**

ME 578(3) Course ID:012972 2019-11-11

**Statistical Methods for Reliability and Life Data Analysis**

[Cross-listed with EE603 and BOE623]

Reliability analysis is concerned with understanding the failure modes that affect an engineered product, estimating the expected life of the product under service conditions, and predicting the failure rate of the product

as a function of time in service. The primary response variable in reliability analysis is time to failure, which may

be measured in controlled laboratory experiments, or observed empirically from post-introduction studies of products "in the field". The analysis of data for which the primary variable of interest is time to failure requires

specialized statistical concepts and tools; this course will cover some of the most useful approaches.

**Components:** Lecture

**Same As Offering:** ME 578

**Course Equivalents:** EE 603, EE 603, BOE 623

**Attributes:** Offered Winter Term

**Requirement Group:** Prerequisites: EE602, ME577, or CS506 or instructor consent.

**Req. Designation:** Technology

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ME 578(3) Course ID:012972 2019-11-11

**Statistical Methods for Reliability and Life Data Analysis**

[Cross-listed with EE603 and BOE623]

Reliability analysis is concerned with understanding the failure modes that affect an engineered product, estimating the expected life of the product under service conditions, and predicting the failure rate of the product

as a function of time in service. The primary response variable in reliability analysis is time to failure, which may

be measured in controlled laboratory experiments, or observed empirically from post-introduction studies of products "in the field". The analysis of data for which the primary variable of interest is time to failure requires

specialized statistical concepts and tools; this course will cover some of the most useful approaches.

**Components:** Lecture

**Same As Offering:** ME 578

**Course Equivalents:** EE 603, EE 603, BOE 623

**Attributes:** Offered Winter Term

**Req. Designation:** Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

ME 580(3) Course ID:012022 2014-12-05

**Advanced Modeling and Simulation of Dynamic Systems**

This course will incorporate techniques of bond graph theory in the energy-based lumped parameter modeling of electrical, mechanical, hydraulic, magnetic, and thermal energy domains. Bond graph theory offers a unified approach to modeling dynamic energy systems and provides the tools necessary for the analysis of complex systems involving a variety of energy domains. Rather than attempt to cover all of the available analysis techniques, this course will serve to provide an underlying foundation on which to develop a thorough understanding of the interactions of energetic systems. Emphasis of the course will focus on multi-domain interaction.

**Components:** Lecture**Req. Designation:** Technology

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**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering****ME 581(3)** Course ID:012624

2016-07-01

**Fuel Cell Science and Hydrogen Engineering**

[Cross-listed with EE 640] [Formerly MER 580] Introduce the student to the science and engineering of fuel cell technology. Emphasis will be on developing an understanding of different types of fuel cells, their applications, and the engineering of complete fuel cell systems. Elements of that class will include: electrochemistry; polymer materials science for proton exchange membrane (PEM) based systems; ceramics for solid oxide fuel cells; liquid-electrolytes for phosphoric acid and alkaline fuel cells; and other methods of generating power directly from a fuel and an oxidant. The system requirements of the fuel cell stack will be introduced to provide a complete picture of the technology. Other elements addressed during the course will include thermochemistry; electrochemistry; fuel processing or reforming; electrical & power management; and polymer science and systems engineering. Developing an understanding of the proton exchange membrane fuel cell will be the primary objective. After completing this course, the student is expected to have an

Components: Lecture

Course Equivalents: EE 640

Req. Designation: Technology

**ME 582(3)** Course ID:012625

2016-07-01

**Photovoltaic Engineering**

[Cross-listed with EE 643] [Formerly MER 580A] The course focuses on the physical principles, technology, and design of efficient semiconductor photovoltaics. Course goals equip students with the concepts and analytical skills to understand efficiency limitations, to assess the viability of various solar and thermophotovoltaic technologies, and to introduce the physics required for understanding photovoltaic energy conversion. The course will focus on three primary aspects of photovoltaic energy conversion, (i) the transfer and conversion of solar (i.e. thermal) radiation to electronic energy, (ii) the theory and design of the semiconductor photovoltaic cell and (iii) photovoltaic systems and applications.

Components: Lecture

Course Equivalents: EE 643

Req. Designation: Technology

**ME 583(3)** Course ID:012626

2016-07-01

**Turbine Engineering**

[Cross-listed with EE 683] [Formerly MER 580B] Course on fundamentals of design, analysis, and technology of turbo machinery - jet engines, gas turbines, steam turbines, water turbines, and wind turbines. The course will provide an understanding of all aspects of system development: thermodynamic cycles, design-point and off-design performance; function and design of components (inlets, compressors, combustors, turbines, outlets), operational limits, and environmental concerns; structural analysis, lifting, and materials; rotor dynamics and blade aeromechanics; clearance analysis, sealing, and packing; heat transfer, blade and component cooling; starting and control; power and thrust generation; testing and instrumentation. The student is expected to develop a broad understanding of the state-of-the-art, challenges, and future of turbine systems.

Components: Lecture

Course Equivalents: EE 683

Req. Designation: Technology

**ME 586(3)** Course ID:012628

2016-07-01

**Welding**

[Formerly MER 580D] Welding metallurgy is a technologically important field that covers a wide range of scientific disciplines. This course uses welding metallurgy as a vehicle to introduce basic and broadly applicable concepts in solid state physics, chemistry, materials science, fluid mechanics, and solid mechanics. Topics covered include welding processes, heat and fluid flow, chemical reactions, residual stresses, solidification phenomena, phase transformations, and welding defects. Special emphasis will be placed on applied engineering problems and on the behavior of structural engineering materials. Real life examples will be used to illustrate the fundamental concepts of the course. Homework assignments and a final project are required.

Prerequisites: Materials Science, Strength of Materials or equivalent.

Components: Lecture

Req. Designation: Technology

**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering****ME 587(3)** Course ID:012629 2016-07-01**Solar Energy Engineering**

[Cross-listed with EE 685] [Formerly MER 580E] This course is designed to enable the student to effectively grasp the complex and quickly changing solar industry. The course will cover such topics as the economy of solar, photovoltaic devices, systems and applications. In order to cover this broad range of technical topics, the course will utilize multiple instructors. Each instructor has significant expertise and depth in the given field and the student will be able to draw from their experience. Students completing this course will develop knowledge of the solar industry, looking at the past, present and future of this technology area. Students will gain key technical background in every aspect of the industry and will be able to assess new technologies as they are developed. Understanding of the economics of solar and its future will also be obtained.

**Components:** Lecture**Course Equivalents:** EE 685**Req. Designation:** Technology**ME 588(3)** Course ID:012630 2016-07-01**Wind Energy Engineering**

[Cross-listed with EE 684] [Formerly MER 580F] The course focuses on 'Wind Farm Project Design and Development' and 'Wind Turbine Technology.' Part I: Teams will demonstrate understanding of complete wind farm design/development process inclusive of site selection, wind resource evaluating target land area, turbine choice, location, energy projection, cost and transmission. Part 2: Focuses on technical understanding of Wind Turbine attributes such as structural, blade system, nacelle system, electrical system, performance, and future opportunities.

**Components:** Lecture**Course Equivalents:** EE 684**Req. Designation:** Technology**ME 589(3)** Course ID:012631 2016-07-02**Synchronous Electrical Generators**

[Cross Listed EE686][Formerly MER 580G] This course covers fundamentals of design and analysis of power generators, such as those used in thermal power plants and wind turbines. The course will address the basic operating principles of the synchronous machine and consider configurations such as wound field, permanent magnet, and doubly fed generators. Key topics will include understanding and analysis of the magnetics within the machine, losses and efficiency, thermal performance, mechanical behavior, operation on the power system, and key IEEE and IEC standards. Further topics will include the duty imposed on the machine during service, as well as the duty it imposes on the turbine. The student is expected to develop a broad functional understanding of the current engineering technology, challenges, and future of generator technology. Cross Listed EE686

**Components:** Lecture**Course Equivalents:** EE 686**Req. Designation:** Technology

**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

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ME 590(3) Course ID:008977 2022-01-01

**Advanced Welding Metallurgy**

Introduction to various aspects of welding processes. Weldability problems in ferrous, non-ferrous and metal-matrix composite materials will be discussed in detail. Solidification modes and their effects on the mechanical properties of austenitic and duplex stainless steel weldments will be examined.

Prerequisites: consent of the instructor.

Components: Laboratory, Lecture

Same As Offering: ME 590

Attributes: Given When Needed

Req. Designation: Technology

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ME 590(3) Course ID:008977 2022-01-01

**Advanced Welding Metallurgy**

Introduction to various aspects of welding processes. Weldability problems in ferrous, non-ferrous and metal-matrix composite materials will be discussed in detail. Solidification modes and their effects on the mechanical properties of austenitic and duplex stainless steel weldments will be examined.

Prerequisites: consent of the instructor.

Components: Laboratory, Lecture

Same As Offering: ME 590

Attributes: Given When Needed

Req. Designation: Technology

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ME 591(3) Course ID:008978 2015-01-28

**Selected Topics in Materials Engineering**

An advanced graduate course in the field of materials engineering. Topics to be covered will be selected to conform to the mutual interests and needs of students and faculty.

Prerequisites: consent of the instructor.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

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ME 594(3) Course ID:008979 2015-02-09

**Selected Topics in Manufacturing**

An advanced graduate course in the field of manufacturing. Topics to be covered will be selected to conform to the mutual interests and needs of students and faculty.

Prerequisites: consent of the instructor.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

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ME 595(3) Course ID:008980 2021-09-14

**Principles of Physical Metallurgy**

Topics include: structure of metals, diffraction techniques (X-Ray, SEM-TEM), dislocation phenomena, diffusion in solids, precipitation hardening, nucleation and growth, solidification and phase transformation in solids.

Prerequisites: consent of the instructor.

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

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**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering**

ME 598(0) Course ID:013008

2020-01-02

**MS-ME Graduate Project - Studies**

This non-credit Seminar project provides a capstone experience for Mechanical Engineering graduate students not completing a thesis or independent study (i.e., all course work). The candidate and faculty advisor agree on project scope and evaluation process. The candidate performs required analytical and/or experimental studies to complete a Graduate Project Paper and Presentation.

**Components:** Seminar**Attributes:** Given When Needed**Req. Designation:** Technology

ME 599(0) Course ID:012638

2020-01-02

**MS-ME Graduate Project - Defense**

[Formerly MER 599] This non-credit Seminar project provides a capstone experience for Mechanical Engineering graduate students not completing a thesis or independent study (i.e., all course work). The candidate will deliver and defend results from studies documented in a Graduate Project Paper and Presentation. The candidate receives a pass/fail grade which appears on the official transcript.

**Components:** Seminar**Req. Designation:** Technology

**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering****ME 610(1 - 2)** Course ID:008982 2015-02-09**Mechanical Engineering Seminar**

Students, staff and visiting lecturers present research results and topics of current interest.

**Components:** Seminar**Attributes:** Offered Each Term**Req. Designation:** Technology**ME 614(1 - 15)** Course ID:008983 2015-02-09**Thesis, Dissertation Credits**

Analytical or experimental studies in mechanical and aeronautical engineering under the direction of a faculty adviser. Credit for this work is given when the requirements for the degree are completed including the presentation of a thesis or dissertation as appropriate to the degree program.

**Components:** Thesis Research**Attributes:** Offered Each Term**Req. Designation:** Technology**ME 616(1 - 7)** Course ID:008984 2015-02-09**Special Project Credits**

Engineering project credits associated with a Masters of Engineering degree under the direction of a faculty advisor.

**Components:** Project Team**Attributes:** Offered Each Term**Req. Designation:** Technology**ME 618(3)** Course ID:008986 2015-02-09**Selected Topics in Heat Transfer**

An upper level graduate course in the field of heat transfer. Areas of coverage will be selected to conform to the mutual interests and needs of students and faculty.

Prerequisites: consent of the instructor.

**Components:** Lecture**Attributes:** Offered Each Term**Req. Designation:** Technology**ME 621(3)** Course ID:011998 2015-02-19**Computational Mechanics of Materials**

The objective of this class is to teach the nonlinear finite element analysis for modeling various advanced solid mechanics problems. Both geometric and material nonlinearities will be covered. A wide range of constitutive models, hyper-/hypo-elasticity, viscoelasticity, classical plasticity, crystal plasticity and piezoelectricity will be introduced. Variational formulation will be developed under both the Lagrangian and Eulerian description. Explicit and implicit integration schemes will be covered, and the stability will be discussed. Students will then learn to implement finite element models that can capture geometric and material nonlinearities that represent a wide range of material behavior. The course is expected to make a student comfortable using Abaqus package for advanced problems including developing their own constitutive models and linking these models to the Abaqus package.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: ME554 or CE554, and ME515 or MA572, or by instructor consent**Req. Designation:** Technology**ME 628(3)** Course ID:008988 2015-02-09**Selected Topics in Fluid Mechanics**

An advanced graduate course in fluid mechanics. Topics of special interest will be chosen to coincide with current needs. Description of the course content in any particular term will be announced in advance.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology**ME 632(3)** Course ID:013131 2021-10-11**Elastic and Inelastic Stress Analysis**

Presents certain key aspects of inelastic solid mechanics centered around viscoelasticity, creep, viscoplasticity, and plasticity. It is divided into three parts consisting of the fundamentals of elasticity, useful constitutive laws, and applications to simple structural members, providing extended treatment of basic problems in static structural mechanics, including elastic and inelastic effects.

**Components:** Lecture**Course Equivalents:** CE 632**Attributes:** Offered Even Springs**Req. Designation:** Technology

**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering****ME 633(3)****Course ID:008972****2015-01-28****Plasticity**

This course provides an introduction to the subject of plasticity. The physical background of inelastic deformation in metals and geological materials is discussed. Continuum constitutive theory is presented including yield criteria, flow rules, and plastic hardening. Extension to the rate-dependent (viscoplastic) material is discussed. Uniqueness and extremum theorems are derived and discussed and field equations for general, two-dimensional and axisymmetric problems are presented. Selected problems from metal and soil/rock plasticity are presented and solved using various techniques, including slip-line theory, limit analysis and exact methods. Other topics such as localization and diffuse instability in plastic deformation and application of FEM in plasticity are presented as time allows.

Prerequisite: CE554 or ME554; recommended CE551 or ME551.

**Components:** Lecture

**Course Equivalents:** CE 633

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**ME 637(3)****Course ID:008992****2015-01-20****Particle Transport, Deposition and Removal II**

Introduction to turbulent flows and turbulent modelings. One and several equation models. Drag, lift, virtual mass, and Basset forces acting on particles. Wall effects and nonspherical particles. Aerosol transport and dispersion in turbulent flows. Turbulent diffusion and wall deposition of aerosols. Particle charging mechanics and electrostatics forces. Thermophoretic and electrophoretic effects. Introduction to colloids and electrokinetic phenomena. Computational aspects of aerosol dispersion and deposition in turbulent flows. Sublayer model approach. Approximate simulation of turbulence and turbulence transport. DNS simulation methods. Nonspherical particle transport in turbulent flows. Coagulation of aerosols due to shear and turbulence. Experimental techniques for turbulent flow measurements. Hot-wire anemometry, Isokinetic sampling. Particle concentration and velocity measurements with phase-doppler, and PIV. Applications to microcontamination control, air pollution, combustor, spray, and particle deposition in human lung.

**Components:** Laboratory, Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisite: ME537

**Req. Designation:** Technology

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**ME 639(3)****Course ID:008993****2021-12-14****Advanced Turbulence**

Review of viscous flow theory. Review of instability of viscous flows. Origin of turbulence. Phenomenological theories of turbulence. Reynolds' equation. Energy budget and vorticity dynamics in turbulence. Free shear and internal flows. Turbulent boundary layer. Introduction to turbulence modeling. The k-e and stress transport models. Recent developments in turbulence modeling, stress transport models, multipoint closure methods, and thermodynamical formulation. Turbulent diffusion, isotropic turbulence, and Karman-Howarth equation. Kraichnan's direct interaction approximation. Wiener-Hermite expansion approach. Characteristic functional formulation and Hopf's theory. Lundgren's probabilistic formulation and Chung's kinetic theory of turbulence. Direct and Large-Eddy simulation techniques. Proper orthogonal decomposition Techniques. Chaos and dynamical systems, stochastic estimation, Lagrangian approaches.

**Components:** Laboratory, Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**ME 654(3)****Course ID:008994****2015-01-28****Elastic Waves in Solids**

The course concerns with stress propagation problems in elastic solids and waveguides. Following the derivation of governing elasto-dynamics equations, formal mathematical issues, such as uniqueness, reciprocal identity, and completeness theorem, are addressed. The most commonly used solution techniques (e.g. Green's functions, integral transforms, normal mode expansions, and series analysis) with examples are provided. Problems considered include propagation in half spaces (reflections and transmissions), approximate rod and plate theories, and classes of composite materials (e.g. laminated bars, and plates). Well-known experimental techniques are also covered. Assignments consist of mathematical derivations, computer simulations and presentations.

Prerequisites: ME551/CE551 and ME554/CE554 or consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

ME 657(1 - 3) Course ID:008997

2015-02-09

**Selected Topics in Solid Mechanics**

An advanced graduate course in solid mechanics. Topics of special interest will be selected to conform to the mutual interests and needs of students and faculty.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

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**Engineering - CRC Engineering Programs - Subject: Mechanical Engineering**

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ME 690(3) Course ID:012632 2016-07-01

**Independent Study**

[Formerly MER 590] Advance graduate course in the field of engineering sciences. Topics of special interest will be selected for current needs. A description of the course content in any particular term will be announced in advance.

Components: Independent Study  
Req. Designation: Technology

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ME 691(3) Course ID:013166 2022-01-01

**Independent Study**

Advance graduate course in the field of engineering sciences. Topics of special interest will be selected for current needs. A description of the course in any particular term will be announced in advance.

Components: Independent Study  
Attributes: Given When Needed  
Req. Designation: Technology

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ME 692(3) Course ID:012634 2022-01-01

**Independent Study**

Advance graduate course in the field of engineering sciences. Topics of special interest will be selected for current needs. A description of the course content in any particular term will be announced in advance.

Components: Independent Study  
Attributes: Given When Needed  
Req. Designation: Technology

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ME 696(3) Course ID:012929 2019-02-14

**Structural Dynamics**

Analysis of elastic and inelastic single and multiple degree-of-freedom structural systems under time-dependent loads including harmonic, impulse, earthquake, and other general dynamic loads. Development of equations of motion. Analytical and numerical evaluation of free and forced vibration response. Identification of dynamic system properties. Modal analysis. Vibration isolation and force transmissibility. Dynamic measurement sensors. Shock loading spectrum Frequency-domain analysis.

Prerequisites: Knowledgeable background in Dynamics, Linear/Matric Algebra, Ordinary and Partial Differential Equations. MATLAB Experience useful

Components: Lecture  
Attributes: Given When Needed  
Req. Designation: Technology

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**Engineering - Mechanical & Aerospace Eng - Subject: Mechanical Engineering**

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ME 997(3) Course ID:013208 2023-05-05

**Special Topics in Engineering**

Used for graduate transfer credit for which Clarkson does not have an equivalent ME course number.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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ME 998(3) Course ID:013209 2023-05-05

**Special Topics in Engineering**

Used for graduate transfer credit for which Clarkson does not have an equivalent ME course number.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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ME 999(1 - 10) Course ID:011131 2015-01-19

**Special Topics in Mechanical Engineering**

Used for graduate transfer credit for which Clarkson does not have an equivalent ME course number.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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**Business - School of Business - Subject: Marketing**

**MK 1(2 - 4)** Course ID:009085 2015-07-16

**Marketing Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Lecture

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**MK 2(2 - 4)** Course ID:009086 2015-07-16

**Marketing Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Lecture

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**MK 306(3)** Course ID:009087 2017-03-10

**Professional Sales**

This course focuses on understanding the sales process mainly at the business-to-business level. Students will learn both theoretical and applied models of sales, with a focus on practical application in the types of companies that Clarkson graduates work at. Topics covered include identification of customer needs, customer relationship management, identification of differentiating factors across products and services, fundamentals of relationship management, managing customer expectations, working with international customers (managing cultural and legal differences), working across internal functional boundaries to sell and support products and services, pricing, negotiation basics, closing a contract, customer satisfaction, and after-sales support and services.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisite: At least Sophomore standing.

**Req. Designation:** Technology

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**MK 320(3)** Course ID:009088 2022-04-05

**Principles of Marketing**

(May be used to satisfy a CUSB MBA or MS foundation requirement). Familiarizes students with various marketing terms, concepts, principles, institutions and practices. Topics covered include: buyer behavior, market research, product planning, pricing, distribution, personal selling and advertising. The changing nature of marketing and the trends in domestic and international marketing are also examined. Experiential exercises are an intrinsic and important part of this course.

**Components:** Lecture

**Attributes:** Offered Fall, Spring, and Summer

**Requirement Group:** Corequisite: Sophomore Standing

**Req. Designation:** Technology

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**MK 321(3)** Course ID:009089 2015-07-06

**Consumer Behavior**

[Cross-listed with PY 321] Extensive coverage of selected consumer behavior theories and models. Special emphasis given to the most recent research along with marketing mix applications. Topics include classic and operant conditioning, motivation and attribution theories and the elaboration likelihood model. Students are required to complete a term project.

**Components:** Lecture

**Course Equivalents:** PY 321

**Requirement Group:** Prerequisite: MK320.

**Req. Designation:** Technology

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**MK 332(3)** Course ID:009093 2015-07-06

**Marketing Research**

Introductory coverage of various concepts and tools relevant to market information acquisition, analysis, and interpretation. Primary focus is on decision making in marketing research. Students are required to complete a term project.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: MK320 and MA/STAT282 or MA/STAT383.

**Req. Designation:** Technology

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**Business - School of Business - Subject: Marketing****MK 419(0)** Course ID:012893 2018-10-09**New Product Development and Marketing Portfolio**

This New Product Development and Marketing Portfolio is the mechanism by which students enrolled in the New Product Development and Marketing Minor maintain a repository of their work within the minor and in related areas of study and work during their time at Clarkson. This portfolio should include at least evidence from four (4) new product development and/or marketing projects that were completed by the student during their Clarkson experience. The portfolio can be multimedia and include both coursework and work from extracurricular activities, entrepreneurial initiatives, or Internship/co-op work experiences.

**Components:** Independent Study**Requirement Group:** Prerequisites: Senior Standing**Req. Designation:** Technology**MK 436(3)** Course ID:009098 2015-07-06**Creativity, Innovation & New Product Development**

This course provides an introduction and broad overview of the strategic decision making process for managing three critical components for firm growth: creativity, innovation and new product development. The fostering of creativity, the stimulation and management of innovation and the strategic new product development process are discussed within the context of interdisciplinary management. This course concentrates on the front end of new product development focusing on understanding, fostering and managing the creative processes, grasping the importance of innovation in satisfying market needs, and the development of new products up to and including the design stage of new product development. The course provides students with the ability to understand, appreciate and manage new products and the new product development process. Marketing research methods, current topics and critical examination of traditional management strategies applicable to creativity, innovation and new product development and management will be explored through lecture, case

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: MK320.**Req. Designation:** Technology**MK 487(1 - 3)** Course ID:009100 2017-01-13 **Instructor Consent Required****Special Project in Marketing**

An investigation of a problem or in-depth topic undertaken by the student under the guidance of a faculty member.

Prerequisites: Permission of the instructor

**Components:** Research**Attributes:** Given When Needed**Req. Designation:** Technology**MK 609(2)** Course ID:009106 2015-07-06**Marketing Management (MBA Module)**

[Cross-listed with MK 610] The problems, decisions and decision-making processes of marketing managers as they seek to increase the effectiveness of performing marketing activities. The objectives are: to update the discussion of marketing principles and practices in the light of recent national and international events; to deepen the discussion of business environmental factors of increased importance, such as energy, inflation, changing consumer life style, government regulation, consumerism and environmentalism; and to aid students in experiencing real-life business situations through the discussion of marketing cases.

Prerequisites: completion of all CUSB MBA foundation requirements and admission to the MBA program.

**Components:** Discussion, Lecture**Course Equivalents:** MK 610, MK 610, HC 626**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Business - CRC Business - Subject: Marketing****MK 610(3)** Course ID:009107

2022-10-13

**Marketing Management**

[Cross-listed with MK 609, HC 626] This course provides graduate students with a fundamental command of marketing concepts, processes, and management, as well as creating an understanding of the critical strategic role marketing plays in the management of organizations. The objectives are two-fold. The first objective is to provide the student with an introduction to the fundamental concepts of marketing and their role in effective marketing management. Thus students will explore central topics including product, price, place, and promotion decisions, examine the roles of consumer behavior and market research, and investigate how organizations blend these inter-related components to create and sustain value. The second objective is to allow students to apply that knowledge in the context of strategic marketing management. Here, strategic elements associated with marketing are integrated into strategic marketing framework to understand and develop marketing strategy and to illustrate how marketing can assist the firm in arriving at a competitive

Components: Lecture

Same As Offering: MK 610

Course Equivalents: MK 609, HC 626

Attributes: Offered Fall Term

Req. Designation: Technology

**MK 610(3)** Course ID:009107

2022-10-13

**Marketing Management**

[Cross-listed with MK 609, HC 626] This course provides graduate students with a fundamental command of marketing concepts, processes, and management, as well as creating an understanding of the critical strategic role marketing plays in the management of organizations. The objectives are two-fold. The first objective is to provide the student with an introduction to the fundamental concepts of marketing and their role in effective marketing management. Thus students will explore central topics including product, price, place, and promotion decisions, examine the roles of consumer behavior and market research, and investigate how organizations blend these inter-related components to create and sustain value. The second objective is to allow students to apply that knowledge in the context of strategic marketing management. Here, strategic elements associated with marketing are integrated into strategic marketing framework to understand and develop marketing strategy and to illustrate how marketing can assist the firm in arriving at a competitive

Components: Lecture

Same As Offering: MK 610

Course Equivalents: MK 609, HC 626

Attributes: Offered Fall Term

Req. Designation: Technology

**MK 626(3)** Course ID:012553

2016-07-01

**Marketing Research Techniques**

[Formerly MBA 626] Marketing research is primarily conducted to reduce the amount of uncertainty managers would otherwise face in their decision-making. This course is designed to develop students' knowledge of marketing research by both exposing them to many major important issues involved with marketing research and requiring them to complete a marketing research report from start to finish. Topics discussed include research designs, data collection methods, survey development, measurement, sampling methods and sample size determination, descriptive statistics, parameter estimation, independent samples t-test analysis, correlation analysis, chi-square analysis, code sheet development, non-sampling errors, and ethics in marketing research.

Components: Lecture

Req. Designation: Technology

**MK 629(3)** Course ID:012555

2016-07-02

**Consumer Behavior**

[Formerly MBA 628] This course is designed to enhance students' understanding of consumers. Topics explored involve the many, many influences that may shape an individual's behaviors in the marketplace, including the impact of these influences on managerial decision-making situations. Observational research methods are also covered.

Components: Lecture

Req. Designation: Technology

**Business - School of Business - Subject: Marketing****MK 630(3)** Course ID:013018

2019-11-01

**Marketing and Social Media Analytics**

The course will provide you with an introduction to marketing and social media analytics. We will study how to conceptualize and apply decision modeling to derive marketing insights from empirical data in areas such as pricing, segmentation, customer lifetime analysis, targeting and positioning, and branding. This will be a hands-on course based on the analytic approach, in which you will acquire skills to translate conceptual understanding into specific marketing plans in various decision contexts.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: IA 530 or equivalent.**Req. Designation:** Technology**MK 640(3)** Course ID:011776

2016-08-27

**Marketing Management for Innovation**

This course introduces students to the fundamentals of marketing management including consumer behavior, market research, professional selling, and marketing strategy all with a focus on managing the innovation process. The course is designed for graduate students who have undergraduate training in a technical field, most likely engineering and need exposure to the theory and practice of marketing and thus, integrates the concept and practice of innovation throughout the topics covered.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**Business - CRC Business - Subject: Marketing****MK 665(3)** Course ID:012573

2016-07-25

**International Marketing Management**

[Formerly MBA 665] This course examines development of international marketing strategies, from determining objectives and evaluating international market opportunities through coordinating strategies in world markets. Particular emphasis is placed on application of marketing principles in the multinational environment.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Business - School of Business - Subject: Marketing****MK 687(1 - 3)** Course ID:009110 2015-07-06**Independent Project in Marketing**

Practical application of marketing theory in an independent research project conducted under the guidance of a Marketing faculty member.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology**MK 689(3)** Course ID:010241 2015-07-06**New Product Marketing**

Accepted analytical models are used to analyze current data obtained from major companies regarding new products which have been test marketed. The objective is to introduce students to a new and crucial aspect of product management: the ability to use computers and analytical tools in brand decisions.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisite: MK609 (Marketing Management)**Req. Designation:** Technology**MK 696(3)** Course ID:009118 2015-07-06**Marketing Methods**

Intended to equip the student with a thorough knowledge of an arsenal of research methods, including the assumptions, methodology, and limitations of these methods. Enhances students' ability to conceptualize and operationalize a research question. Some statistical content is included as an introduction to data analysis. Applications of these methods are discussed within the context of research problems faced by both academic researchers and practitioners (e.g., managers, engineers, economists, marketing researchers, information system designers). A research project will be an integral part of the course.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**Other - Computer Science - Subject: Multidisciplinary****MP 151(0 - 3) Course ID:009140 2017-01-13 Instructor Consent Required****Multidisciplinary Course (Open Source Software Projects)**

Student teams will engage in projects in the following areas: administer, create, modify, test, or document Open Source Software (OSS); analyze business and policy issues involving OSS; and create and run outreach/tutorial programs that introduce interested persons to OSS or enhance the skill of persons already using OSS. Project status will be reported during regularly scheduled weekly meetings. Students will document projects on the Clarkson Open Source Institute (COSI) web site and will construct individual, web-based portfolios of their work. Students are expected to have some experience or course preparation in their project areas. Given Pass/No Credit.

**Components:** Research**Attributes:** Given When Needed**Req. Designation:** Technology**MP 152(0 - 3) Course ID:010338 2017-01-13 Instructor Consent Required****Internet Teaching Laboratory Projects Course**

In conjunction with Clarkson's Internet Teaching Laboratory, students will participate in projects related to computer networking such as implementing network software, configuring networking hardware, simulating large-scale networks, evaluating and testing computer security, administering the Internet Teaching Laboratory, deploying networked solutions for community members or developing network tutorials for other students. Students will construct web-based portfolios and give oral presentations of their work. Given Pass/No Credit. By permission of instructor.

**Components:** Research**Attributes:** Offered Each Term**Req. Designation:** Technology

**Inst for a Sustainable Environ - Provost - Subject: Multidisciplinary****MP 210(1 - 3)** Course ID:013001 2020-10-15**Food-to-Energy: A K-12/University Partnership to develop a Resource Recovery Program**

Clarkson students will work with Clarkson University and a local school district to encourage food waste diversion from the solid waste stream and to explore beneficial uses of food waste for nutrient and energy recovery. Students will develop lesson plans to be implemented in K-12 classes as well as work with student teams to promote best food waste practices.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Other - Computer Science - Subject: Multidisciplinary**

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**MP 251(0 - 3)** Course ID:010115 2017-01-13 **Instructor Consent Required**  
**Open Source Software Projects**  
A continuation of MP 151  
**Components:** Research  
**Attributes:** Given When Needed  
**Req. Designation:** Technology

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**MP 252(0 - 3)** Course ID:010339 2017-01-13 **Instructor Consent Required**  
**Internet Teaching Laboratory Projects Course**  
In conjunction with Clarkson's Internet Teaching Laboratory, students will participate in projects related to computer networking such as implementing network software, configuring networking hardware, simulating large-scale networks, evaluating and testing computer security, administering the Internet Teaching Laboratory, deploying networked solutions for community members or developing network tutorials for other students. Students will construct web-based portfolios and give oral presentations of their work. Given Pass/No Credit. By permission of instructor.  
**Components:** Research  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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**Inst for a Sustainable Environ - Provost - Subject: Multidisciplinary**

MP 310(1 - 3) Course ID:013061 2020-10-15

**Food to Energy: A K-12/University Partnership to develop a Resource Recovery Program**

Clarkson students will work with Clarkson University and a local school district to encourage food waste diversion from the solid waste stream and to explore beneficial uses of food waste for nutrient and energy recovery. Students will develop lesson plans to be implemented in K-12 classes as well as work with student teams to promote best food waste practices.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Other - Computer Science - Subject: Multidisciplinary**

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**MP 351(0 - 3)** Course ID:010116 2017-01-13 **Instructor Consent Required**  
**Open Source Software Projects**  
A continuation of MP 251.  
**Components:** Research  
**Attributes:** Given When Needed  
**Req. Designation:** Technology

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**MP 352(0 - 3)** Course ID:010340 2017-01-13 **Instructor Consent Required**  
**Internet Teaching Laboratory Projects Course**  
In conjunction with Clarkson's Internet Teaching Laboratory, students will participate in projects related to computer networking such as implementing network software, configuring networking hardware, simulating large-scale networks, evaluating and testing computer security, administering the Internet Teaching Laboratory, deploying networked solutions for community members or developing network tutorials for other students. Students will construct web-based portfolios and give oral presentations of their work. Given Pass/No Credit. By permission of instructor.  
**Components:** Research  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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**Other - Civil & Environmental Eng - Subject: Multidisciplinary****MP 401(3) Course ID:009166 2015-01-20 Instructor Consent Required****Multidisciplinary Course (Environmental Remediation Design)**

Science and engineering concepts are synthesized to generate safe, economics and effective solutions to real-world environmental restoration projects. Emphasis is placed on multidisciplinary teamwork and communication.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Engineering - School of Engineering - Subject: Multidisciplinary****MP 414(0 - 3)****Course ID:009174****2020-03-30****Instructor Consent Required****Multidisciplinary Course (Applied Robotics)**

Clarkson students work together with local high school students to participate in a nation-wide robotics competition and get a hands-on, inside look at the engineering profession. During the fall semester, students plan for the upcoming spring competition by participating in a series of seminars that focus on various aspects of mobile robot design and construction. Competition rules are announced at the start of the spring semester, and during an intense six-week period, students work to brainstorm, design, construct, and test their robot entry. With only six weeks of build time, all jobs are critical path. Teams from across the nation then compete in a tournament complete with referees, cheerleaders and time clocks. The competition changes each year, so returning team members always have a new challenge.

**Components:** Project Team**Attributes:** Offered Each Term**Req. Designation:** Technology

**Other - Civil & Environmental Eng - Subject: Multidisciplinary**

MP 418(3)

Course ID:009177

2015-02-09

Instructor Consent Required

**Project-Based Learning Program**

Clarkson students will work with students from two local school districts to increase their understanding of science, math, engineering and technology. Clarkson students in this project will develop and then teach a holistic, project-based learning approach to problem solving. Both the Clarkson and K-12 students will gain an appreciation for the relevance and usefulness of science and engineering within a larger social, political and economic context. Year long projects will be oriented towards understanding and solving environmentally related problems that affect their school or community.

Prerequisite: consent of the instructor.

**Components:** Lecture

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**School of Arts and Sciences - Provost - Subject: Multidisciplinary****MP 425(3)** Course ID:012776 2016-12-06**Multidisciplinary Course - Sustainable Housing Solution**

[Cross-listed with MP525] A team of Clarkson students from multiple majors will collaborate to design, optimize, and build a prototype of a housing solution. Principles of sustainable design, alternatives assessment, resource management, multidisciplinary teamwork, and communication will be emphasized.

**Components:** Lecture**Course Equivalents:** MP 525**Attributes:** One communication unit, Offered Spring Term**Req. Designation:** Technology

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**Other - Computer Science - Subject: Multidisciplinary**

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**MP 451(0 - 3)** Course ID:010117 2017-01-13 **Instructor Consent Required**  
**Open Source Software Projects**  
A continuation of MP 441  
**Components:** Research  
**Attributes:** Given When Needed  
**Req. Designation:** Technology

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**MP 452(0 - 3)** Course ID:010341 2017-01-13 **Instructor Consent Required**  
**Internet Teaching Laboratory Projects Course**  
In conjunction with Clarkson's Internet Teaching Laboratory, students will participate in projects related to computer networking such as implementing network software, configuring networking hardware, simulating large-scale networks, evaluating and testing computer security, administering the Internet Teaching Laboratory, deploying networked solutions for community members or developing network tutorials for other students. Students will construct web-based portfolios and give oral presentations of their work. Given Pass/No Credit. By permission of instructor.  
**Components:** Research  
**Attributes:** Offered Each Term  
**Req. Designation:** Technology

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**Business - Engineering & Management - Subject: Multidisciplinary****MP 456(3) Course ID:012845 2017-10-18 Instructor Consent Required****Special Topics in E&M: Lean Six Sigma for Healthcare**

Students will have a first-hand experience in solving a real-world problem by applying lean six sigma tools. To this aim, students will be assigned to a process improvement research project and will closely collaborate with stakeholders of a Healthcare organization in the North Country. Students will gather and analyze data, and provide process insights and recommendations for redesigning a process. To this aim, students will have to commute on a regular basis to the Healthcare organization facilities that can be located in Canton, Potsdam, or in the Adirondacks. The goal is to bring a tangible improvement that ultimately results in an effective and efficient operational process that consistently satisfies customers/patients.

Requirement: Instructor permission

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

Other - Civil & Environmental Eng - Subject: Multidisciplinary

MP 518(3)

Course ID:009193

2015-02-09

Instructor Consent Required

**Project-Based Learning Program**

See MP 318 for course description.

Prerequisite: consent of the instructor.

**Components:** Lecture**Attributes:** Offered Each Term**Req. Designation:** Technology

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**School of Arts and Sciences - Provost - Subject: Multidisciplinary****MP 525(3)** Course ID:012775 2016-12-06**Multidisciplinary Course - Sustainable Housing Solution**

[Cross-listed with MP425] A team of Clarkson students from multiple majors will collaborate to design, optimize, and build a prototype of a housing solution. Principles of sustainable design, alternatives assessment, resource management, multidisciplinary teamwork, and communication will be emphasized.

**Components:** Lecture**Course Equivalents:** MP 425**Attributes:** One communication unit, Offered Spring Term**Req. Designation:** Technology

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**Other - Computer Science - Subject: Multidisciplinary****MP 551(0 - 3) Course ID:010118 2015-08-15 Instructor Consent Required****Open Source Software Projects**

Student teams will engage in projects in the following areas: administer, create, modify, test, or document Open Source Software (OSS); analyze business and policy issues involving OSS; and create and run outreach/tutorial programs that introduce interested persons to OSS or enhance the skill of persons already using OSS. Project status will be reported during regularly scheduled weekly meetings. Students will document projects on the Clarkson Open Source Institute (COSI) web site and will construct individual, web-based portfolios of their work. Students are expected to have some experience or course preparation in their project areas. Given Pass/No Credit.

**Components:** Project Team**Attributes:** Given When Needed**Req. Designation:** Technology**MP 552(0 - 3) Course ID:010342 2015-08-15 Instructor Consent Required****Internet Teaching Laboratory Projects Course**

In conjunction with Clarkson's Internet Teaching Laboratory, students will participate in projects related to computer networking such as implementing network software, configuring networking hardware, simulating large-scale networks, evaluating and testing computer security, administering the Internet Teaching Laboratory, deploying networked solutions for community members or developing network tutorials for other students. Students will construct web-based portfolios and give oral presentations of their work. Given Pass/No Credit. By permission of instructor.

**Components:** Project Team**Attributes:** Offered Each Term**Req. Designation:** Technology

Other - Military Science - Subject: Military Science

MS 111(1) Course ID:009194

2015-02-19

**Leadership and Personal Development**

Introduces cadets to the personal challenges and competencies that are critical for effective leadership. Cadets learn how the personal development of life skills such as critical thinking, goal setting, time management, physical fitness, and stress management relate to leadership, officership, and the Army profession.

The focus is on developing basic knowledge and comprehension of Army leadership dimensions while gaining a big picture understanding of the ROTC program, its purpose in the Army, and its advantages for the student. Class meets weekly for one hour with a co-requisite laboratory and one weekend field training exercise. Physical fitness training is also required.

**Components:** Laboratory, Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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MS 112(1) Course ID:009195

2015-01-20

**Introduction to Tactical Leadership**

Overviews leadership fundamentals such as setting direction, problem-solving, listening, presenting briefs, providing feedback, and using effective writing skills. Cadets explore dimensions of leadership values, attributes, skills, and actions in the context of practical, hands-on, and interactive exercises.

Continued emphasis is placed on recruitment and retention of cadets. Cadre role models and the building of stronger relationships among the cadets through comment experience and practical interaction are critical aspects of the MS112 experience. Class meets weekly for one hour with a co-requisite laboratory and one weekend field training exercise. MS111 recommended but not required as prerequisite; Physical fitness training is also required. No military obligation for non-contracted students.

**Components:** Laboratory, Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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MS 221(2) Course ID:009196

2015-02-19

**Innovative Team Leadership**

Explores the dimensions of creative and innovative tactical leadership strategies and styles by examining team dynamics and two historical leadership theories that form the basis of the Army leadership framework (trait and behavior theories). Cadets practice aspects of personal motivation and team building in the context of planning, executing, and assessing team exercises and participating in leadership labs.

Focus is on continued development of the knowledge of leadership values and attributes through an understanding of Army rank, structure, and duties and basic aspects of land navigation and squad tactics. Case studies provide tangible context for learning the Soldier's Creed and Warrior Ethos as they apply in the contemporary operating environment (COE). Class meets weekly for two hours with co-requisite laboratory and one weekend field training exercise. Physical fitness training is also required. MS111 and MS112 recommended but not required as prerequisites. No military obligation for non-contracted students.

**Components:** Laboratory, Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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MS 222(2) Course ID:009197

2015-01-20

**Foundations of Tactical Leadership**

Examines the challenges of leading tactical teams in the complex contemporary operating environment (COE). The course highlights dimensions of terrain analysis, patrolling, and operations orders. Further study of the theoretical basis of the Army leadership framework explores the dynamics of adaptive leadership in the context of military operations. MS222 provides a smooth transition into MS331. Cadets develop greater self awareness as they assess their own leadership styles and practice communication and team building skills. COE case studies give insight into the importance and practice of teamwork and tactics in real-world scenarios. Class meets weekly for two hours with co-requisite laboratory and one weekend field training exercise. Physical training is also required. MS111, MS112, MS221 recommended but not required as prerequisites. No military obligation for non-contracted students.

**Components:** Laboratory, Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**Other - Military Science - Subject: Military Science****MS 331(3)** Course ID:009199 2015-02-19**Adaptive Tactical Leadership**

Challenges cadets to study, practice, and evaluate adaptive leadership skills as they are presented with challenging scenarios related to squad tactical operations. Cadets receive systematic and specific feedback on their leadership attributes and actions. Based on such feedback, as well as their own self-evaluations, cadets continue to develop their leadership and critical thinking abilities. The focus is developing cadets tactical leadership abilities to enable them to succeed at ROTC's summer Leadership Development and Assessment Course (LDAC). Class meets weekly for three hours with co-requisite laboratory and one weekend field training exercise. Physical fitness is also required.

Prerequisite: MS Basic Course or equivalent.

Components: Laboratory, Lecture

Attributes: One communication unit, Offered Fall Term

Req. Designation: Technology

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**MS 332(3)** Course ID:009200 2015-01-20**Leadership in Changing Environments**

Uses increasingly intense situational leadership challenges to build cadet awareness and skills in leading tactical operations up to platoon level. Cadets review aspects of combat, stability, and support operations. They also conduct military briefings and develop proficiency in garrison operation orders. The focus is on exploring, evaluating, and developing skills in decision-making, persuading, and motivating team members in the contemporary operating environment (COE). MS332 cadets are evaluated on what they know and do as leaders as they prepare to attend the ROTC summer Leader Development Assessment Course (LDAC). Class meets weekly three hours with co-requisite laboratory and one weekend field training exercise. Physical fitness training is also required.

Prerequisite: MS Basic Course or equivalent.

Components: Laboratory, Lecture

Attributes: One communication unit, Offered Spring Term

Req. Designation: Technology

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**School of Arts and Sciences - Military Science - Subject: Military Science**

MS 350(3)

Course ID:013183

2022-08-29

**Military History**

This course will survey world history through the lens of conflict and military tactics, beginning with pre-history through modern times. Students will study the basic causes of conflict and apply these continuities to specific conflicts through history. Students will evaluate consistent principles of war as they apply to specific conflicts. Students will analyze change and continuity to military conflict. Several overarching themes will be emphasized: 1. How war influenced the society during particular periods; 2. How has technology impacted warfare and how warfare has impacted technological advancements; 3. How individual soldiers experienced warfare; 4. How warfare has impacted the course of human events; 5. Develop an understanding of historical chronology by studying conflict. Students will develop analytical skills by working with primary and secondary resources especially as they apply to the disciplines of history and geography.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Enrollment in Military Science ROTC required**Req. Designation:** Technology

Other - Military Science - Subject: Military Science

MS 441(3) Course ID:009201 2015-02-19

**Developing Adaptive Leaders**

Develops cadet proficiency in planning, executing, and assessing complex operations, functioning as a member of a staff, and providing performance feedback to subordinates. Cadets assess risk, make ethical decisions, and lead fellow ROTC cadets. Lessons on military justice and personnel processes prepare cadets to make the transition to Army officers. MS IV cadets analyze, evaluate, and instruct cadets for their first unit of assignment. They identify responsibilities of key staff, coordinate staff roles, and use situational opportunities to teach, train, and develop subordinates. Class meets weekly for three hours with co-requisite laboratory and one weekend field training exercise. Physical fitness training also required.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Offered Fall Term**Req. Designation:** Technology

MS 442(3) Course ID:009202 2015-01-20

**Leadership in a Complex World**

Explores the dynamics of leading in the complex situations of current military operations in the contemporary operating environment (COE). Cadets examine differences in customs and courtesies, military law, principles of war, and rules of engagement in the face of international terrorism. They also explore aspects of interacting with non-government organizations, civilians on the battlefield, and host nation support. The course places significant emphasis on preparing cadets for their first unit of assignment. It uses case studies, scenarios, and What Now, Lieutenant? exercises to prepare cadets to face the complex ethical and practical demands of leading as commissioned officers in the United States Army. Class meets weekly for three hours with co-requisite laboratory and one weekend field training exercise. Physical fitness training also required.

**Components:** Laboratory, Lecture**Attributes:** One communication unit, Offered Spring Term**Req. Designation:** Technology

**Engineering - Materials Science & Engineering - Subject: Materials Sci & Engineering****MSE 451(3)** Course ID:012917 2022-02-03**Advanced Characterization of Materials**

[Cross-listed with MSE551] Advanced methods for characterizing materials, such as scattering methods, including laser light scattering and x-ray diffraction (powder patters & Laue patters); microscopy, including optical microscopy; scanning electron microscopy (including EDX), transmission electron microscopy, and atomic force microscopy; and spectroscopy, including nuclear magnetic resonance, surface plasmon resonance, and scanning confocal Raman microscopy.

**Components:** Lecture**Course Equivalents:** MSE 551**Attributes:** Given When Needed**Requirement Group:** Prerequisites: CM132 (or CM104 and CM106), PH132, and ES260**Req. Designation:** Technology

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**School of Arts and Sciences - Materials Science & Engineering - Subject: Materials Sci & Engineering****MSE 551(3)** Course ID:011560 2022-02-03**Advanced Materials Characterization**

Advanced methods for characterizing materials, such as scattering methods, including laser light scattering and x-ray diffraction (powder patterns & Laue patterns); microscopy, including optical microscopy; scanning electron microscopy (including EDX), transmission electron microscopy, and atomic force microscopy; and spectroscopy, including nuclear magnetic resonance, surface plasmon resonance, and scanning confocal Raman microscopy.

The following undergraduate courses should be completed prior to taking this course: CM371 (Physical Chemistry I); PH132 (Physics II); and ES260 (Materials Science and Engineering I)

**Components:** Lecture**Course Equivalents:** MSE 451**Req. Designation:** Technology

**Graduate Interdisciplinary - Materials Science & Engineering - Subject: Materials Sci & Engineering****MSE 560(3)** Course ID:011561 2022-02-03**Advanced Materials Science and Engineering I**

Atomic and molecular structure of solids (crystalline and glassy); atomic and molecular bonding; thermodynamics of materials (condensed matter); kinetics, diffusion and phase transformation; properties of bulk solids compared to thin films, and nano-sized materials; methods for forming solids and thin films (solidification, crystallization, precipitation, evaporation, physical vapor deposition, chemical vapor deposition, etc.); materials chemistry; defects (point, line, surface); mechanical, thermal, electrical, and optical properties; relationship between materials processing and materials properties.

The following undergraduate courses should be completed prior to taking this course: CM371 (Physical Chemistry I); PH132 (Physics II); and ES260 (Materials Science and Engineering I)

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**School of Arts and Sciences - Materials Science & Engineering - Subject: Materials Sci & Engineering****MSE 575(3)****Course ID:012126****2022-02-03****Sustainable Nanotechnology**

[Cross-listed with CM 575, and ES 575] The goal of this course is to provide graduate students and advanced undergraduates with a modern view of current and emerging research in nanotechnology. Topics will include: fundamental nanoscale properties and applications, green manufacturing and assembly in functional devices, interaction of nanomaterials with biological systems, the physical and chemical phenomena at nano-bio interfaces, fate, transport and transformation of engineered nanomaterials, environmental and health impact, nanometrology, nanotoxicology and hazard identification of nano-based products. Development of analytical methods and characterization tools for assessing nanoscale properties and materials will also be discussed. Students will be exposed to interdisciplinary topics and an integrated training bridging material and environmental sciences with biology and analytical chemistry. Students will be able to demonstrate a basic awareness of risks and benefits of emerging technologies and evaluate overall environmental and societal

**Components:** Lecture**Course Equivalents:** CM 475, CM 575, ES 575**Attributes:** Offered Spring Term**Req. Designation:** Technology**MSE 587(3)****Course ID:012911****2022-02-03****Applications of Synchrotron and Electron Based Techniques**

The purpose of the course is to familiarize all students with the x-ray and electron based experimental techniques available at Brookhaven National Lab and other similar facilities. Students will be cognizant of the applications of these cutting edge facilities, and well positioned to use them in their own research. This course is suitable for graduate students, postdocs, and advanced undergrads in physical sciences and engineering, as well as students in biological, environmental, and chemical sciences who may have the interest to learn more about the techniques they may use for their research.

**Components:** Lecture**Course Equivalents:** PH 587, CM 487, CM 587, PH 487, ES 587**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Engineering - Materials Science & Engineering - Subject: Materials Sci & Engineering****MSE 614(1 - 15)****Course ID:012021****2022-02-03****Thesis, Dissertation**

Analytic or experimental studies in materials science & engineering under the direction of a faculty adviser. Credit for this work is given when the requirements for the degree are completed including the presentation of a thesis or dissertation as appropriate to the degree program.

**Components:** Thesis Research**Attributes:** Given When Needed**Req. Designation:** Technology**MSE 999(1 - 4)****Course ID:012875****2022-02-03****Material Science and Engineering Elective**

Used for awarding transfer credits for graduate courses completed elsewhere for which no equivalent Clarkson University graduate course can be identified. (Not offered at Clarkson, for transfer credit only).

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology

**Engineering - School of Engineering - Subject: Multidisciplinary Project Team**


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MT 51(0) Course ID:010554 2021-10-21

**Introduction to Basic Shop Skills**

This course covers simple shop procedures including measurement and layout, drills and drill presses, use of hand taps, proper use of the various band saws, and use of the shear and brake; involves use of the composite lab and wood working equipment. MT 51 consists of three hours of lecture, and three hours of hands-on lab experience.

**Components:** Lecture

**Req. Designation:** Technology

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MT 52(0) Course ID:010555 2019-02-06

**Basic Lathe Operations**

This course covers the basic theory and operation of the metal lathe; topics include tool grinding, turning, facing, boring, fits, tapers, etc. this course consists of three lectures of 1.5 hours each and four labs of 2 hours each. Offered Pass/No Credit.

**Components:** Laboratory, Lecture

**Requirement Group:** Prerequisite: MT 51

**Req. Designation:** Technology

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MT 53(0) Course ID:010556 2019-02-06

**Basic Milling Procedures**

Basic Milling will cover the theory and operation of the Bridgeport type mill; topics covered include set-up of the mill, fixturing, zeroing parts, cutters, and milling techniques for various materials. This course would consist of three lectures of 1.5 hours each and four labs of 2 hours each. Offered Pass/No Credit.

Prerequisite: MT52.

**Components:** Laboratory, Lecture

**Requirement Group:** Prerequisite: MT 51

**Req. Designation:** Technology

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MT 54(0) Course ID:010557 2017-09-13

**CNC Mill Procedures**

Basics of CNC Machine programming and operation of the Haas Bed Mill; topics covered include machine start up and homing, conversational programming, drill patterns, profiles, and pockets. The course would consist of three lectures of 1.5 hours and four labs of 2 hours each.

**Components:** Laboratory, Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisite: MT53

**Req. Designation:** Technology

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MT 55(0) Course ID:010558 2019-02-06

**Basic Welding Procedures**

Basic welding addresses the operation and use of welding equipment in a safe and effective manner; topics include general welding safety, oxygen-acetylene techniques, basic arc welding, MIG welding, TIG welding, and use of the plasma cutting torch. The course would consist of three lectures of 1.5 hours each and four labs of 2 hours each. Offered Pass/No Credit.

Prerequisite: MT51.

**Components:** Laboratory, Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisite: MT 51

**Req. Designation:** Technology

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MT 56(0) Course ID:011053 2019-02-06

**Introduction to MasterCam**

This course is an overview of the CAD software MasterCam. Students will draw, choose tool paths, create machine code, and run programs on CNC mills using CAD.

**Components:** Laboratory, Lecture

**Requirement Group:** Prerequisite: MT 54

**Req. Designation:** Technology

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MT 57(0) Course ID:011054 2019-02-06

**Advanced Lathes**

This course will cover the use of the precision lathes in the student shop. Students will set up and machine on several different lathes using advanced techniques and tooling. Prerequisite: MT52.

**Components:** Laboratory, Lecture

**Requirement Group:** Prerequisite: MT 52

**Req. Designation:** Technology

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**Engineering - School of Engineering - Subject: Multidisciplinary Project Team**

**MT 58(0)** Course ID:011587 2019-03-14

**CNC Lathe Operation**

CNC Lathe Operations and Programming. Topics covered include machine programming and operation; using g-code programs generated by CAD/CAM software, tool path creation utilizing conversational HAAS lathe programming and basic g-code. Students will learn how to turn complex profiles and mill a variety of 3D contours. This course will consist of four lectures of 1.25 hours each and four labs of 2 hours each.

**Components:** Laboratory, Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: MT56, and MT 57

**Req. Designation:** Technology

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**MT 109(0)** Course ID:009127 2014-10-29 **Instructor Consent Required**

**Mini Baja Car Project**

Active participation in Mini Baja Car project. Pass/No Credit only. Must have permission of instructor.

**Components:** Project Team

**Req. Designation:** Technology

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**MT 110(0 - 3)** Course ID:009128 2014-09-22 **Instructor Consent Required**

**Multidisciplinary Course (CPS OM-DINI)**

Active participation in Creative Problem Solving -- Odyssey of the Mind/Destination Imagination project. Pass/No Credit only. Must have permission of instructor.

Prerequisite: consent of the instructor.

**Components:** Project Team

**Req. Designation:** Technology

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**MT 209(0)** Course ID:009146 2014-10-29 **Instructor Consent Required**

**Mini Baja Car Project**

Active participation in Mini Baja Car project. Pass/No Credit only. Must have permission of instructor.

**Components:** Project Team

**Req. Designation:** Technology

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**MT 210(0 - 3)** Course ID:009670 2014-09-22 **Instructor Consent Required**

**Multidisciplinary Course (CPS OM-DINI)**

See MT 110 for course description.

**Components:** Project Team

**Req. Designation:** Technology

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**MT 214(0)** Course ID:009147 2015-02-09 **Instructor Consent Required**

**Multidisciplinary Course (FIRST Robotics Competition)**

Clarkson students work together with local high school students to participate in a nation-wide robotics competition and get a hands-on, inside look at the engineering profession. During the fall semester, students plan for the upcoming spring competition by participating in a series of seminars that focus on various aspects of mobile robot design and construction. Competition rules are announced at the start of the spring semester, and during an intense six-week period, students work to brainstorm, design, construct, and test their robot entry. With only six weeks of build time, all jobs are critical path. Teams from across the nation then compete in a tournament complete with referees, cheerleaders and time clocks. The competition changes each year, so returning team members always have a new challenge.

**Components:** Project Team

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**MT 309(0)** Course ID:009158 2014-10-29 **Instructor Consent Required**

**Mini Baja Car Project**

Active participation in Mini Baja Car project. Pass/No Credit only. Must have permission of instructor.

**Components:** Project Team

**Req. Designation:** Technology

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**MT 310(0 - 3)** Course ID:009676 2014-09-22 **Instructor Consent Required**

**Multidisciplinary Course (CPS OM-DINI)**

See MT 110 for course description.

**Components:** Project Team

**Req. Designation:** Technology

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**Engineering - School of Engineering - Subject: Multidisciplinary Project Team**

MT 409(0)

**Mini Baja Car Project**

Active participation in Mini Baja Car project. Pass/No Credit only. Must have permission of instructor.

Components: Project Team

Req. Designation: Technology

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**School of Arts and Sciences - CRC Education Program - Subject: Educational Mathematics****MTH 524(3)****Course ID:012652****2022-04-08****Geometry for Math Teachers**

This geometry course will focus primarily on content in the new high school Common Core geometry course. The main domains in this course are congruency, similarity, circle properties, measurement and modeling, and coordinate geometry. Emphasis will be on changes in the high school course especially in the areas of transformations, geometric constructions, trigonometric concepts, and modeling with geometry. Students will develop strong proof and reasoning skills throughout this course.

**Components:** Seminar**Attributes:** Given When Needed**Req. Designation:** Technology

Institute for STEM Education - CRC Education Program - Subject: Educational Mathematics

MTH 560(3) Course ID:012657 2021-10-08

**Common Core Math Standards for Teachers**

Common Core Mathematics is a 3-credit course that focuses on the changes in teaching mathematics in the present day classroom. Teachers in the Common Core classroom faces changes in curriculum, modeling, assessments and APPR. This class prepares teachers by analyzing pedagogical shifts, discussing the eight mathematical practices, and examining the new rigorous curriculum. Students will be able to demonstrate models in class and will show the progression from concrete, pictorial and finally abstract representations.

**Components:** Seminar

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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MTH 580(3) Course ID:012661 2021-10-08

**MAT Project in Mathematics (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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MTH 988(3) Course ID:012668 2017-07-01

**Independent Study in Mathematics**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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MTH 989(3) Course ID:012669 2017-07-01

**Independent Study in Mathematics**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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**Business - School of Business - Subject: Operations Management**

OM 1(2 - 4) Course ID:009204 2015-01-19

**Operations Management Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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OM 2(2 - 4) Course ID:009205 2015-01-19

**Operations Management Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

This course may be used to satisfy a Business Foundation Curriculum Requirement.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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OM 331(3) Course ID:009010 2022-04-05

**Operations & Supply Chain Management**

[Cross-listed with EM 331] (May be used to satisfy a CUSB MBA and MS foundation requirement.) An introduction to the planning, analysis and control of production systems. Topics include product and service design, manufacturing processes, aggregate production planning, inventory models and MRP, just-in-time systems, facility layout, forecasting/demand planning, project management, and quality management. Students acquire problem solving experience using ERP software.

Components: Lecture

Course Equivalents: EM 331

Attributes: Offered Fall and Spring

Requirement Group: Prerequisites: STAT 282 or STAT 383 or MA 330, and at least sophomore standing

Req. Designation: Technology

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OM 341(3) Course ID:009019 2017-10-11

**Supply Chain Design & Management**

[Cross-listed with EM 341] Fierce competition in today's global markets has forced business enterprises to focus on reducing costs while meeting rising customer expectations by designing and managing effective and sustainable supply chains. This course focuses on a systems approach to review state-of-the-art models and practical tools for inventory and materials management, design for supply chain, as well as supply chain integration. Topics covered include managing inventories in the supply chain, the bullwhip effect, risk pooling, delayed differentiation, measuring the financial performance of supply chains, the value of information and the role of information technology in the supply chain, coordination and collaboration with channel partners, supply chain related strategic alliances, and outsourcing/off-shoring/reshoring trends. Several team projects and hand-on experiences are utilized to demonstrate real world issues and applications.

Components: Lecture

Course Equivalents: EM 341

Attributes: Offered Spring Term

Requirement Group: Prerequisite: OM331 and at least junior standing.

Req. Designation: Technology

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OM 371(3) Course ID:012840 2022-02-10

**Strategic Sourcing**

This course provides an in-depth analysis of the procurement process and supplier management, with strong emphasis on managing a supplier base for both products and services. Topics covered include the strategic role of sourcing in supply chains, the identification and evaluation of requirements, the strategic make versus buy decision, supplier selection, development and evaluation processes, the supplier coordination and control mechanisms, the relationship between product design and the supplier base and the impact of information technology on strategic sourcing. Both theoretical and quantitative perspectives will be offered. In addition, the topics will be addressed from strategic, financial, sustainability and global perspectives. Students will also develop practical skills in using quantitative tools to select and evaluate suppliers.

Components: Lecture

Course Equivalents: EM 371

Attributes: Offered Fall Term

Requirement Group: Prerequisites: OM/EM331 and at least junior standing

Req. Designation: Technology

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**Business - School of Business - Subject: Operations Management**

**OM 380(3)** Course ID:009030 2018-04-09

**Project Management**

[Cross-listed with EM 380] This course will introduce students to all phases of project management from project initiation to termination. Topics covered include project selection, organization, contracts, planning and scheduling (PERT and CPM), estimating, budgeting and cost control, procurement, resource allocation, variance analysis, auditing and termination procedures. Project management software, case studies, and student team projects will be an integral part of the course.

**Components:** Lecture

**Course Equivalents:** EM 380

**Attributes:** Economics and Organizations, Offered Each Term

**Requirement Group:** Restrictions: Enrollment is limited to students in E&M, CUSB, Software Engineering, Project Management

**Req. Designation:** Technology

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**OM 451(3)** Course ID:009032 2022-02-10

**Quality Management & Lean Enterprise**

[Cross-listed with EM 451] This course will introduce the students to both the managerial and technical aspects of quality improvement. The course emphasizes statistical applications to quality related topics such as process/product design, process capability, quality control, design of experiment, and inspections/sampling. Other topics of interest include: Juran quality trilogy, six-sigma project methodology, and cost of quality. The course consists of a series of lecture and problems solved in class.

**Components:** Lecture

**Course Equivalents:** EM 451

**Attributes:** Offered Fall and Spring

**Requirement Group:** Prerequisites: MA/STAT282 or MA/STAT383 or MA330 or permission of instructor.

**Req. Designation:** Technology

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**OM 476(3)** Course ID:009029 2015-07-06

**Management of Technology**

[Cross-listed with EM 476] Management of technology links together the engineering, science, and management disciplines to plan, develop, and implement technological capabilities to be competitive in the global arena. Students taking the course will gain an understanding of the following topics: innovation, product life cycles, product development process, concurrent engineering, management of technology strategy, selecting technical projects, management of the R&D process, initiating new ventures, international technology transfer, and the management of complex projects. Lectures, readings, and case studies focus on firms operating in an international context.

**Components:** Lecture

**Course Equivalents:** EM 476

**Attributes:** Science, Technology and Society, Offered Each Term

**Requirement Group:** Prerequisite: OM331.

**Req. Designation:** Technology

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**OM 484(3)** Course ID:012745 2022-02-10

**Advanced Project Management**

[Cross listed with EM484] This course builds on the foundation of EM/OM380 (Project Management) by introducing advanced topics in decision making, risk, and cost control as well as providing comprehensive knowledge of project scheduling and other PM tools. This course also provides an opportunity for students to further extend their PM skills in managing and controlling projects by applying the PM methods in a project management simulation using typical project management software. Students are exposed to advanced research topics in the emerging PM areas.

**Components:** Lecture

**Course Equivalents:** EM 484

**Attributes:** Offered Fall and Spring

**Requirement Group:** Prerequisite: EM/OM380

**Req. Designation:** Technology

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**OM 487(1 - 3)** Course ID:009033 2017-01-13 **Instructor Consent Required**

**Special Project in Operations Management**

An investigation of a problem or in-depth topic undertaken by the student under the guidance of a faculty member.

Prerequisites: Permission of the instructor

**Components:** Research

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Business - School of Business - Subject: Operations Management**

OM 602(2) Course ID:009044 2015-07-06

**Decision Analysis and Supply Chain Modeling (MBA Module)**

In today's fast-paced competitive environment, successful managers need the ability to define business problems, construct quantitative models and effectively utilize decision making tools. This course will introduce students to decision analysis techniques by focusing on the development and analysis of models for a variety of business management problems. Topics include supply chain network design, project management, decision making under uncertainty and risk, business process management, and simulation modeling of supply chain systems. Microsoft Excel will be used as a modeling and analysis environment to investigate a variety of analytic techniques.

Prerequisites: completion of all CUSB MBA foundation requirements and admission to the MBA program.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**Business - CRC Business - Subject: Operations Management**

OM 603(3) Course ID:009045

2020-01-05

**Decision Analysis & Supply Chain Modeling**

This course introduces students to different approaches, support tools, and analytical methods for decision making in various business management situations. The objective is to develop the students' ability to define business problems, construct quantitative models and effectively utilize decision making application software. Topics such as linear programming, network modeling, project management, decision making under uncertainty and risk, queueing theory, business process simulation, and Monte Carlo simulation will be explored. Special attention will be given to supply chain modeling and applications. Microsoft Excel will be used as a spreadsheet modeling and analysis environment to investigate a variety of analytic techniques.

**Components:** Lecture**Same As Offering:** OM 603**Course Equivalents:** HC 605**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: OM607**Req. Designation:** Technology

OM 603(3) Course ID:009045

2020-01-05

**Decision Analysis & Supply Chain Modeling**

This course introduces students to different approaches, support tools, and analytical methods for decision making in various business management situations. The objective is to develop the students' ability to define business problems, construct quantitative models and effectively utilize decision making application software. Topics such as linear programming, network modeling, project management, decision making under uncertainty and risk, queueing theory, business process simulation, and Monte Carlo simulation will be explored. Special attention will be given to supply chain modeling and applications. Microsoft Excel will be used as a spreadsheet modeling and analysis environment to investigate a variety of analytic techniques.

**Components:** Lecture**Same As Offering:** OM 603**Course Equivalents:** HC 605**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Business - School of Business - Subject: Operations Management****OM 606(2)** Course ID:009047 2015-08-06**Supply Chain Management (MBA Module)**

[Cross-listed with OM 607] Global supply chains are networks of facilities around the globe that procure raw materials, transform them into intermediate and final products, and subsequently deliver the products to customers worldwide through distribution systems. Rapid advances in information technology are accelerating productivity by providing a multitude of new, lower-cost options for integrating supply chains. In this course we review and discuss state-of-the-art concepts and practical tools to effectively design and management the supply chain. Topics covered include a strategic framework for supply chain management, supply chain design and operation, logistics strategies and design for logistics, inventory management and risk pooling, warehousing and material handling systems, supplier relations, and new and future trends in supply chain management.

Prerequisites: completion of all CUSB MBA foundation requirements and admission to the MBA program.

Components: Lecture

Course Equivalents: OM 607, OM 607

Req. Designation: Technology

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**OM 607(3)** Course ID:009048 2017-11-13**Global Supply Chain Management**

[Cross-listed with OM 606] Intense global competition has forced business enterprises to redesign and integrate their supply chains to effectively meet rising customer expectations at a reasonable cost. This course will start with selected introductory topics before covering the state-of-the-art concepts and practical tools to effectively design and manage the supply chain. Topics covered include a strategic framework for supply chain management, supply chain design, managing inventories in the supply chain, global logistics and distribution strategies, design for logistics, global sourcing, managing supply chain risk/disruptions, and new and future trends in supply chain management. Some combination of team projects, case studies, simulation games, and consulting experiences will be utilized to demonstrate real world issues, challenges and applications.

Components: Lecture

Same As Offering: OM 607

Course Equivalents: OM 606

Req. Designation: Technology

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**Business - CRC Business - Subject: Operations Management**

OM 607(3) Course ID:009048

2017-11-13

**Global Supply Chain Management**

[Cross-listed with OM 606] Intense global competition has forced business enterprises to redesign and integrate their supply chains to effectively meet rising customer expectations at a reasonable cost. This course will start with selected introductory topics before covering the state-of-the-art concepts and practical tools to effectively design and manage the supply chain. Topics covered include a strategic framework for supply chain management, supply chain design, managing inventories in the supply chain, global logistics and distribution strategies, design for logistics, global sourcing, managing supply chain risk/disruptions, and new and future trends in supply chain management. Some combination of team projects, case studies, simulation games, and consulting experiences will be utilized to demonstrate real world issues, challenges and applications.

**Components:** Lecture**Same As Offering:** OM 607**Course Equivalents:** OM 606**Req. Designation:** Technology

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**Business - School of Business - Subject: Operations Management**

OM 620(3) Course ID:013019 2019-11-01

**Supply Chain and Operations Analytics**

Data-driven decision making is essential to drive performance and growth in modern supply chain management. This course showcases real-life applications of data analytics (descriptive, predictive and prescriptive) in various fields of supply chain management. Students learn to define the right data set, ask the right questions to drive supply chain excellence and business value, and use the right models and tools to develop data-driven decisions. Topics include demand forecasting, retail analytics, transportation analytics fulfillment diagnostic in logistic systems, sales and operations analytics in production, and inventory and resource management.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: IA 530 or equivalent.**Req. Designation:** Technology

OM 650(3) Course ID:009061 2016-08-27

**Operations Strategy and International Competitiveness**

The emphasis of the course is the operations and logistics function in firms that source, produce, distribute and market in multiple nations. The management of logistics in such firms differs from its domestic counterpart along several key dimensions. First, there is the need to be able to identify and analyze factors that differ across nations that influence the effectiveness of this function. These include worker productivity, process adaptability, governmental concerns, transportation availability, culture, and so on. In addition, because of the distances involved, transportation and distribution are of greater significance. Finally, these geographically dispersed set of facilities and markets must be integrated and managed to enhance the strategy of the business unity.

**Components:** Lecture**Req. Designation:** Technology

OM 671(3) Course ID:010251 2015-07-06

**Supply Chain Environmental Management**

Manufacturing organizations have increased their interest in environmental management through activities such as green purchasing, reverse logistics, product stewardship and design-for-the environment. These activities, usually involving several organizations, are often part of what is known as supply chain environmental management. This course aims to gain a greater understanding of supply chain environmental management by examining: (i) the advantages and business risks of adopting and implementing environmental practices and technologies in the supply chain, (ii) the role of suppliers and customers to facilitate the adoption/implementation of environmental practices and technologies, and (iii) the implications of such supply chain activities on an organization's operations strategy. This course consists of a mix of lectures and class discussion and relies primarily on a set of readings and a series of cases that will be analyzed in class.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: OM606 (Supply Chain Management)**Req. Designation:** Technology

OM 672(3) Course ID:013103 2022-09-05

**Supply Management Strategy and Analysis**

Effective supply management strategies and management enhances efficiency, customer service, and innovations, ultimately contributing to the profitability and competitive advantages of the entire organization and its supply chain. This course equips you with analytical methods and theoretical strategies to develop and implement an effective supply management strategy for your company. Specific topics include global sourcing and supply chain management strategy alignment, pricing and cost strategy, supplier network evaluation and development, contract management, and sustainable sourcing. Highly interactive format features student-led discussions and staged debates. Includes assignments on case studies and sourcing analysis, as well as projects and a final exam.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

OM 676(3) Course ID:009071 2015-07-06

**Developing and Managing Technology**

This course covers the creation, design, development, implementation, diffusion and transfer of product and process innovation. The course covers the full range of activities from laying a foundation of technical knowledge in research, through the creation of new products and processes, to the integration of marketing, manufacturing and engineering, to commercialization. Topics include innovation management, managing r&d, product and process development, concurrent engineering, project selection, initiating new ventures, and technology transfer. Lectures, cases, reading, and projects focus on managing technology in companies.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Corequisite: OS610 (or equivalent)**Req. Designation:** Technology

**Business - School of Business - Subject: Operations Management**

OM 680(3)

Course ID:009073

2016-02-04

**Strategic Project Management**

[Cross-listed with ES 510, OM 681] A project is a one-time or infrequently occurring operation with a unique goal, a limited lifespan and limited resources. This course will focus on project management from a decision-making perspective and how projects can be used to implement organizational strategy. The course follows the project life cycle model from project initiation to implementation to termination. Topics covered include such things as project scope development, project selection, organizational strategy, leadership, team building, planning, conflict resolution, budgeting, resource allocation, information management, control, auditing, and termination procedures. Computer applications such as MS Project, case studies, project simulations and student project teams will be an integral part of the course. This course satisfies the educational prerequisite for the Project Management Institute's (PMI) Certified Associate in Project Management (CAPM) and Project Management Professional (PMP) certifications.

**Components:** Lecture**Course Equivalents:** ES 510, OM 681**Attributes:** Offered Spring Term**Req. Designation:** Technology

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**Business - CRC Business - Subject: Operations Management**

OM 681(3)

Course ID:012010

2017-03-17

**Strategic Project Management**

[Cross-listed with ES 510, OM 680] A project is a one-time or infrequently occurring operation with a unique goal, a limited lifespan and limited resources. This course will focus on project management from a decision-making perspective and how projects can be used to implement organizational strategy. The course follows the project life cycle model from project initiation to implementation to termination. Topics covered include such things as project scope development, project selection, organizational strategy, leadership, team building, planning, conflict resolution, budgeting, resource allocation, information management, control, auditing, and termination procedures. Computer applications such as MS Project, case studies, project simulations and student project teams will be an integral part of the course. This course satisfies the educational prerequisite for the Project Management Institute's (PMI) Certified Associate in Project Management (CAPM) and Project Management Professional (PMP) certifications.

**Components:** Lecture**Course Equivalents:** ES 510, OM 680**Attributes:** Offered Summer Term**Req. Designation:** Technology

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**Business - School of Business - Subject: Operations Management**

OM 685(3) Course ID:009075

2023-05-10

**Quality Management and Process Improvement**

[Cross-listed with ES 572, OM 686] This course will introduce the students to both the managerial and technical aspects of quality improvement techniques. The discussion of statistical topics will be tied to the Six Sigma methodology for the improvement of quality, productivity, and competitive position. A systemic and strategic approach to quality management will be provided, with emphasis on process improvement tools and methodologies. The course is designed to expose students to the integral elements of a total quality management system within both manufacturing and service organizations. Several individual and team projects involving class presentations, discussion of supplemental articles and case studies are utilized to demonstrate real world issues and applications.

Prerequisites: SB284 or consent of the instructor.

Components: Lecture

Same As Offering: OM 685

Course Equivalents: OM 686

Req. Designation: Technology

OM 685(3) Course ID:009075

2023-05-10

**Quality Management and Process Improvement**

[Cross-listed with ES 572, OM 686] This course will introduce the students to both the managerial and technical aspects of quality improvement techniques. The discussion of statistical topics will be tied to the Six Sigma methodology for the improvement of quality, productivity, and competitive position. A systemic and strategic approach to quality management will be provided, with emphasis on process improvement tools and methodologies. The course is designed to expose students to the integral elements of a total quality management system within both manufacturing and service organizations. Several individual and team projects involving class presentations, discussion of supplemental articles and case studies are utilized to demonstrate real world issues and applications.

Prerequisites: SB284 or consent of the instructor.

Components: Lecture

Same As Offering: OM 685

Course Equivalents: OM 686

Req. Designation: Technology

**Business - CRC Business - Subject: Operations Management**

OM 686(3) Course ID:012004

2017-03-17

**Quality Management and Process Improvement**

[Cross-listed with ES 572, OM 685] This course will introduce the students to both the managerial and technical aspects of quality improvement techniques. The discussion of statistical topics will be tied to the Six Sigma methodology for the improvement of quality, productivity, and competitive position. A systemic and strategic approach to quality management will be provided, with emphasis on process improvement tools and methodologies. The course is designed to expose students to the integral elements of a total quality management system within both manufacturing and service organizations. Several individual and team projects involving class presentations, discussion of supplemental articles and case studies are utilized to demonstrate real world issues and applications.

**Components:** Lecture**Course Equivalents:** OM 685, OM 685**Attributes:** Offered Fall Term**Req. Designation:** Technology

**Business - School of Business - Subject: Operations Management**

OM 687(1 - 6) Course ID:009076 2015-07-06

**Independent Project in Management**

[Cross-listed with OM 688] An investigation of a problem undertaken by the student under the guidance of an individual faculty member. The course provides an opportunity for the student to explore an area of management research in depth on an independent study basis. To register students must receive approval of the faculty member.

Prerequisites: consent of the instructor.

Components: Independent Study

Req. Designation: Technology

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**Business - School of Business - Subject: Organizational Studies**

**OS 1(2 - 4)** Course ID:009207 **2015-01-19**

**Organizational Studies Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Lecture

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**OS 2(2 - 4)** Course ID:009208 **2015-01-19**

**Organizational Studies Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

This course may be used to satisfy a Business Foundation Curriculum Requirement.

**Components:** Lecture

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**OS 286(3)** Course ID:009016 **2015-07-06**

**Organizational Behavior I**

[Cross-listed with EM 286, PY 286] (May be used to satisfy a CUSB MBA or MS foundation requirement.) An introduction to the processes required to manage contemporary organizations with a focus on individual behaviors as they relate to the functions of planning, organizing, controlling, and leading. The most recent concepts of behavioral science in the practice of management are presented to assist the student in gaining understanding of the pervasiveness of the discipline in all types of organizations and processes. Topics include motivation, leadership, perceptions, personality theory, learning theory, personnel issues, stress management, organizational culture, and decision making.

**Components:** Lecture

**Course Equivalents:** PY 286, EM 286

**Attributes:** Individual and Group Behavior, Offered Each Term

**Requirement Group:** Prerequisites: sophomore standing or the permission of the instructor.

**Req. Designation:** Technology

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**OS 352(3)** Course ID:009013 **2015-07-06**

**Strategic Human Resource Management**

This course provides an introduction to the strategic management of human resources in organizations. Topics include human resource planning, recruitment and selection of employees, training and development, performance appraisal, employee motivation, compensation and benefits, and employee and labor/management relations. These topics should be understood in the context of business strategy, pressures external to organizations, and relevant theories of human and organizational behavior.

**Components:** Lecture

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisites: OS 286 (or equivalent)

**Req. Designation:** Technology

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**OS 432(3)** Course ID:009021 **2015-07-06**

**Organizational Policy and Strategy**

[Cross-listed with EM 432] A capstone course designed to integrate the functional areas and tools of management studied in previous courses within a strategic planning framework giving due attention to ethical and social responsibility concerns and international business issues. Emphasis is placed on the business environment in a global economy, industry analysis, tactical planning, overall strategic planning, policy establishment and implementation. Case analysis, in the small group setting, is utilized, enabling students to share their expertise and explore their value structure. Students present results via written and oral reports.

**Components:** Lecture

**Course Equivalents:** EM 432

**Attributes:** Two communication units, Offered Each Term

**Requirement Group:** Prerequisites: FN361, OM331, OS286, MK320 and Senior standing.

**Req. Designation:** Technology

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**Business - School of Business - Subject: Organizational Studies**

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OS 452(3) Course ID:011767 2015-07-08

**Advanced Human Resource Management**

This course provides advanced instruction in the strategic management of human resources in organizations. The focus is on the development and critical evaluation of sound HR policies and systems in key HR areas such as selection, training and development, performance management, and compensation. The course will also address the use of HR metrics, employee surveys, and the relationship between strategic HR practices and organizational performance. Knowledge and skills will be developed through qualitative and quantitative data analysis, evaluating best practices, and linking current HR research to practice.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: OS352.

**Req. Designation:** Technology

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OS 466(3) Course ID:009028 2015-07-06

**Negotiations and Relationship Management**

This course introduces students to the complex problems associated with the management of stakeholder relationships. The course emphasis is on the establishing, negotiating, building, sustaining, and repairing of both workplace and external relationships, including relationships with employees, management, customers, suppliers, manufacturers, shareholders, society, and other key stakeholders. This course introduces theories of negotiation, conflict, complaint handling, and norms and ethics of fairness. The course introduces labor relations, collective bargaining, and U.S. labor and employment laws, and considers corresponding implications for union and nonunion workplaces.

**Components:** Lecture

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisites: OS286 and Junior Standing.

**Req. Designation:** Technology

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OS 487(1 - 3) Course ID:010260 2017-01-13 Instructor Consent Required

**Special Project in Organizational Studies**

An investigation of a problem or in-depth topic undertaken by the student under the guidance of a faculty member.

Prerequisite: Permission of the instructor

**Components:** Research

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Business - CRC Business - Subject: Organizational Studies**

OS 602(1.5)

Course ID:011254

2017-03-17

**Leadership Development I - Foundations of Leadership & Organizational Behavior**

The purpose of this course is to help students understand the general principles and processes of organizational behavior and effective leadership so that they can lead in a wide variety of situations. Course concepts include personality, motivation, decision making, power, team dynamics, and leadership styles. This course proceeds from the premise that leadership skills supplement the technical and diagnostic skills learned in other Clarkson MBA courses. Students in this course will develop an understanding of the course topics through hands-on experience, using a business simulation and a number of team exercises.

**Components:** Lecture**Attributes:** Offered Summer Term**Req. Designation:** Technology

OS 603(3)

Course ID:011256

2022-10-12

**Leadership and Organizational Behavior**

[Cross-listed with OS 608, HC 651] This course builds upon the lessons learned in OS602 and other MBA classes to allow students to further develop their leadership skills and understanding of behavior within an organizational setting. Specific topics to be covered include organizational culture and structure, influencing others through formal and informal means, negotiations, and analysis of organizational congruence. The course uses business cases, videos, articles from the academic and popular press, as well as in-class exercises.

**Components:** Lecture**Course Equivalents:** OS 608, HC 651**Attributes:** Offered Fall and Spring**Req. Designation:** Technology

**Business - School of Business - Subject: Organizational Studies**

**OS 608(2)** Course ID:009049 2016-07-21

**Organizational Behavior and Performance Management**

[Cross-listed with OS 603] The purpose of this module is to prepare students for leadership responsibilities in the organization. The module may focus around one or more of several topics: managing your own performance and that of subordinates; managing organizational change; managing power, politics and conflicts; working in and managing groups effectively; managing technology to enhance productivity. Other topics will be covered as appropriate.

Prerequisites: completion of all CUSB MBA foundation requirements and admission to the MBA program.

**Components:** Lecture

**Course Equivalents:** OS 603, HC 651

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**OS 610(2)** Course ID:009051 2015-07-06

**Strategic Planning**

[Cross-listed with OS 611] This course provides an integrative approach to recognition, analysis and solution of strategic issues or challenges facing business executives in their quest to gain and sustain strategic advantage in the world marketplace. Through case analyses, as well as other instructional methods, students will develop the synthetic, critical thinking, and communication skills necessary for effectively managing in a global context. Students will also develop an ethical/moral understanding of the dynamics involved in the creation and distribution of value among organizational stakeholders.

Prerequisites: completion of all CUSB MBA foundation requirements and admission to the MBA program.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: AC603, EC604, FN607, MK609, OM606, OS608, and SB609.

**Req. Designation:** Technology

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**Business - CRC Business - Subject: Organizational Studies**

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OS 651(3) Course ID:012565 2016-07-25

**High Performance Leadership**

[Formerly MBA 652] This course emphasizes cognitive skills and experiential practicum learning applied to ongoing leadership and organizational problems. Students learn about leadership roles and competencies essential for building and supporting organizational capabilities and business strategies in global markets. The course also enables students to learn a method to diagnose their strengths and weaknesses in leadership capacities and measure their proficiency against bench-marked models of high performance leadership.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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OS 654(3) Course ID:012567 2017-07-14

**Labor Relations**

[Formerly MBA 654] This comprehensive course ties together the history of modern labor movements in the United States with issues facing workers in the Twenty-First Century, including the impact of globalization and international outsourcing. Subtopics include negotiation, conflict resolution, and workforce diversity. In addition, a comparative study on international unions will be examined. Each week, current events and their implications for labor relations will be discussed.

**Components:** Lecture

**Same As Offering:** OS 654

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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OS 654(3) Course ID:012567 2017-07-14

**Labor Relations**

[Formerly MBA 654] This comprehensive course ties together the history of modern labor movements in the United States with issues facing workers in the Twenty-First Century, including the impact of globalization and international outsourcing. Subtopics include negotiation, conflict resolution, and workforce diversity. In addition, a comparative study on international unions will be examined. Each week, current events and their implications for labor relations will be discussed.

**Components:** Lecture

**Same As Offering:** OS 654

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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**Business - School of Business - Subject: Organizational Studies**

OS 657(3) Course ID:009066

2022-07-19

**Leading Organizational Change**

[Cross-listed with OS 656] This course examines the processes of organizational change in dynamic technological and global business environments to enhance organizational quality, productivity, and overall operation. The course focuses on leadership approaches that facilitate stakeholder acceptance of change and employee contribution to the management of change. Topics include: change models and theories, the various types of organizational change, planned organizational change, resistance to change, the role of change management consultants, and human resource management practices that facilitate change. The types of change considered range from minor change interventions to transformational change, including technological, cultural, and work design changes. The course utilizes case studies, skills development exercises, and group projects in the study of organizational change.

**Components:** Lecture**Same As Offering:** OS 657**Requirement Group:** Prerequisite: OS 608 (Organizational Behavior and Performance Management), or OS 603 (Leadership Development)**Req. Designation:** Technology

OS 657(3) Course ID:009066

2022-07-19

**Leading Organizational Change**

[Cross-listed with OS 656] This course examines the processes of organizational change in dynamic technological and global business environments to enhance organizational quality, productivity, and overall operation. The course focuses on leadership approaches that facilitate stakeholder acceptance of change and employee contribution to the management of change. Topics include: change models and theories, the various types of organizational change, planned organizational change, resistance to change, the role of change management consultants, and human resource management practices that facilitate change. The types of change considered range from minor change interventions to transformational change, including technological, cultural, and work design changes. The course utilizes case studies, skills development exercises, and group projects in the study of organizational change.

**Components:** Lecture**Same As Offering:** OS 657**Requirement Group:** Prerequisite: OS 608 (Organizational Behavior and Performance Management), or OS 603 (Leadership Development)**Req. Designation:** Technology

OS 666(3) Course ID:009069

2015-07-06

**Negotiations and Relationship Management**

[Cross-listed with OS 667] This course examines the complex problems associated with the management of stakeholder relationships under conditions of rapid economic change and intense global competition. The course emphasis is on the establishing, negotiating, building, sustaining, and repairing of both workplace and external relationships, including relationships with employees, management, customers, suppliers, manufacturers, shareholders, society, and other key stakeholders. This course provides an in-depth understanding of the theories of negotiation, conflict, complaint handling, and norms and ethics of fairness. The course also provides a foundation on labor relations, collective bargaining, and U.S. labor and employment laws, with an emphasis on the corresponding implications for union and nonunion workplaces. The course is intended to be applicable to a broad spectrum of work- or business-related relationship issues faced by managers and professionals.

**Components:** Lecture**Course Equivalents:** OS 667, OS 667**Requirement Group:** Prerequisites: OS608 (Organizational Behavior & Performance Management) or OS602 (Leadership Development)**Req. Designation:** Technology

**Business - CRC Business - Subject: Organizational Studies**

OS 667(3) Course ID:012006

2018-12-12

**Negotiations and Relationship Management**

[Cross-listed with OS 666] This course examines the complex problems associated with the management of stakeholder relationships under conditions of rapid economic change and intense global competition. The course emphasis is on the establishing, negotiating, building, sustaining, and repairing of both workplace and external relationships, including relationships with employees, management, customers, suppliers, manufacturers, shareholders, society, and other key stakeholders. This course provides an in-depth understanding of the theories of negotiation, conflict, complaint handling, and norms and ethics of fairness. The course also provides a foundation on labor relations, collective bargaining, and U.S. labor and employment laws, with an emphasis on the corresponding implications for union and nonunion workplaces. The course is intended to be applicable to a broad spectrum of work- or business-related relationship issues faces by managers and professionals.

**Components:** Lecture**Same As Offering:** OS 667**Course Equivalents:** OS 666**Attributes:** Offered Summer Term**Requirement Group:** Prerequisites: OS603 or OS602**Req. Designation:** Technology

OS 667(3) Course ID:012006

2018-12-12

**Negotiations and Relationship Management**

[Cross-listed with OS 666] This course examines the complex problems associated with the management of stakeholder relationships under conditions of rapid economic change and intense global competition. The course emphasis is on the establishing, negotiating, building, sustaining, and repairing of both workplace and external relationships, including relationships with employees, management, customers, suppliers, manufacturers, shareholders, society, and other key stakeholders. This course provides an in-depth understanding of the theories of negotiation, conflict, complaint handling, and norms and ethics of fairness. The course also provides a foundation on labor relations, collective bargaining, and U.S. labor and employment laws, with an emphasis on the corresponding implications for union and nonunion workplaces. The course is intended to be applicable to a broad spectrum of work- or business-related relationship issues faces by managers and professionals.

**Components:** Lecture**Same As Offering:** OS 667**Course Equivalents:** OS 666**Attributes:** Offered Summer Term**Requirement Group:** Prerequisites: OS603 or OS602**Req. Designation:** Technology

OS 675(3) Course ID:012579

2016-07-01

**Human Resource Management Systems**

[Formerly MBA 675] This course covers theories, empirical research and practical applications relevant to strategic human resource management from three major perspectives: legal, management and social science. The course will provide foundational knowledge in human resource and anti-discrimination law, job analysis, and strategic human resource planning processes. Four functional areas of human resource management will be addressed: recruitment/selection, training/development, motivation (e.g., performance management, compensation/benefits) and maintenance (e.g., communications, health and safety, labor relations, corrective action/discipline).

**Components:** Lecture**Req. Designation:** Technology

OS 676(3) Course ID:012580

2016-07-25

**Current Issues in Human Resource Management**

[Formerly MBA 676] This course addresses the strategic practice of human resource management from the perspective of an organizational leader striving to work strategically, ethically, and effectively with people. Current topics of importance in human resources (such as employee engagement, diversity/inclusion, work-life integration strategies, shifting employment relationships) will be addressed, discussing ways to manage human resources effectively in organizations' dynamic legal, social and economic environments. Course topics will be examined using a problem solving approach, through analyses of case studies and court cases, social science research, and federal/state/local legislation.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Business - CRC Business - Subject: Organizational Studies****OS 677(3)** Course ID:012581 2016-07-25**International Human Resources**

[Formerly MBA 677] International Human Resource Management will focus on how effective human resource policy and practice contributes to a global company's competitiveness. This course will be considered within the context of strategic business objectives, culture, and resource management constraints given by the various national entities. Special focus will be placed on understanding the unifying human resource policies that support the strategic objectives of a global organization. This course will draw on practical examples from companies that have experienced challenges of international human resource management.

**Components:** Lecture**Attributes:** Offered Summer Term**Req. Designation:** Technology**OS 681(3)** Course ID:012582 2023-01-11**Strategic Planning**

[Cross-listed with HC 681] [Formerly MBA 681] This capstone course provides an integrative approach to the recognition, analysis, and action that managers need as part of the effective strategic management process. Critical thinking, creative thinking, and analytical skills applicable to strategy formulation and implementation are developed across a variety of organizational contexts. Concepts including multiple strategic frameworks, competitor analysis, and competitive advantage are applied to real organizations. Enhanced written and oral communications skills are developed to persuasively and credibly present strategic conclusions and recommendations. Different types of data are analyzed and tools and models from core MBA coursework are integrated. A strategic assessment is conducted, including relevant recommendations that consider ethical practices and corporate social responsibilities.

**Components:** Lecture**Same As Offering:** OS 681**Course Equivalents:** SB 609, SB 610, HC 681**Requirement Group:** Prerequisites: AC 604, EC 605, FN 608, MK 610, OM 607, OS 603, and SB 610**Req. Designation:** Technology**OS 681(3)** Course ID:012582 2023-01-11**Strategic Planning**

[Cross-listed with HC 681] [Formerly MBA 681] This capstone course provides an integrative approach to the recognition, analysis, and action that managers need as part of the effective strategic management process. Critical thinking, creative thinking, and analytical skills applicable to strategy formulation and implementation are developed across a variety of organizational contexts. Concepts including multiple strategic frameworks, competitor analysis, and competitive advantage are applied to real organizations. Enhanced written and oral communications skills are developed to persuasively and credibly present strategic conclusions and recommendations. Different types of data are analyzed and tools and models from core MBA coursework are integrated. A strategic assessment is conducted, including relevant recommendations that consider ethical practices and corporate social responsibilities.

**Components:** Lecture**Same As Offering:** OS 681**Course Equivalents:** SB 609, SB 610, HC 681**Req. Designation:** Technology

**Business - School of Business - Subject: Organizational Studies**

OS 687(1 - 6) Course ID:010109 2015-08-19 Instructor Consent Required

**Project in Organizational Studies**

An investigation of a problem undertaken by the student under the guidance of an individual faculty member. The course provides an opportunity for the student to explore an area of organizational research in depth on an independent study basis. To register students must receive approval of the faculty member.

Prerequisites: consent of the instructor.

**Components:** Independent Study

**Course Equivalents:** OS 688

**Req. Designation:** Technology

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**Business - CRC Business - Subject: Organizational Studies**

OS 688(1 - 6)

Course ID:012039

2017-03-17

Instructor Consent Required

**Project in Organizational Studies**

An investigation of a problem undertaken by the student under the guidance of an individual faculty member. The course provides an opportunity for the student to explore an area of organizational research in depth on an independent study basis. To register students must receive approval of the faculty member.

Prerequisites: consent of the instructor.

**Components:** Independent Study

**Course Equivalents:** OS 687

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Health Sciences - Occupational Therapy - Subject: Occupational Therapy**

OT 501(4) Course ID:012048 2019-01-15

**Gross Anatomy**

This course will provide students with a sound working knowledge of the structure of the human body with a strong emphasis on the musculoskeletal and nervous systems through the study of clinical anatomy. The relationship between structure and function will be addressed and the integration of these body systems during normal and abnormal function will be reviewed. Course structure will focus on regional anatomy and therefore will emphasize the relationship between various structures including muscles, nerves and arteries. The laboratory is designed to facilitate the study of human anatomy through the dissection of human cadavers and examination of skeletal materials and anatomical models. In addition, dissection provides students a unique opportunity to consider and discuss issues of professionalism, team-building, ethics, and death and dying.

**Components:** Lecture**Attributes:** Offered Odd Falls**Requirement Group:** Prerequisite: Students must be admitted into the OT-MS program**Req. Designation:** Technology

OT 503(4) Course ID:012049 2023-06-20

**Neuroscience**

This course will focus on the application of neuroscience theory and clinical principles of nervous system function to behavioral outcomes in sensation, movement, perception and cognition as typically seen by rehabilitation professionals. Anatomy and function of the human nervous systems will be taught with emphasis placed on their role in development, movement and motor learning, the sensory system, cognition, perception and behavior for the purpose of understanding rehabilitation principles and intervention. Components of normal function and dysfunction of the peripheral and central nervous systems will be reviewed from the perspective of the rehabilitation specialist. Nervous system components including the spinal cord, brainstem, cerebrum and the auditory, visual and vestibular systems will be reviewed. Primary roles and functions, knowledge of the physical structures involved and the neural pathways that link systems

**Components:** Lecture**Attributes:** Offered Odd Springs**Req. Designation:** Technology

OT 511(2) Course ID:012073 2019-01-15

**Development and Occupational Performance Across the Lifespan**

In this course, students will explore motor, cognitive and psychosocial development and age-related changes that occur from birth through older adulthood in typical individuals. Students will gain an appreciation for, and understanding of, individual and contextual factors that influence development and aging, including but not limited to biologic, social, environmental and health-related factors. They will examine the relationship between development and aging on performance skills, and apply this knowledge to gain a deeper understanding of activity demands. Students will be able to recognize the challenges that are presented when typical development does not occur or when age-related conditions negatively impact occupational performance.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: Students must be admitted into the OT-MS program**Req. Designation:** Technology

OT 521(2) Course ID:012056 2023-06-20

**Mental Health and Occupational Performance**

This course provides students the opportunity to visit the roots of occupational therapy, as students explore the role of the profession as it relates to psychosocial mental health issues. Students will compare the traditional role of OT practice in this field with current trends and emerging practice as they explore innovative ways to assist these clients with occupational goals. Additionally, students will explore how mental health and psychosocial issues can impact all areas of practice, from pediatrics, to adult physical dysfunction, to non-traditional practice areas. Mental health, cognition, and psychosocial issues will be addressed across a life-span while examining mental health conditions according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).

Prerequisite: Students must be admitted into the OT-MS program.

**Components:** Lecture**Attributes:** Offered Odd Falls**Req. Designation:** Technology

**Health Sciences - Occupational Therapy - Subject: Occupational Therapy**

OT 531(3) Course ID:012052 2023-01-30

**Theory and Practice**

In this foundational course, students are introduced to the profession of occupational therapy through history, theory, and current practice. An overview of the value of occupational therapy in society is presented as students examine historical constructs of occupation and the current use of theories, models, and frames of reference.

**Components:** Lecture**Attributes:** Offered Odd Falls**Requirement Group:** Prerequisite: Students must be admitted into the OT-MS program**Req. Designation:** Technology

OT 533(2) Course ID:012053 2023-06-20

**Applied Kinesiology for Occupational Therapists**

Kinesiology is the study of human motion. Students will demonstrate knowledge and understanding of the structure and function of the human body as it relates to kinesiology and biomechanics. This course is designed to establish a basis of general biomechanical principles as well as a detailed understanding of the osteokinematics and arthrokinematics of the various joints of the body. The course consists of both lecture and laboratory sessions. Laboratory sessions will provide the student with practical applications of principles covered in class. In addition, the laboratory sessions will allow the student to become proficient in the areas of surface anatomy and palpation, manual muscle testing, and goniometry. The student will study normal and pathological movements. Students will employ logical thinking, critical analysis, problem solving, and creativity throughout this course.

Prerequisites: Successful completion of all previous semester courses.

**Components:** Lecture**Attributes:** Offered Odd Springs**Req. Designation:** Technology

OT 537(2) Course ID:012074 2023-06-20

**Experiential Learning Lab: Pediatric Assessment**

In this course, students will develop skills in obtaining, interpreting, and reporting evaluative information and data through both standardized and non-standardized methods. They will gain the ability to utilize comprehensive evaluation results to identify meaningful and realistic intervention goals that are relevant to the practice setting and reflect client/family needs and priorities. Students will gain an ability to accurately and professionally report the results of an evaluation both orally and in a formal evaluation report.

Prerequisites: Successful completion of all previous semester courses.

**Components:** Lecture**Attributes:** Offered Summer Term**Req. Designation:** Technology

OT 539(3) Course ID:012059 2023-06-20

**Professional Practice, Leadership, and Management**

In this course, students will apply knowledge of OT practice and global healthcare organizations to the development of OT leadership skills. Students will prepare a comprehensive OT business and marketing proposal that reflects evidence-based OT practice and community needs. The proposal will include needs assessment, strategic planning, organizational structure, services delivery model, quality management planning, financial management and grant opportunities, and marketing plan. Students will be introduced to leadership theories and effective leadership models for management and supervisory roles. Expectations for teaching on a college level will be discussed and students will demonstrate an introductory understanding of instructional and teaching design.

Prerequisite: Successful completion of all previous semester courses.

**Components:** Lecture**Attributes:** Offered Even Springs**Req. Designation:** Technology

**Health Sciences - Occupational Therapy - Subject: Occupational Therapy**

OT 541(3) Course ID:012054 2023-01-30

**Evidence-based Practice I**

Evidence-Based Practice I (EBPI) provides students with an advanced general understanding of qualitative and quantitative research methodologies. With this knowledge, students will learn to review research and scrutinize scholarly works in a range of peer-reviewed journals, in the health and social sciences, and develop the foundational skills to incorporate research evidence into practice. Students will then consider the research process from a science and technology studies (STS) lens, with introductions to institutional review boards (IRBs), the peer review process, editorial discretion, and even the practice of citing other works. The traditions that drive academic publishing, including the tenure process, ultimately influence the quality of evidence that is available to clinicians. EBPI provides students with a look behind the curtain, so to speak, at research practice before "findings" are reified in print as scientific artifacts.

Components: Lecture

Attributes: Offered Even Falls

Requirement Group: Prerequisite: Students must be admitted into the OT-MS program

Req. Designation: Technology

OT 549(2) Course ID:012055 2023-06-20

**Evidence-based Practice II**

In Evidence-Based Practice II, students will develop an advanced understanding of how research is used to support practice decisions. Students will learn to efficiently and effectively assess articles and make determinations as support for selected interventions. Students will be encouraged to develop an understanding of the interplay of evidence, the effectiveness of interventions and assessments, the client perspective and the professional experience to evidence-based practice. Additionally, students will demonstrate knowledge of the social determinants of health, including how they may implicate evidence-based practice.

Prerequisites: Successful completion of all previous semester courses.

Components: Lecture

Attributes: Offered Even Springs

Req. Designation: Technology

OT 551(3) Course ID:012065 2023-06-20

**Fundamentals of Occupational Performance**

In this course students develop a connection between the Occupational Therapy Practice Framework, real-life activities, and occupations. Students can expect to gain an understanding of the role and process of occupational therapy in promoting health among individuals with and without conditions. Students will apply knowledge of human development, behavior, and occupational performance to critically explore and explain the relationships between client factors, context, environment, occupation, health and disability. Students will apply concepts of occupation and activity to therapeutic intervention within various service delivery models. Core occupational therapy competencies of interpersonal skills, oral and written communication,

Components: Lecture

Attributes: Offered Odd Falls

Requirement Group: Prerequisite: Students must be admitted into the OT-MS program

Req. Designation: Technology

OT 553(2) Course ID:012057 2023-06-22

**Cognition and Occupational Performance**

In this basic science course, students are introduced to the tenets of cognitive and perceptual rehabilitation in occupational therapy. Students will explore how cognitive and perceptual deficits impact occupational performance and health related quality of life. Neurocognitive disorders will be reviewed, along with current assessments, evidence-based interventions, and practice models.

Prerequisite: Successful completion of all previous semester courses.

Components: Lecture

Attributes: Offered Odd Springs

Req. Designation: Technology

**Health Sciences - Occupational Therapy - Subject: Occupational Therapy**

OT 557(2) Course ID:012050

2023-06-22

**Upper Extremity Rehabilitation and Orthotics**

In this hands-on, highly interactive course, students will link learned science concepts from anatomy, neuroanatomy, kinesiology, and occupational science to the art and science of upper extremity rehabilitation.

Upper extremity assessment and intervention, and the link to meaningful occupational engagement, will be explored through cases. The importance of the hand in everyday functioning will be explored through an anthropology, biological, and occupational science perspective. Experiential learning component of the course will require students to create orthotic devices aimed toward the client's social and cultural adaptation to disabilities and to maximize health and participation.

Prerequisites: Successful completion of all previous semester courses.

**Components:** Lecture

**Attributes:** Offered Even Falls

**Req. Designation:** Technology

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**School of Arts and Sciences - Occupational Therapy - Subject: Occupational Therapy**

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OT 563(2) Course ID:012811 2023-06-22

**Adult Conditions I**

This course links concepts learned in Anatomy (OT 501) to the Experiential Learning Lab I (OT 583). Clinical correlations covered in lectures as well as laboratory will present the fundamentals of human anatomy in a clinical context. Health related topics covered in this course target the adult and older population including, cardiovascular, pulmonary, diabetes, wounds, burns, amputations, arthritis, joint replacement, visual perceptual dysfunction, and additional focuses on fall prevention and community mobility and transportation. Material covered will provide students with a rich foundation in which they will develop clinical reasoning that guides occupational therapy practice, professional inquiry and evidence-

**Components:** Lecture

**Requirement Group:** Corequisite: OT583

**Req. Designation:** Technology

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OT 567(2) Course ID:012812 2023-06-20

**Adult Conditions II**

This course links concepts learned in Neuroscience (OT 503) to the Experiential Learning Lab: Adult Neuro Assessment and Intervention (OT 587). Clinical correlations covered in lectures as well as laboratory will present the fundamentals of understanding and identifying neuroscience related health conditions in a clinical context. Topics covered in this course include, cerebrovascular accidents, traumatic brain injury, spinal cord injuries, and a variety of neurodegenerative diseases (i.e. Huntington's Disease, Alzheimer's Disease, Multiple Sclerosis) that span across the adult to older adult population. Material covered will provide students with a rich foundation in which they will develop clinical reasoning that guides occupational therapy practice, professional inquiry and evidence-based decision-making.

Prerequisite: Successful completion of all previous semester courses.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Health Sciences - Occupational Therapy - Subject: Occupational Therapy**

OT 579(3) Course ID:012995 2023-06-20

**Group Dynamics**

This course utilizes self-directed, life-long learning concepts as students explore therapeutic use of self and group dynamics. Using case studies and experiential learning, students will explore and apply these concept domains while examining daily living tasks, activities, and engagement in performance of occupations. Using the group process, students will identify a variety of intervention techniques affording the client opportunities to engage in meaningful occupations. The overarching purpose of this course is to enable students to understand the group process experience as a viable intervention option. Students will develop entry level skills of the student occupational therapist sufficient for intervention planning, note writing, patient/consumer safety, and student safety in varied practice settings.

Prerequisite: Successful completion of all previous semester courses.

**Components:** Lecture

**Attributes:** Offered Odd Springs

**Req. Designation:** Technology

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OT 583(3) Course ID:012879 2023-06-20

**Experiential Learning Lab: Adult Assessment and Intervention**

This course serves as the experiential lab for adult populations while simultaneously linking concepts from the Adult Conditions I (OT563) course and integrating knowledge of gross anatomy and pathology.

Through simulated hands-on experiences, students will develop a deeper understanding of the impact of lifestyle, health, and disability on occupational performance and participation thereby developing clinical reasoning skills.

Students learn to administer assessments, interpret, and document their results.

Evaluative data is then used to design and implement meaningful and evidence-based interventions.

Prerequisite: Successful completion of all previous semester courses.

**Components:** Laboratory

**Req. Designation:** Technology

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**School of Arts and Sciences - Occupational Therapy - Subject: Occupational Therapy**

OT 587(3) Course ID:012940 2023-06-20

**Experiential Learning Lab: Adult Neuro Assessment and Intervention**

This course serves as the experiential lab for adults with neurological conditions while simultaneously linking concepts from the Adult Conditions II (OT 567) course. Students integrate knowledge of neurological concepts and related pathological conditions to explore their impact on occupational performance and participation. Students will become competent in all aspects of the evaluation process and will develop critical thinking and clinical reasoning skills to design and implement evidence-based interventions for the adult neurological population.

Prerequisite: Successful completion of all previous semester courses.

**Components:** Laboratory

**Attributes:** Offered Odd Springs

**Req. Designation:** Technology

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**Health Sciences - Occupational Therapy - Subject: Occupational Therapy****OT 589(4)** Course ID:012058 2023-06-20**Experiential Learning Lab: Pediatric Intervention**

This experiential learning course in pediatric intervention supports students to develop evidence-based and theoretically informed interventions to address client factors, performance patterns, and performance skills in pediatric populations. Hands-on skills are practiced in guided lab experiences developed to support practice competency.

Prerequisite: Successful completion of all previous semester courses.

Components: Lecture

Attributes: Offered Even Falls

Req. Designation: Technology

**OT 591(2)** Course ID:012061 2023-01-30**Professional Communication and Practice**

In this course, students begin to develop themselves as professional agents of change through the introduction and exploration of core occupational therapy values, ethical decision making, healthcare policy, and advocacy. Emphasis is placed on the development of effective writing and communication skills that will support a team based approach to the promotion of health and wellness.

Components: Seminar

Attributes: Offered Odd Falls

Requirement Group: Prerequisite: Students must be admitted into the OT-MS program

Req. Designation: Technology

**OT 595(2)** Course ID:012062 2023-06-22**Interprofessional and Emerging Practice**

Students will explore interprofessional practice, emerging practice, and understand the crucial, unique, and vital role occupational therapists play in a variety of teams. Through the exploration of different practice areas, students will understand how occupational performance plays a key role in health and wellness, despite practice setting. Health literacy and advocacy are addressed as students start exploring clinical questions, critically analyze available evidence, and begin learning how to convey this knowledge to clients, colleagues, and other stakeholders.

Prerequisite: Successful completion of all previous semester courses.

Components: Seminar

Attributes: Offered Odd Springs

Req. Designation: Technology

**OT 597(2)** Course ID:012063 2023-06-22**Special Topics in Advanced Practice**

This course provides students the opportunity to examine and discuss specialty topics related to advanced practice. Students will explore research on these specialty topics as it applies to occupation-based practice, understand ways to collect evidence in the clinic and incorporate that evidence into occupational therapy best practice, learn ways to disseminate this information to peers, colleagues, and clients, and advocate for change. Topics covered in this class include death and dying, Hospice and Palliative Care, ICU and Acute care, and Physical agent modalities.

Prerequisite: Successful completion of all previous semester courses.

Components: Seminar

Attributes: Offered Even Falls

Req. Designation: Technology

**OT 599(2)** Course ID:012064 2023-06-22**The Lifelong Learner**

This course provides students with the opportunity to synthesize and integrate core concepts that were learned throughout the entire academic program. Concepts related to evaluation and assessment, intervention management, reimbursement systems, and evidence-based practice will be reviewed using advanced cases and test questions. Students will begin their preparation for the NBCOT exam and state licensure.

Prerequisite: Successful completion of all previous semester courses.

Components: Seminar

Attributes: Offered Even Springs

Req. Designation: Technology

**Health Sciences - Occupational Therapy - Subject: Occupational Therapy**


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OT 603(3) Course ID:012066 2023-06-22

**Activity Analysis**

Students will explore the enduring relevance of Mary Reilly's quote: "Man, through the use of his hands as they are energized by mind and will, can influence the state of his own health." Students will examine the relationship between creativity, activity, and occupation through personal involvement in creative endeavors and analysis. This course explores how creative expression plays a vital role in health and personal transformations. Students will learn to gather occupational history, analyze tasks and skills, identify necessary performance skills, and explore current and innovative adaptations and modifications to foster participation.

Prerequisite: Successful completion of all previous semester courses.

Components: Lecture

Attributes: Offered Odd Springs

Req. Designation: Technology

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OT 605(2) Course ID:012067 2023-06-22

**Assistive Technology**

In this course, students will explore the role that modifications and adaptations have in maximizing independence, functional capabilities, and occupational performance and engagement for individuals with a variety of health conditions. They will gain an understanding of concepts of Universal Design as a proactive means of supporting participation among all individuals. They will also acquire an understanding of the no-tech, low-tech, mid-tech and high-tech interventions that can be implemented to address specific functional areas. Students will gain an understanding of the process of selecting appropriate strategies, adaptive equipment or assistive technologies, while ensuring a good fit between client needs and intervention/tool characteristics.

Prerequisite: Successful completion of all previous semester courses.

Components: Lecture

Attributes: Offered Summer Term

Req. Designation: Technology

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OT 630(2) Course ID:012075 2023-06-22

**Engineering Pathways to Clinical Practice: Technology for Health-Related Quality of Life I**

Students who elect to participate in the Technology for HRQoL track will have the opportunity to capitalize on the entrepreneurial spirit that is inherent in a Clarkson education and leverage Clarkson's expertise through cross disciplinary collaborations. Faculty will assist students to identify a need, formulate an action plan, and develop a well thought out solution. Throughout the three capstone courses of this track, students will be provided opportunities to develop technology based skills that can be applied to assistive technology needs in practice. Students will also be guided to develop a capstone project which meets an unmet need for individuals, groups, or organizations in the community.

Prerequisite: Successful completion of all previous semester courses.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

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OT 631(2) Course ID:012076 2023-06-22

**Engineering Pathway to Clinical Practice: Occupational Therapist as a Researcher I**

In this first course of the research track, students will take what they learned in Evidence-Based Practice I a step further, focusing on becoming practitioners of research methods. Students will begin by completing critically appraised papers for quantitative and qualitative research, conducting a brief needs assessment, and engaging with topics in research ethics. At the same time, students will decide on their capstone research topics and begin to develop the research. For some, this may involve working on an Institutional Review Board proposal; for others, it may involve specialized training to conduct specific assessments or design a program.

During the final three didactic semesters, all students in the research track will receive advanced training in qualitative interviewing, ethnmethodology, and grounded theory. Classic texts on advanced research methods will be assigned

Components: Lecture

Attributes: Offered Even Falls

Req. Designation: Technology

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**Health Sciences - Occupational Therapy - Subject: Occupational Therapy**

OT 632(2) Course ID:012077 2023-06-22

**Engineering Pathway to Clinical Practice: Innovative Practitioner I**

Students who elect to participate in the innovation track will have the opportunity to capitalize on the entrepreneurial spirit that is inherent in a Clarkson education and leverage Clarkson expertise through cross-disciplinary collaborations. Faculty will assist students to identify a need, formulate a plan to action, and develop a well thought out innovative solution. Over the course of 3 semesters, students will work to develop a capstone project that solves an innovative and/or non-traditional solution to an identified population or program in an effort to conserve current practice in new ways or offer an agency of change to redefine practice. This project will strive to achieve significant client outcomes using innovative solutions to keep

the profession relevant and responsive to the changes that occur in healthcare.

Prerequisite: Successful completion of all previous semester courses.

Components: Lecture

Attributes: Offered Even Falls

Req. Designation: Technology

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OT 640(2) Course ID:012078 2023-06-22

**Engineering Pathway to Clinical Practice: Technology for Health-Related Quality of Life II**

In the second track courses, students will develop their own learning project or research under the tutelage of the course instructor and/or a mentor advisor. Students remain in their chosen track course, and by doing so, have an opportunity to immerse themselves in their specialty area of interest, expand their knowledge and skills, and apply their knowledge and skills to produce a scholarly project that contributes to the profession. Throughout this process students will be encouraged to engage in activities to promote personal and professional growth while developing the critical skills of a life-long learner. Throughout the three capstone courses of this track, students will be provided opportunities to develop technology based skills that can be applied to assistive technology needs in practice. Students will also be guided to develop a capstone project which fulfills an unmet need for individuals, groups, or organizations in the community.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

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OT 641(2) Course ID:012079 2023-06-22

**Engineering Pathway to Clinical Practice: Occupational Therapist as a Researcher II**

In this second course of the research track, students will further develop their capstone research. For some, this will involve submitting a proposal to the IRB; others will formalize their research question(s) and begin organizing their literature searches. All students will conduct an abbreviated systematic review on a topic of their choice, where they will develop skills to follow PRISMA guidelines and navigate the literature. As they expand on their annotated bibliographies for their capstone research, students will aim to begin collecting data near the end of the semester or beginning of the next one. All students will continue receiving advanced training in qualitative interviewing, ethnmethodology, and grounded theory, and all students will learn basic commands in Stata to conduct exploratory data analyses using graphical methods. Classic texts on

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

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OT 642(2) Course ID:012080 2023-06-22

**Engineering Pathway to Clinical Practice: Innovative Practitioner II**

In the second track courses, students will develop their own learning project or research under the tutelage of the course instructor and/or a mentor advisor. Students remain in their chosen track course, and by doing so, have an opportunity to immerse themselves in their specialty area of interest, expand their knowledge and skills, and apply their knowledge and skills to produce a scholarly project that contributes to the profession. Throughout this process students will be encouraged to engage in activities to promote personal and professional growth while developing the critical skills of a life-long learner.

Prerequisite: Successful completion of all previous semester courses.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

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**Institute for STEM Education - Occupational Therapy - Subject: Occupational Therapy**

OT 650(2) Course ID:012964 2023-06-22

**Engineering Pathways to Clinical Practice: Technology for Health-Related Quality of Life III**

In the third and final track courses, students will finalize their own learning project or research. Students continue to immerse themselves in their specialty area of interest as they remain in their chosen track course. The final scholarship project results in disseminating the outcomes of the project to the greater community. Throughout this process students will be encouraged to engage in activities to promote personal and professional growth while developing the critical skills of a life-long learner. Throughout the three capstone courses of this track, students will be provided opportunities to develop technology-based skills that can be applied to assistive technology needs in practice. Students will also be guided to develop a capstone project which fulfills an unmet need for individuals, groups, or organizations in the community.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

OT 651(2) Course ID:012962 2023-06-22

**Engineering Pathways to Clinical Practice: Occupational Therapist as a Researcher III**

In this third and final course of the research track, students will complete their work on their capstone projects, culminating in an article suitable for submission to occupational therapy's flagship journal. Inevitably, some students will be collecting data throughout the semester, while others may be completing the finishing touches of their manuscripts. Thus, much of the course time will be to participate in "data sessions," where students will present their data for discussion and collective analysis, as well as to learn the art of academic writing. Students will also prepare posters for presentation at the end of the semester, and some class time will be available to provide feedback to each other on how best to present an extended abstract to an audience of one's peers. By the end of the course, students will be well prepared, should they later choose, to begin a PhD program and enter a career in academia.

Prerequisite: Successful completion of all previous semester courses.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

OT 652(2) Course ID:012963 2023-06-22

**Engineering Pathways to Clinical Practice: Innovative Practitioner III**

In the third and final track courses, students finalize their own learning project or research. Students continue to immerse themselves in their specialty area of interest within innovation as they remain in their chosen track course. The final scholarship project results in disseminating the outcomes of the project to the greater community. Throughout this process students will be encouraged to engage in activities to promote personal and professional growth while developing the critical skills of a life-long learner.

Prerequisite: Successful completion of all previous semester courses.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Health Sciences - Occupational Therapy - Subject: Occupational Therapy**

OT 700A(2)

Course ID:012081

2019-04-24

**Fieldwork Level I**

OT 700 provides the student with an introduction to the fieldwork experience and the opportunity to develop a basic comfort level with and understanding of client needs. Students will develop professional and ethical behaviors while exploring current and emerging roles of occupational therapy with a variety of populations across the lifespan, in a variety of settings. While assisting in service delivery and intervention, students engage in an exploration of efficacy, therapeutic use of self, empathy and mindfulness and the development of self-awareness to support the art, craft and skill of effective therapeutic relationships. Students will reflect on the role of innovation and technology in meeting the needs of clients in a rural context. Students will begin to develop a deeper understanding of how psycho-social factors influence engagement in occupation. Students also participate in an accompanying seminar that offers the opportunity for peer interaction, mentoring and feedback as professional competence begins to emerge.

**Components:** Field Studies

**Attributes:** Offered Fall and Spring

**Req. Designation:** Technology

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**School of Arts and Sciences - Occupational Therapy - Subject: Occupational Therapy**

OT 700B(2)

Course ID:012799

2023-06-22

**Fieldwork Level I**

This course is embedded in either the fall or spring semester of the second academic year to allow simultaneous classroom and clinical education opportunities. This fieldwork experience runs 1 day per week for 10 weeks. Students are exposed to a different setting to ensure a well-rounded and varied fieldwork experience program. While engaging in service delivery and intervention, students apply didactic knowledge and concepts to clinical practice. Students can expect to further develop clinical reasoning and evidence-based decision-making skills, reflect on the role of innovation and technology in meeting the needs of clients in a rural context, and explore the impact of psychosocial factors on engagement in occupation. Students participate in an accompanying seminar that offers the opportunity for peer interaction, mentorship and feedback through a discussion board and complete clinical documentation during this fieldwork experience.

**Components:** Field Studies  
**Attributes:** Offered Fall and Spring  
**Req. Designation:** Technology

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**Health Sciences - Occupational Therapy - Subject: Occupational Therapy**

OT 705(9)

Course ID:012082

2023-06-22

**Fieldwork Level II A**

This twelve-week supervised fieldwork experience will provide students the opportunity to apply academic knowledge and skills learned in the classroom to selected clinical settings under the supervision of a practicing clinician. Students are exposed to a variety of client ages, diagnoses, clinical settings, and service delivery models that reflect current &/or evolving practice. These experiences are designed to promote clinical reasoning, clinical skills, professionalism, and reflective, ethical practice. The goal of this placement is to develop competent, entry-level, generalist therapists who; provide safe and ethical service delivery, effectively articulate the basic tenets of occupational therapy, are skilled in the screening, evaluation, intervention planning and execution processes, successfully manage all components of occupational therapy services, and demonstrate effective communication and professional behaviors.

**Components:** Field Studies**Attributes:** Offered Summer Term**Requirement Group:** Prerequisites: OT 507, OT 517, OT 527, OT 547, and (OT 640 or OT 641 or OT 642)**Req. Designation:** Technology

OT 710(9)

Course ID:012083

2023-06-22

**Fieldwork Level II B**

This second 12-week supervised fieldwork experience will provide students the opportunity to apply academic knowledge and skills learned in the classroom to selected clinical settings under the supervision of a practicing clinician. Students are exposed to a variety of client ages, diagnoses, clinical settings, and service delivery models that reflect current &/or evolving practice. These experiences are designed to promote clinical reasoning, clinical skills, professionalism, and reflective, ethical practice. The goal of this placement is to develop competent, entry-level, generalist therapists who; provide safe and ethical service delivery, effectively articulate the basic tenets of occupational therapy, are skilled in the screening, evaluation, intervention planning and execution processes, successfully manage all components of occupational therapy services, and demonstrate effective communication and professional behaviors.

**Components:** Field Studies**Attributes:** Given When Needed, Offered Odd Falls**Req. Designation:** Technology

**Health Sciences - Physician Assistant Studies - Subject: Physician Assistant Studies**

**PA 501(6)** Course ID:011500 2016-04-08

**Clinical Medicine I**

This is the first in a series of courses designed to provide an intensive study of human diseases and disorders, using a lifespan approach from pediatrics to geriatrics, in the areas of clinical medicine including epidemiology, etiology, historical data, clinical manifestations, progression, therapeutic management, prevention, laboratory medicine, imaging, and prognosis. Emphasis will be on disease processes common to primary care practices and the emergency department following the NCCPA Blueprint, and the development of differential diagnoses and plans based upon the patient's clinical presentation. This course will be facilitated through lecture and problem-based learning.

Prerequisite: Admission to the PA program

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

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**PA 502(6)** Course ID:011501 2016-04-08

**Clinical Medicine II**

This is the second in a series of courses designed to provide an intensive study of human diseases and disorders, using a lifespan approach from pediatrics to geriatrics, in the areas of clinical medicine including epidemiology, etiology, historical data, clinical manifestations, progression, therapeutic management, prevention, laboratory medicine, imaging and prognosis. Emphasis will be on disease processes common to primary care practices and the emergency department following the NCCPA Blueprint, and the development of differential diagnoses and plans based upon the patient's clinical presentation. This course will be facilitated through lecture and problem-based learning.

Prerequisite: Successful completion of prior semester of PA course work or program permission

Components: Lecture

Attributes: Offered Summer Term

Req. Designation: Technology

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**PA 503(6)** Course ID:011504 2016-04-08

**Clinical Medicine III**

This is the third in a series of courses designed to provide an intensive study of human diseases and disorders, using a lifespan approach from pediatrics to geriatrics, in the areas of clinical medicine including epidemiology, etiology, historical data, clinical manifestations, progression, therapeutic management, prevention, laboratory medicine, imaging, and prognosis. Emphasis will be on disease processes common to primary care practices and the emergency department following the NCCPA Blueprint, and the development of differential diagnoses and plans based upon the patient's clinical presentation. This course will be facilitated through lecture and problem-based learning.

Prerequisite: Successful completion of prior semester of PA course work or program permission

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

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**PA 504(2)** Course ID:011505 2016-04-08

**Basic Science I**

This is the first in a series of courses designed to develop an understanding of normal physiology, genetics, pathologic, and pathophysiologic concepts of diseases per organ system, and clinical anatomy with an emphasis on important anatomical landmarks required in physical evaluation of patients, anatomical relationships of structures to each other, and anatomical components of body systems.

Prerequisite: Admission to the PA program

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

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**PA 505(2)** Course ID:011506 2016-04-08

**Basic Science II**

This is the first in a series of courses designed to develop an understanding of normal physiology, genetics, pathologic, and pathophysiologic concepts of diseases per organ system, and clinical anatomy with an emphasis on important anatomical landmarks required in physical evaluation of patients, anatomical relationships of structures to each other, and anatomical components of body systems.

Prerequisite: Successful completion of previous semester of PA course work or program permission

Components: Lecture

Attributes: Offered Summer Term

Req. Designation: Technology

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**Health Sciences - Physician Assistant Studies - Subject: Physician Assistant Studies****PA 506(2)** Course ID:011515 2016-04-08**Basic Science III**

This is the third in a series of courses designed to develop an understanding of normal physiology, genetics, pathologic, and pathophysiologic concepts of diseases per organ system, and clinical anatomy with an emphasis on important anatomical landmarks required in physical evaluation of patients, anatomical relationships of structures to each other, and anatomical components of body systems.

Prerequisite: Successful completion of prior semester of PA course work or program permission

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**PA 507(3)** Course ID:011516 2016-04-08**Pharmacotherapeutics I**

This is the first in a series of courses designed to develop skills related to the principles of pharmacology as they pertain to therapeutic agents, prescription, and non-prescription medications. Discussion will include the principal mechanisms of action of the major classes of therapeutic agents, understanding of pharmacodynamics, uses, side effects, and toxicities.

Prerequisite: Admission to the PA program

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**PA 508(3)** Course ID:011517 2016-04-08**Pharmacotherapeutics II**

This is the second in a series of courses designed to develop skills related to the principles of pharmacology as they pertain to therapeutic agents, prescription, and non-prescription medications. Discussion will include the principal mechanisms of action of the major classes of therapeutic agents, understanding of pharmacodynamics, uses, side effects, and toxicities.

Prerequisite: Successful completion of prior semester of PA course work or program permission

**Components:** Lecture**Attributes:** Offered Summer Term**Req. Designation:** Technology**PA 509(3)** Course ID:011521 2016-04-08**Pharmacotherapeutics III**

This is the third in a series of courses designed to develop skills related to the principles of pharmacology as they pertain to therapeutic agents, prescription, and non-prescription medications. Discussion will include the principal mechanisms of action of the major classes of therapeutic agents, understanding of pharmacodynamics, uses, side effects, and toxicities.

Prerequisite: Successful completion of prior semester of PA course work or program permission

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**PA 510(3)** Course ID:011522 2016-04-08**Patient Assessment I**

This is the first in a series of courses designed to develop the knowledge and skills required to obtain and record the complete medical history, use of appropriate equipment, proper techniques, and accurate medical terminology to document findings. This course will provide an overview of the medical record as well as development of writing and organizational skills for medical record keeping and oral presentation skills. Skills will be developed through lecture and structured laboratory exercises.

Prerequisite: Admission to the PA program

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**PA 511(3)** Course ID:011523 2016-04-08**Patient Assessment II**

This is the second in a series of courses designed to develop the knowledge and skills required to obtain and record the complete medical history, use of appropriate equipment, proper techniques, and accurate medical terminology to document findings. This course will provide an overview of the medical record as well as development of writing and organizational skills for medical record keeping and oral presentation skills. Skills will be developed through lecture and structured laboratory exercises.

Prerequisite: Successful completion of prior semester of PA course work or program permission

**Components:** Lecture**Attributes:** Offered Summer Term**Req. Designation:** Technology

**Health Sciences - Physician Assistant Studies - Subject: Physician Assistant Studies**

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PA 512(3) Course ID:011524 2016-04-08

**Patient Assessment III**

This is the third in a series of courses designed to develop the knowledge and skills required to obtain and record the complete medical history, use of appropriate equipment, proper techniques, and accurate medical terminology to document findings. This course will provide an overview of the medical record as well as development of writing and organizational skills for medical record keeping and oral presentation skills. Skills will be developed through lecture and structured laboratory exercises.

Prerequisite: Successful completion of prior semester of PA course work or program permission

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

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PA 513(1) Course ID:011525 2016-04-08

**The Patient and the PA I**

This is the first in a series of courses designed to develop skills in the area of patient communication, patient counseling, patient education, and cultural diversity and how they influence all aspects of medical practice. Instruction is focused on the detection and application of preventive measures and treatment of health risk behaviors including stress, abuse and violence, substance abuse, sexuality, end of life issues, and reaction to illness. The course will also include discussions on medical ethics.

Prerequisite: Admission to the PA program

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

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PA 514(1) Course ID:011526 2016-04-08

**The Patient and the PA II**

This is the second in a series of courses designed to develop skills in the area of patient communication, patient counseling, patient education, and cultural diversity and how they influence all aspects of medical practice. Instruction is focused on the detection and application of preventive measures and treatment of health risk behaviors including stress, abuse and violence, substance abuse, sexuality, end of life issues, and reaction to illness. The course will also include discussions on medical ethics.

Prerequisite: Successful completion of prior semester of PA course work or program permission

Components: Lecture

Attributes: Offered Summer Term

Req. Designation: Technology

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PA 515(1) Course ID:011527 2016-04-08

**The Patient and the PA III**

This is the third in a series of courses designed to develop skills in the area of patient communication, patient counseling, patient education, and cultural diversity and how they influence all aspects of medical practice. Instruction is focused on the detection and application of preventive measures and treatment of health risk behaviors including stress, abuse and violence, substance abuse, sexuality, end of life issues, and reaction to illness. The course will also include discussions on medical ethics.

Prerequisite: Successful completion of prior semester of PA course work or program permission

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

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PA 516(1) Course ID:011528 2016-04-08

**Medical Informatics**

This course will cover the importance of evidence-based medicine and review basic statistics, research methods, and ethical standards in research. It will also cover the interpretation of medical literature and application of various types of clinical articles in answering clinical questions. It will also include the basics of medical writing to provide added guidance for upcoming projects.

Prerequisite: Successful completion of prior semester of PA course work or program permission

Components: Lecture

Attributes: Offered Summer Term

Req. Designation: Technology

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**Health Sciences - Physician Assistant Studies - Subject: Physician Assistant Studies****PA 517(2)** Course ID:011529 2016-04-08**Clinical Procedures**

This course will prepare the student for the upcoming clinical year. The focus will be on procedures, such as bedside and surgical procedures including aseptic technique, air and blood-borne pathogen transmission prevention, phlebotomy, IV placement, foley catheter insertion, lumbar puncture, injections, surgical techniques, and casting.

Prerequisite: Successful completion of prior semester of PA course work or program permission

Components: Clinical

Attributes: Offered Fall Term

Req. Designation: Technology

**PA 518(1)** Course ID:012888 2018-10-08**Laboratory and Diagnostics I**

Introduction to basic laboratory and diagnostic testing/studies as it applies to physician assistant studies.

Components: Laboratory

Attributes: Offered Spring Term

Requirement Group: PA 518 Prerequisites as required for entry into the didactic phase of Clarkson PA education

Req. Designation: Technology

**PA 600(3)** Course ID:011530 2021-09-14**Supervised Practice - Ambulatory Medicine**

This 5 week clinical course will be within a Family Medicine clinic setting. This course provides the PA student with experience in the outpatient evaluation and treatment of pediatric and adult patients, including preventive medicine, acute and chronic illness, and patient education.

Prerequisite: Completion of the preclinical year of the physician assistant program or program permission.

Components: Field Studies

Attributes: Offered Fall, Spring, and Summer

Req. Designation: Technology

**PA 601(3)** Course ID:011531 2021-09-14**Supervised Practice - Internal Medicine**

This 5 week clinical course will be within an Internal Medicine practice. It will include a substantial inpatient experience for the PA student to gain knowledge of the evaluation and treatment of the multiple diseases and conditions of the adult population requiring hospitalization.

Prerequisite: Completion of the preclinical year of the physician assistant program or program permission.

Components: Field Studies

Attributes: Offered Fall, Spring, and Summer

Req. Designation: Technology

**PA 602(3)** Course ID:011532 2021-09-14**Supervised Practice - General Surgery**

This 5 week clinical course will be within a surgical practice. PA students will participate in Operating Room (OR) cases and hospital consultations as well as clinic based cases and visits in caring for conditions that require surgical management. This will include preoperative, intra-operative, and post-operative care.

Prerequisite: Completion of the preclinical year of the physician assistant program or program permission.

Components: Field Studies

Attributes: Offered Fall, Spring, and Summer

Req. Designation: Technology

**PA 603(3)** Course ID:011533 2021-09-14**Supervised Practice - Emergency Medicine**

This 5 week clinical course will be within a hospital Emergency Department. PA students will gain knowledge and learn skills relevant to the triage, stabilization, diagnosis, and management of acute, lifethreatening injuries and illnesses as well as the care of less threatening conditions.

Prerequisite: Completion of the preclinical year of the physician assistant program or program permission.

Components: Field Studies

Attributes: Offered Fall, Spring, and Summer

Req. Designation: Technology

**Health Sciences - Physician Assistant Studies - Subject: Physician Assistant Studies**

**PA 604(3)** Course ID:011534 2021-09-14

**Supervised Practice - Pediatrics**

This 5 week clinical course will provide the PA student with experience in outpatient and/or in-patient management of pediatric patients. The student will have the opportunity to perform well child exams, problem oriented exams, evaluate common pediatric illnesses, and the care of the newborn and children.

Prerequisite: Completion of the preclinical year of the physician assistant program or program permission.

**Components:** Field Studies

**Attributes:** Offered Fall, Spring, and Summer

**Req. Designation:** Technology

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**PA 605(3)** Course ID:011535 2021-09-14

**Supervised Practice - Women's Health**

This 5 week clinical course provides the PA student with experience in managing common gynecologic disorders. The obstetric experience will include routine prenatal and postpartum care. It will include labor & delivery when possible.

Prerequisite: Completion of the preclinical year of the physician assistant program or program permission.

**Components:** Field Studies

**Attributes:** Offered Fall, Spring, and Summer

**Req. Designation:** Technology

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**PA 606(3)** Course ID:011536 2021-09-14

**Supervised Practice - Behavioral Health**

This 5 week clinical course will provide the PA student with a behavioral medicine experience in caring for ambulatory and/or hospitalized patients with psychiatric disorders. The student will perform basic psychiatric evaluations, monitor medications, and support the clinical management plan for patients after psychiatric evaluation and treatment.

Prerequisite: Completion of the preclinical year of the physician assistant program or program permission.

**Components:** Field Studies

**Attributes:** Offered Fall, Spring, and Summer

**Req. Designation:** Technology

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**PA 607(3)** Course ID:011537 2021-09-14

**Supervised Practice - Elective I**

This 5 week clinical course will provide the PA student the opportunity to practice in any available medical setting of the student's choice. This may be used to augment a previous clinical experience or explore an area of interest or potential future employment.

Prerequisite: Completion of the preclinical year of the physician assistant program or program permission

**Components:** Field Studies

**Attributes:** Offered Fall, Spring, and Summer

**Req. Designation:** Technology

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**PA 608(3)** Course ID:011538 2021-09-14

**Supervised Practice - Elective II**

This 5 week clinical course will provide the PA student the opportunity to practice in any available medical setting of the student's choice. This may be used to augment a previous clinical experience or explore an area of interest or potential future employment.

Prerequisite: Completion of the preclinical year of the physician assistant program or program permission

**Components:** Field Studies

**Attributes:** Offered Fall, Spring, and Summer

**Req. Designation:** Technology

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**PA 609(3)** Course ID:011539 2021-05-13

**Clinical Research Elective**

This 5 week course allows the PA student to participate in research in any medical area of interest in preparation for the student's Master's Project. The student may engage the multiple academic departments of Clarkson University outside of PA Studies for this research. Topics for research must be approved by the Department Chair and must be approved by the appropriate university review board. As an alternative, the student may perform a service learning project during this time as part of the Master's Project.

Prerequisite: Completion of the preclinical year of the physician assistant program or program permission.

**Components:** Independent Study

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**Health Sciences - Physician Assistant Studies - Subject: Physician Assistant Studies**

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PA 610(1) Course ID:011540 2016-04-08

**Summative Review**

This course, presented near the end of the clinical year, will include intensive board review in preparation for the PANCE, review for clinical skills testing, CV preparation, and interviewing skills. It also include a final clinical skills exam as well as a cumulative written test, both of which must be successfully passed to graduate from the program.

Prerequisite: Successful completion of the preclinical year and all supervised practice rotations

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

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PA 611(2) Course ID:011541 2018-01-01

**Master Project**

This course is a follow up to Medical Informatics and the Research elective. It is designed to allow the PA student to complete a master's degree project under the guidance of Clarkson faculty or a community advisor. Students may identify an area of medicine, disease process or condition, conduct research, and produce a paper worthy of publication. The student may also perform a learning service project resulting in a publishable paper or product for use in the community. The student will prepare and present an oral presentation on their topic at the conclusion of the year.

Prerequisite: Completion of the preclinical year of the physician assistant program or program permission.

Components: Research

Attributes: Offered Spring Term

Req. Designation: Technology

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PA 900(1 - 12) Course ID:011762 2015-02-11

**PA Clinical Placeholder**

This course is a clinical rotation placeholder until final clinical assignments have been finalized. Once finalized, students will be placed into the correct clinical assignment course number.

Components: Independent Study

Req. Designation: Technology

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**Other - The Clarkson School - Subject: Physical Education**

PE 100(1) Course ID:009210 2014-11-20

**First Year Seminar**

[Cross-listed with FY 100] See FY 100 First Year Seminar for description.

**Components:** Lecture**Requirement Group:** Prerequisite: for Clarkson School students only.**Req. Designation:** Technology

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**Other - Athletics - Subject: Physical Education**

PE 101(0) Course ID:009211 2015-01-20

**Introduction to Lifetime Activities**

This will be a 14 week course combining seven lifetime activities (racquetball, weight training/physical fitness, badminton, volleyball, golf, indoor soccer, and tennis) Each activity will go for two week and will cover rules, strategies, and skills.

**Components:** Physical Education  
**Attributes:** Offered Spring Term  
**Req. Designation:** Technology

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**School of Arts and Sciences - Athletics - Subject: Physical Education**

PE 315(3) Course ID:013153

2022-03-17

**Introduction to Complex Networks**

This course will introduce the student to the new, burgeoning field of Complex Networks, their analysis and applications to everyday-life. Elementary concepts from Graph Theory, Statistical Physics and Discrete Math techniques will be taught as demanded by the material. Covered topics will include: Basic concepts from Graph Theory, Global vs. local algorithms of analysis, Erdos-Renyi Random Graph, Small-World model of Watts & Strogatz, Scale-free networks, Barabasi-Albert and Krapivsky-Redner models, Recursive scale-free models and their applications; The percolation problem and its applications to epidemic spreading, vaccination strategies, etc. and Kleinberg navigation.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

**School of Arts and Sciences - Physics - Subject: Physics****PH 1(2 - 4)****Course ID:009246****2015-01-19****PH Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology**PH 2(2 - 4)****Course ID:009247****2015-01-19****PH Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

This course may be used to satisfy a Science Foundation Curriculum Requirement.

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology**PH 31(2)****Course ID:009248****2015-01-28****Elementary Physics I**

Introduction to Newtonian Mechanics. Given as a Pass or No-Credit (P/NC) only. Credit does not count toward graduation.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**PH 121(1)****Course ID:009254****2015-02-19****Physics Freshman Seminar**

Activities and facilities in the Physics Department, curriculum choices, and career options in Physics will be introduced to incoming freshmen through group discussions and faculty seminars. Challenge problem solving and team projects will cover selected topics beyond the material in general freshman Science courses.

**Components:** Seminar**Attributes:** Offered Fall Term**Req. Designation:** Technology**PH 131(4)****Course ID:009255****2015-02-12****Physics I**

Calculus-based general physics course covering elements of Newtonian mechanics and thermal physics. Laboratory experiments keyed to the lectures to illustrate and demonstrate some of the physical principles and concepts.

**Components:** Laboratory, Lecture**Attributes:** Offered Fall, Spring, and Summer**Requirement Group:** Corequisite: MA 131**Req. Designation:** Technology**PH 132(4)****Course ID:009256****2015-02-12****Physics II**

Calculus-based general physics course covering elements of electricity and magnetism, waves and optics. Laboratory experiments keyed to the lectures to illustrate and demonstrate some of the physical principles and concepts.

**Components:** Laboratory, Lecture**Attributes:** Offered Fall, Spring, and Summer**Requirement Group:** Prerequisite: PH131 Corequisite: MA132**Req. Designation:** Technology**PH 141(4)****Course ID:009257****2022-06-07****Physics for Life Sciences I**

General physics course covering elements of mechanics, thermal physics, and physics of fluids, with emphasis on topics and applications relevant for biological sciences, physical therapy, and pre-med (MCAT). Laboratory experiments keyed to the lectures to illustrate and demonstrate some of the physical principles and concepts.

Corequisite: MA180.

**Components:** Laboratory, Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

**School of Arts and Sciences - Physics - Subject: Physics**

PH 142(4) Course ID:009258 2022-06-07

**Physics for Life Sciences II**

General physics course covering elements of electricity and magnetism, waves, optics, and modern physics, with emphasis on topics and application relevant for biological sciences, physical therapy, and pre-med (MCAT). Laboratory experiments keyed to the lectures to illustrate and demonstrate some of the physical principles and concepts.

**Components:** Laboratory, Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: PH141 or equivalent**Req. Designation:** Technology

PH 157(3) Course ID:012028 2022-06-07

**Elementary Astronomy**

This course will cover basic concepts in astronomy. The course will cover the planets and planet formation, life cycle of stars, clusters, galaxies, and the scientific principles used in astronomy and astrophysics.

**Components:** Lecture**Attributes:** Offered Fall and Spring**Req. Designation:** Technology

PH 165(3) Course ID:013088 2022-06-07

**Solar Energy**

Solar radiation, Spectral irradiance, Air mass. Electricity basics. Si solar cells: Band structure and doping of semiconductors; Semiconductor junctions; Light absorption; I-V characteristics, fill factor and efficiency of a solar cell; Power losses. Si solar cell fabrication process. Solar panels and modules. Thin film solar cells; Solar energy storage. Electrical and mechanical designs of PV systems; Performance analysis and maintenance of PV systems. Applications: Domestic supply, telecommunication, satellite.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

PH 221(3) Course ID:009267 2015-01-20

**Theoretical Mechanics I**

Kinematics and dynamics of a single particle and systems of particles, conservation laws, central force problem, oscillatory and rotational motion. Introduction to Lagrangian and Hamiltonian formulations of classical mechanics.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: PH132 Corequisites: MA232**Req. Designation:** Technology

PH 230(3) Course ID:012137 2016-02-22

**Physics III**

This course introduces certain fundamental concepts of waves, optics and thermal physics, including the basic mathematical framework necessary to describe the associated physical phenomena. Specific topics of waves phenomena include: Transverse and longitudinal waves, wave equation, superposition principle, interference of waves, phasors; electromagnetic waves, Maxwell's equations; Poynting vector, radiation pressure; polarization, reflection and refraction; Young's interference experiment; coherence; Michelson's interferometer; wave theory of light, diffraction grating, X-Ray diffraction; photoelectric effect, and matter waves. Topics of thermal physics include: Temperature, thermal expansion; absorption of heat; heat transfer mechanisms; first and second laws of thermodynamics; entropy. With an emphasis on problem solving, this course serves to bridge the concepts developed in Physics II (PH 132) and Modern Physics (PH 231), and is strongly recommended as a PH elective to physics majors.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: PH132 and MA132**Req. Designation:** Technology

PH 231(3) Course ID:009268 2022-06-07

**Fundamentals of Modern Physics**

Introduction to the most important developments of 20th century physics, including applications to technology. Foundations and implications of special relativity, introduction to waves and quantum theory. Survey of applications in solid state, atomic, nuclear and particle physics.

**Components:** Lecture**Attributes:** Offered Each Term**Requirement Group:** Prerequisites: PH132 Corequisites: MA232**Req. Designation:** Technology

**School of Arts and Sciences - Physics - Subject: Physics**

PH 232(1) Course ID:009269 2022-06-07

**Modern Physics Laboratory**

Laboratory course to supplement PH 231. Experiments keyed to the lectures to illustrate and demonstrate some of the physical principles and concepts.

**Components:** Laboratory  
**Attributes:** One communication unit, Offered Each Term, Writing Intensive Course  
**Requirement Group:** Corequisites: PH231  
**Req. Designation:** Technology

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PH 245(3) Course ID:013087 2022-06-07

**Medical Physics**

Material phases (solid, liquid, gas, plasma). Basic laws of fluids; viscosity, diffusion, osmotic pressure. Surface tension, adsorption. Basic thermodynamics. Mechanism of respiration. Blood pressure measurement. Electric processes in organisms; Membrane potential of nerve cell, Action potentials (nerve fiber and heart cell), Echocardiogram. Pacemakers; Defibrillation. Acoustics and hearing basics. Ultrasound imaging. Basic optics. Lenses, microscopes. Optics of human vision. Interaction of radiation with matter. X-ray imaging, Computed Tomography. Excitation and ionization of atoms. Atomic nuclei and their magnetic properties. Magnetic resonance imaging. Basics of radioactivity (decay law, radioactive series; accelerators). Detection of radiation, radiation dosimetry. Nuclear medicine

**Components:** Lecture  
**Attributes:** Given When Needed  
**Requirement Group:** PH142 or Instructor Consent  
**Req. Designation:** Technology

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PH 301(1 - 2) Course ID:009272 2015-02-19

**Teaching Methodology in Physics I**

Assisting a faculty member in a physics course, in order to prepare the student for teaching physics with emphasis on skills needed for work as a teaching assistant (TA) in a graduate school.

Prerequisite: consent of the instructor.

**Components:** Independent Study  
**Attributes:** Offered Fall Term  
**Req. Designation:** Technology

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PH 302(1 - 2) Course ID:009273 2015-01-20

**Teaching Methodology in Physics II**

Assisting a faculty member in a physics course, in order to prepare the student for teaching physics with emphasis on skills needed for work as a teaching assistant (TA) in a graduate school.

Prerequisite: consent of the instructor.

**Components:** Independent Study  
**Attributes:** Offered Spring Term  
**Req. Designation:** Technology

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PH 315(3) Course ID:013155 2022-03-17

**Introduction to Complex Networks**

This course will introduce the student to the new, burgeoning field of Complex Networks, their analysis and applications to everyday-life. Elementary concepts from Graph Theory, Statistical Physics and Discrete Math techniques will be taught as demanded by the material. Covered topics will include: Basic concepts from Graph Theory, Global vs. local algorithms of analysis, Erdos-Renyi Random Graph, Small-World model of Watts & Strogatz, Scale-free networks, Barabasi-Albert and Krapivsky-Redner models, Recursive scale-free models and their applications; The percolation problem and its applications to epidemic spreading, vaccination strategies, etc. and Kleinberg navigation.

**Components:** Lecture  
**Course Equivalents:** MA 315  
**Attributes:** Offered Fall Term  
**Requirement Group:** Prerequisite: MA132  
**Req. Designation:** Technology

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**School of Arts and Sciences - Physics - Subject: Physics**

PH 320(3) Course ID:012858 2022-06-07

**Physical Models of Living Systems**

This course focuses on modeling essential processes in living systems using the tools and techniques of physics, including computer modeling. Using case studies in virus dynamics, bacterial genetics and naturally evolved cellular circuits, the course will explore how living organisms use physical mechanisms to gain information about their surroundings, process information and make decisions. It will also examine some of the cutting edge techniques used by scientists at the forefront of biophysical and life sciences research to study living organisms and understand their behavior. This course is broadly aimed at students studying in physics, chemistry, mathematics, computer science, chemical engineering, and biomedical engineering, in addition to biology majors with advanced math classes.

**Components:** Lecture**Course Equivalents:** PH 520**Attributes:** Given When Needed**Requirement Group:** Prerequisites: PH132 and MA132**Req. Designation:** Technology

PH 323(3) Course ID:009276 2022-06-07

**Optics**

Geometrical optics: reflection and refraction at plane and spherical surfaces, lenses, lens aberrations. Physical optics: interference, diffraction, polarization, photons, absorption, scattering, electrooptics.

**Components:** Lecture**Attributes:** Offered Odd Falls**Requirement Group:** Prerequisite: PH132 or consent of the instructor.**Req. Designation:** Technology

PH 324(3) Course ID:013170 2022-07-15

**Laser Physics**

Introduction to physical principles of laser operation, including semiclassical light-matter interactions, laser theory, optical resonators, Gaussian beams, steady-state and transient dynamics of laser oscillation. Examples of commonly used lasers, and some of their applications will also be discussed. Familiarity with basic optics (as covered in PH323/523 Optics) and basic quantum mechanics (PH231 Fundamentals of Modern Physics) is strongly recommended.

**Components:** Lecture**Course Equivalents:** PH 524**Attributes:** Offered Odd Falls**Req. Designation:** Technology

PH 325(3) Course ID:009277 2015-02-19

**Thermal Physics**

Temperature, heat, thermodynamics and applications. Introduction to kinetic theory and classical and quantum statistical mechanics.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PH231 and MA231 or consent of the instructor.**Req. Designation:** Technology

PH 327(1 - 3) Course ID:009278 2022-06-07

**Experimental Physics I**

Experiments selected from the fields of atomic physics, electricity and magnetism, thermal physics, condensed matter physics and optics. A major component of the course involves statistical analyses of experimental data and random uncertainties. The topics of data analysis include: Standard deviation and standard deviation of the mean; variance, co-variance and Schwarz inequality; weighted averages, histograms and distribution functions; confidence limit; least-squares fitting, uncertainties in slopes and intercepts, error-bars, coefficients of correlation and determination, chi squared test; general formula of error propagation and its applications. Computer based graphing and data analyses are routinely used throughout the course. Elements of writing technical research papers are practiced in the laboratory reports.

**Components:** Lecture**Attributes:** Two communication units, Offered Spring Term**Requirement Group:** Prerequisites: PH 132 and MA 132, or consent of the instructor**Req. Designation:** Technology

PH 328(1 - 3) Course ID:009279 2022-06-07

**Experimental Physics II**

Continuation of PH 327.

**Components:** Lecture**Attributes:** Offered Spring Term, Writing Intensive Course**Requirement Group:** Prerequisite: PH327 or consent of the instructor.**Req. Designation:** Technology

**School of Arts and Sciences - Physics - Subject: Physics****PH 331(3)** Course ID:009280 2015-01-20**Quantum Physics I**

Basic principles of quantum mechanics, Schrödinger equation for simple potentials including harmonic oscillator and hydrogen atom. Selected application to atomic, molecular and nuclear structure.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: PH 231 and MA 232**Req. Designation:** Technology**PH 341(3)** Course ID:009282 2022-06-07**Solid State Physics I**

This course focuses on the fundamental physical processes that occur in solid state materials. Topics include crystal structure of solids, point defects and dislocations, crystal bonding, X-ray diffraction, lattice vibrations, thermal properties, specific heat, thermal conductivity, free electron gas theory of metals, energy bands, theory of semiconductors, band gaps, doping, and a brief introduction to device physics. Graduate students will do additional coursework.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: PH231, or ES260, or consent of the instructor**Req. Designation:** Technology

**School of Arts and Sciences - Chemistry & Biomolecular Sci - Subject: Physics**

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PH 371(3) Course ID:009283 2014-11-20

**Physical Chemistry I**

[Cross-listed with CM 371] This course covers the gaseous state, kinetic theory and chemical thermodynamics, with applications to chemical and phase equilibria. The emphasis is on mathematics and problem solving.

**Components:** Lecture

**Course Equivalents:** CM 371

**Requirement Group:** Prerequisites: CM104 or CM132, MA132, PH131 Corequisites: PH132

**Req. Designation:** Technology

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PH 372(3) Course ID:009284 2014-11-20

**Physical Chemistry II**

[Cross-listed with CM 372] A continuation of PH 371. Topics may include quantum mechanics, atomic structure, chemical bonds, intermolecular forces, spectroscopy, molecular symmetry, optical activity, photochemistry and photobiology.

**Components:** Lecture

**Course Equivalents:** CM 372

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: CM371 or BY371 or PH371.

**Req. Designation:** Technology

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**School of Arts and Sciences - Physics - Subject: Physics**

PH 380(3) Course ID:009285 2015-02-19

**Electromagnetic Theory I**

Fundamental properties of electric and magnetic fields. Gauss law, Poisson equation, dielectrics, boundary value problems, vector potential, inductance, Maxwell equations, electromagnetic waves.

Components: Lecture

Attributes: Offered Fall Term

Requirement Group: Prerequisites: PH132 and MA231 or consent of the instructor.

Req. Designation: Technology

PH 401(1 - 2) Course ID:009287 2015-02-19

**Teaching Methodology in Physics III**

Assisting a faculty member in a physics course, in order to prepare the student for teaching physics with emphasis on skills needed for work as a teaching assistant (TA) in a graduate school.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Offered Fall Term

Req. Designation: Technology

PH 402(1 - 2) Course ID:009288 2015-01-21

**Teaching Methodology in Physics IV**

Assisting a faculty member in a physics course, in order to prepare the student for teaching physics with emphasis on skills needed for work as a teaching assistant (TA) in a graduate school.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Offered Spring Term

Req. Designation: Technology

PH 426(3) Course ID:009291 2022-06-07

**Introduction to Biophysics**

[Cross-listed by BY 426] This course concentrates on the fundamental physical processes that occur within living organisms, particularly the cell. Topics include the structure and physics of macromolecules, biological membranes, the thermodynamics of living systems, muscle contraction and the propagation of signals in nerve cells.

Components: Lecture

Course Equivalents: PH 526

Attributes: Given When Needed

Requirement Group: Prerequisites: BY160 or BY312 or consent of instructor

Req. Designation: Technology

PH 432(3) Course ID:009292 2022-06-07

**Quantum Physics II**

Continuation of PH 331. Transformation theory and matrix formulation of quantum mechanics; angular momentum, spin, perturbation theory, variational methods, scattering theory.

Components: Lecture

Attributes: Given When Needed

Requirement Group: Prerequisite: PH331 or consent of the instructor.

Req. Designation: Technology

PH 435(1) Course ID:009295 2015-02-19

**Physics Senior Seminar**

Forum for discussion of current research in physics. Exploration of employment and career opportunities for physics majors. Preparation for GRE in Physics.

Prerequisite: consent of the instructor.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

PH 445(1 - 3) Course ID:009300 2015-01-28

**Undergraduate Thesis I**

Investigation of a topic selected by the student in consultation with a thesis adviser. A written thesis is required.

Prerequisite: consent of the instructor.

Components: Lecture

Attributes: Two communication units, Given When Needed

Req. Designation: Technology

**School of Arts and Sciences - Physics - Subject: Physics****PH 447(3)** Course ID:009302 2022-06-07**Nuclear Physics**

An introduction to nuclear structure, nuclear radiation and elementary particle physics. Topics include properties of nuclei, the two-nucleon forces, complex nuclei, interaction of radiation with matter, accelerators, nuclear reactions, elementary particles and their classification.

**Components:** Lecture**Course Equivalents:** PH 547**Attributes:** Offered Even Falls**Requirement Group:** Prerequisites: PH331 or consent of the instructor.**Req. Designation:** Technology**PH 451(3)** Course ID:009303 2022-06-07**Statistical Mechanics I**

Review of thermodynamics and classical ensembles. Modern theories of phase transitions, critical phenomena, liquid structure. Introduction to Monte Carlo methods, nonequilibrium phenomena.

**Components:** Lecture**Course Equivalents:** PH 551**Attributes:** Given When Needed**Requirement Group:** Prerequisites: PH325 or consent of the instructor.**Req. Designation:** Technology**PH 455(3)** Course ID:009305 2022-06-07**Mathematical Methods in Physics**

Mathematics methods used in theoretical physics. Topics covered include complex variables, Fourier transforms, special functions, eigenfunction expansions, Green's functions, differential equations, linear algebra and linear spaces, with physical applications.

Prerequisite: consent of the instructor.

**Components:** Lecture**Course Equivalents:** PH 555**Attributes:** Offered Even Springs**Req. Designation:** Technology**PH 457(3)** Course ID:009306 2022-06-07**Introduction to Astrophysics**

Radiation from astrophysical sources and measurement of position, mass, temperature, velocity, density, composition and age. Emphasis will be on recent discoveries and interpretations.

**Components:** Lecture**Attributes:** Offered Odd Falls**Requirement Group:** Prerequisites: PH231 or consent of the instructor.**Req. Designation:** Technology**PH 460(3)** Course ID:009307 2022-06-07**Physics of Fluids**

Discussion of the mechanics of fluids based on the Navier-Stokes equation. Laminar and turbulent flows, dimensional analysis. Special topics with applications.

**Components:** Lecture**Course Equivalents:** PH 560**Attributes:** Given When Needed**Requirement Group:** Prerequisites: PH221 and PH325 or consent of the instructor.**Req. Designation:** Technology

**Institute for STEM Education - Physics - Subject: Physics**

PH 463(3) Course ID:013027

2020-02-18

**Computer Simulation Methods in Physics**

[Cross-listed with PH563] This is a computer laboratory course that explores physical concepts using computer simulations. Topics include: Euler method and its applications in classical mechanics and thermodynamics; the cooling of coffee, motion of falling objects, planetary motion with and without the solar wind, simple harmonic oscillator, damped oscillations, Molecular Dynamics, Boltzmann distribution, random walk and Brownian Dynamics, percolation model, and Monte Carlo Method.

**Components:** Lecture**Course Equivalents:** PH 563**Attributes:** Two communication units, Given When Needed**Requirement Group:** PH463/563 Prerequisites: PH132, MA232; PH325 or ES340 and PH380 or EE381 or instructor consent.**Req. Designation:** Technology

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**School of Arts and Sciences - Physics - Subject: Physics**

PH 470(1 - 3) Course ID:009308 2015-01-28

**Directed Study Experimental**

A course of study of subjects not otherwise available in formal courses may be undertaken under the supervision of a faculty member.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

PH 471(1 - 3) Course ID:009309 2015-01-28

**Directed Study Experimental**

A course of study of subjects not otherwise available in formal courses may be undertaken under the supervision of a faculty member.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

PH 473(1 - 3) Course ID:009311 2015-01-28

**Directed Study Experimental**

A course of study of subjects not otherwise available in formal courses may be undertaken under the supervision of a faculty member.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

PH 474(1 - 3) Course ID:009312 2015-01-28

**Directed Study Theoretical**

A course of study of subjects not otherwise available in formal courses may be undertaken under the supervision of a faculty member.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

PH 475(1 - 3) Course ID:009313 2005-05-15

**Directed Study Theoretical**

Prerequisite: consent of the instructor.

Components: Independent Study

Req. Designation: Technology

PH 476(1 - 3) Course ID:009314 2005-05-15

**Directed Study Theoretical**

Prerequisite: consent of the instructor.

Components: Independent Study

Req. Designation: Technology

PH 478(1 - 3) Course ID:011319 2017-01-13

**Directed Research in Experimental Physics**

Students will carry out research in experimental physics under the supervision of a faculty member. Topics will be determined by faculty research programs. A formal report is required at the conclusion of the course.

Components: Research

Req. Designation: Technology

PH 479(1 - 3) Course ID:011320 2017-01-13

**Directed Research in Theoretical Physics**

Students will carry out research in theoretical physics under the supervision of a faculty member. Topics will be determined by faculty research programs. A formal report is required at the conclusion of the course.

Components: Research

Req. Designation: Technology

**School of Arts and Sciences - Physics - Subject: Physics**

PH 480(1) Course ID:009316 2009-04-21

**Internship/Co-op in Physics**

Students will gain practical work experience in Physics under the direction and supervision of professionals outside their department. Students must submit a formal report describing work performed as well as the Internship/Co-op learning opportunities. Report approval is required for the award of credit. Feedback will be provided by their Internship/Co-op field supervisor. This course will be graded on a pass/no-credit basis.

Components: Independent Study

Req. Designation: Technology

PH 487(3) Course ID:012910 2018-11-02

**Applications of Synchrotron and Electron Based Techniques**

The purpose of the course is to familiarize all students with the x-ray and electron based experimental techniques available at Brookhaven National Lab and other similar facilities. Students will be cognizant of the applications of these cutting edge facilities, and well positioned to use them in their own research. This course is suitable for graduate students, postdocs, and advanced undergrads in physical sciences and engineering, as well as students in biological, environmental, and chemical sciences who may have the interest to learn more about the techniques they may use for their research.

Components: Lecture

Course Equivalents: PH 587, CM 487, CM 587, MSE 587, ES 587

Attributes: Offered Spring Term

Requirement Group: Prerequisites: PH132 or consent of the instructor; ES260 and/or PH231 are recommended prerequisites

Req. Designation: Technology

PH 520(3) Course ID:012859 2022-06-07

**Physical Models of Living Systems**

This course focuses on modeling essential processes in living systems using the tools and techniques of physics, including computer modeling. Using case studies in virus dynamics, bacterial genetics and naturally evolved cellular circuits, the course will explore how living organisms use physical mechanisms to gain information about their surroundings, process information and make decisions. It will also examine some of the cutting edge techniques used by scientists at the forefront of biophysical and life sciences research to study living organisms and understand their behavior. This course is broadly aimed at students studying in physics, chemistry, mathematics, computer science, chemical engineering, and biomedical engineering, in addition to biology majors with advanced math classes.

Components: Lecture

Course Equivalents: PH 320

Attributes: Given When Needed

Req. Designation: Technology

PH 523(3) Course ID:009324 2022-06-07

**Optics**

Geometrical optics: reflection and refraction at plane and spherical surfaces, lenses, lens aberrations.

Physical optics: interference, diffraction, polarization, photons, absorption, scattering, electrooptics.

Prerequisite: PH132 or consent of the instructor.

Components: Lecture

Attributes: Offered Odd Falls

Req. Designation: Technology

PH 524(3) Course ID:013171 2022-07-15

**Laser Physics**

Introduction to physical principles of laser operation, including semiclassical light-matter interactions, laser theory, optical resonators, Gaussian beams, steady-state and transient dynamics of laser oscillation. Examples of commonly used lasers, and some of their applications will also be discussed. Familiarity with basic optics (as covered in PH323/523 Optics) and basic quantum mechanics (PH231 Fundamentals of Modern Physics) is strongly recommended.

Components: Lecture

Course Equivalents: PH 324

Attributes: Offered Odd Falls

Req. Designation: Technology

PH 525(3) Course ID:009325 2015-02-19

**Thermal Physics**

Temperature, heat, thermodynamics and applications. Introduction to kinetic theory and classical and quantum statistical mechanics.

Prerequisites: PH231 and MA231 or consent of the instructor.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

**School of Arts and Sciences - Physics - Subject: Physics****PH 526(3)** Course ID:009326 2022-06-07**Introduction to Biophysics**

[Cross-listed by BY 526] This course concentrates on the fundamental physical processes that occur within living organisms, particularly the cell. Topics include the structure and physics of macromolecules, biological membranes, the thermodynamics of living systems, muscle contraction and the propagation of signals in nerve cells.

Prerequisite: consent of the instructor.

Components: Lecture

Course Equivalents: PH 426

Attributes: Given When Needed

Req. Designation: Technology

**PH 531(3)** Course ID:009327 2015-01-21**Quantum Physics I**

Basic principles of quantum mechanics, Schrödinger equation for simple potentials including harmonic oscillator and hydrogen atom. Selected application to atomic, molecular and nuclear structure.

Prerequisites: PH231 and MA232, or consent of the instructor.

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

**PH 532(3)** Course ID:009328 2022-06-07**Quantum Physics II**

Continuation of PH 531. Transformation theory and matrix formulation of quantum mechanics; angular momentum, spin, perturbation theory, variational methods, scattering theory.

Prerequisites: PH331 or PH531, or consent of the instructor.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

**PH 541(3)** Course ID:009332 2022-06-07**Solid State Physics I**

This course focuses on the fundamental physical processes that occur in solid state materials. Topics include crystal structure of solids, point defects and dislocations, crystal bonding, X-ray diffraction, lattice vibrations, thermal properties, specific heat, thermal conductivity, free electron gas theory of metals, energy bands, theory of semiconductors, band gaps, doping, and a brief introduction to device physics.

Graduate students will do additional course work.

Prerequisites: PH231 or ES260, or consent of the instructor.

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

**PH 547(3)** Course ID:009334 2022-06-07**Nuclear Physics**

An introduction to nuclear structure, nuclear radiation and elementary particle physics. Topics include properties of nuclei, the two-nucleon forces, complex nuclei, interaction of radiation with matter, accelerators, nuclear reactions, elementary particles and their classification.

Prerequisites: PH331 or PH531, or consent of the instructor.

Components: Lecture

Course Equivalents: PH 447

Attributes: Offered Even Falls

Req. Designation: Technology

**PH 551(3)** Course ID:009335 2022-06-07**Statistical Mechanics I**

Review of thermodynamics and classical ensembles. Modern theories of phase transitions, critical phenomena, liquid structure. Introduction to Monte Carlo methods, nonequilibrium phenomena.

Prerequisites: PH325 or PH525, or consent of the instructor.

Components: Lecture

Course Equivalents: PH 451

Attributes: Given When Needed

Req. Designation: Technology

**School of Arts and Sciences - Physics - Subject: Physics**

PH 555(3) Course ID:009337 2022-06-07

**Mathematical Methods in Physics**

Mathematics methods used in theoretical physics. Topics covered include complex variables, Fourier transforms, special functions, eigenfunction expansions, Green's functions, differential equations, linear algebra and linear spaces, with physical applications.

Prerequisite: consent of the instructor.

**Components:** Lecture

**Course Equivalents:** PH 455

**Attributes:** Offered Even Springs

**Req. Designation:** Technology

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PH 560(3) Course ID:009339 2022-06-07

**Physics of Fluids**

Discussion of the mechanics of fluids based on the Navier-Stokes equation. Laminar and turbulent flows, dimensional analysis. Special topics with applications.

Prerequisite: consent of the instructor.

**Components:** Lecture

**Course Equivalents:** PH 460

**Attributes:** Given When Needed

**Req. Designation:** Technology

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PH 563(3) Course ID:013028 2020-02-18

**Computer Simulation Methods in Physics**

[Cross-listed with PH463] This is a computer laboratory course that explores physical concepts using computer simulations. Topics include: Euler method and its applications in classical mechanics and thermodynamics; the cooling of coffee, motion of falling objects, planetary motion with and without the solar wind, simple harmonic oscillator, damped oscillations, Molecular Dynamics, Boltzmann distribution, random walk and Brownian Dynamics, percolation model, and Monte Carlo Method.

**Components:** Lecture

**Course Equivalents:** PH 463

**Attributes:** Given When Needed

**Requirement Group:** PH463/563 Prerequisites: PH132, MA232; PH325 or ES340 and PH380 or EE381 or instructor consent.

**Req. Designation:** Technology

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PH 570(1 - 3) Course ID:009340 2015-01-28

**Directed Study Experimental**

A course of study of subjects not otherwise available in formal courses may be undertaken under the supervision of a faculty member.

Prerequisite: consent of the instructor.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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PH 574(1 - 3) Course ID:009344 2015-01-28

**Directed Study Theoretical**

A course of study of subjects not otherwise available in formal courses may be undertaken under the supervision of a faculty member.

Prerequisite: consent of the instructor.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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PH 580(3) Course ID:009348 2015-02-19

**Electromagnetic Theory I**

Fundamental properties of electric and magnetic fields. Gauss law, Poisson equation, dielectrics, boundary value problems, vector potential, inductance, Maxwell equations, electromagnetic waves.

Prerequisites: PH132 and MA231, or consent of the instructor.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Req. Designation:** Technology

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**School of Arts and Sciences - Physics - Subject: Physics**

PH 587(3) Course ID:009355 2018-11-02

**Applications of Synchrotron and Electron Based Techniques**

The purpose of the course is to familiarize all students with the x-ray and electron based experimental techniques available at Brookhaven National Lab and other similar facilities. Students will be cognizant of the applications of these cutting edge facilities, and well positioned to use them in their own research. This course is suitable for graduate students, postdocs, and advanced undergrads in physical sciences and engineering, as well as students in biological, environmental, and chemical sciences who may have the interest to learn more about the techniques they may use for their research.

Components: Lecture

Course Equivalents: CM 487, CM 587, PH 487, MSE 587, ES 587

Attributes: Offered Spring Term

Req. Designation: Technology

PH 625(1 - 3) Course ID:011370 2009-08-24

**Computer Modeling in Physics**

Physical concepts using computer simulations: Euler method and its applications in classical mechanics and thermodynamics (cooling of coffee, Styrofoam ball fall, motion of planets, pendulum), random walks (Brownian dynamics), percolation, Monte Carlo method.

Pre-requisites: PH325, MA232 and knowledge of any programming language (Java, Fortran, C, C++, Matlab, etc.) or consent of the instructor. (Optional PH231/PH331 and PH380/PH381.)

Components: Independent Study

Req. Designation: Technology

PH 626(3) Course ID:013023 2020-02-18 Instructor Consent Required

**Electroanalytical Methods**

This course explores fundamental principles and selected applications of modern electroanalytical methods. Topics include: Ions in electrolytes; transport numbers, specific conductivity, Walden's rule, ionic strength; Laplace transform and diffusion problems. Electrode potentials and kinetics; Nernst equation, Butler-Volmer formulation. Voltammetry, chronoamperometry, and chronopotentiometry. Mixed potential effects, corrosion and Pourbaix diagram. Double layer models, specific adsorption and isotherms. Electrochemical impedance spectroscopy (EIS); analyses of EIS data; complex impedance elements; nonlinear least square method, circuit models of interfacial reactions; Kramers-Kronig transform, statistical analyses, F-test and t-test. Applications of electroanalysis; fuel cells, electrocatalysis, corrosion protection, chemical mechanical planarization, batteries and supercapacitors. The course requires a strong undergraduate background in mathematics.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

PH 661(3) Course ID:009363 2016-09-12 Instructor Consent Required

**Classical Mechanics**

Basic concepts of classical mechanics. The two body central force problem, Lagrange's equations, kinematics and dynamics of a rigid body, many particle systems, variational principles, Hamilton's equations, canonical transformations, Hamilton-Jacobi theory, perturbation theory, small oscillations, and continuous systems and fields.

Prerequisite: consent of the instructor.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

PH 663(3) Course ID:009364 2016-09-12 Instructor Consent Required

**Electromagnetic Theory I**

This course includes theoretical treatment of static electric and magnetic fields, time-dependent fields, electromagnetic waves in a vacuum, in homogeneous isotropic media, and at boundaries. Also included are selected topics from special relativity, wave guides and resonant cavities, radiation and magnetohydrodynamics.

Prerequisite: consent of the instructor.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

**School of Arts and Sciences - Physics - Subject: Physics**

**PH 669(3)** Course ID:009367 2015-01-21 Instructor Consent Required

**Quantum Mechanics I**

General formulation of quantum mechanics and its interpretation, matrix formulation, advanced perturbation and variational methods, scattering theory, atomic structure, radiative transitions and applications to atoms, nuclei, molecules and solids.

Prerequisite: consent of the instructor.

Components: Lecture

Attributes: Offered Spring Term

Req. Designation: Technology

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**PH 681(1 - 3)** Course ID:009371 2015-01-28 Instructor Consent Required

**Selected Topics in Physics I**

An advanced treatment of selected topics in fields of current interest not presently covered in other courses.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

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**PH 682(1 - 3)** Course ID:009372 2015-01-28 Instructor Consent Required

**Selected Topics in Physics II**

An advanced treatment of selected topics in fields of current interest not presently covered in other courses.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

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**PH 683(1)** Course ID:009373 2021-09-20

**Graduate Seminar I**

Faculty, distinguished visiting speakers, and graduate students report on current research. An important objective is to encourage the graduate students to keep informed of current developments in physics and closely related fields, and practice presentation techniques of research results. Professional development of graduate students, including resume development, practicing in written article reviews, training in research ethics, and other relevant training.

Prerequisite: consent of the instructor.

Components: Seminar

Attributes: Given When Needed

Req. Designation: Technology

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**PH 684(1)** Course ID:009374 2017-08-25

**Graduate Seminar II**

Continuation of PH 683.

Prerequisite: consent of the instructor.

Components: Seminar

Attributes: Given When Needed

Req. Designation: Technology

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**PH 699(1 - 15)** Course ID:009382 2015-02-09

**Thesis, Dissertation or Special Project**

An investigation of a problem undertaken by the student under the guidance of a faculty member.

Prerequisite: consent of the instructor.

Components: Thesis Research

Attributes: Offered Each Term

Req. Designation: Technology

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**PH 999(1 - 10)** Course ID:011101 2015-01-19

**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Philosophy**

**PHIL 1(2 - 4)** Course ID:010820 2015-01-19

**Philosophy Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**PHIL 2(2 - 4)** Course ID:010816 2015-01-19

**Philosophy Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Humanities or Social Science Foundation Curriculum Requirement, depending on the specific designator.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**PHIL 200(3)** Course ID:008617 2015-02-20

**Philosophy and Contemporary Issues**

This course introduces students to philosophy and philosophizing by using philosophical concepts and methods to examine contemporary issues. For example, a society's practices regarding crime and punishment rest on its beliefs about human freedom and responsibility, and philosophical discussions of determinism provide a vantage point from which to critically evaluate these beliefs. Other issues -- such as the possibility and implications of artificial intelligence, the legitimacy of religious beliefs, the morality of torture, and the paradoxes of democracy (for example, people who are rational managers of their time may not spend the time necessary to be informed citizens) -- can be evaluated on the basis of philosophical accounts about knowledge, religion, the basis of morality, and the nature of the state.

**Components:** Lecture

**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Offered Fall Term

**Req. Designation:** Technology

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**PHIL 220(3)** Course ID:012842 2017-10-11

**Philosophy and Shakespeare**

This course is an introduction to ethics through a study of Shakespeare. The course pairs different moral theories with specific plays to examine their strengths and weakness and it attempts to understand Shakespeare's views on ethics. Along the way, the course examines the relationship between philosophy and art.

**Components:** Lecture

**Attributes:** Imaginative Arts, Individual and Group Behavior, University Course, Given When Needed

**Req. Designation:** Technology

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**PHIL 222(3)** Course ID:012119 2015-09-29

**Philosophy for Life**

[Cross-Listed as LIT 222] In this course, we will learn to think philosophically (which is to say: critically, rigorously, and reflectively) about complex and difficult questions. We will study practical life philosophies from both the Eastern and Western traditions, from the Tao Te Ching to Marcus Aurelius, and from Plato to the Dalai Lama. We will reflect on the ontological, epistemological, rhetorical, and ethical perspectives of each of these philosophers and schools of thought. We will note striking similarities and important distinctions between them. Ultimately, we will reflect on our own life philosophies as well--each of us refining our personal life philosophy through reading, reflection, and discussion of these classic texts from the wisdom literature tradition.

**Components:** Lecture

**Course Equivalents:** LIT 222

**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed

**Req. Designation:** Technology

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**PHIL 241(3)** Course ID:008621 2015-03-05

**Medical Ethics**

[Formerly LP241] The practice of modern medicine has created a number of moral dilemmas for health-care providers, their patients, and society as a whole. This course will explore the roots and nature of these various dilemmas and examine the moral theories and principles used to resolve them.

**Components:** Lecture

**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Offered Odd Springs

**Req. Designation:** Technology

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**Business - Humanities & Social Sciences - Subject: Philosophy****PHIL 243(3)****Course ID:010382****2021-05-21****Business Ethics**

[Formerly LP243] This course introduces students to ethical issues in business and the ethical concepts, theories, and methods they can apply to them. There are numerous examples of unethical behavior on the part of individual businesspersons, departments, and entire business organizations. Some of these are big enough to make the news media, but most are ethical missteps that negatively impact managers, employees, and customers without making the headlines. This course explores the causes and characteristics of ethical issues and problems in business, as well as ways to resolve them. Topics will include: Foundational theories about what makes an ethical decision correct. The role of such ethical theories in business. A decision procedure for thinking about and resolving ethical issues in business. Practice in applying the ethical theories and decision procedure to cases about issues such as honesty in business, fair and equitable treatment of employees, the environmental responsibilities of business, product safety, doing business in other countries,

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Offered Fall Term**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Philosophy****PHIL 245(3)** Course ID:013034

2020-02-21

**Philosophy of Mind**

Most things don't have minds. Mountains, molecules, suns, and apples are some of the many things that lack consciousness and thought. Yet, somehow, in a universe in which barely anything can think, you have a mind. How is this possible, and what does this mean? Are there other sorts of things with minds? What about pigs, or spiders, or computers? Is the mind just the brain? This course introduces students to classic and contemporary debates in the philosophy of mind. We will investigate the nature of the human mind from a philosophical perspective and try to make progress in one of the most mysterious fields of human inquiry.

Components: Lecture

Attributes: Individual and Group Behavior, Science, Technology and Society, University Course, Given When Needed

Req. Designation: Technology

**PHIL 325(3)** Course ID:013159

2022-03-18

**Philosophy and Ethics of Sport**

This course introduces students to thinking philosophically about sport. Students will learn to apply philosophical methods, concepts, and theories in analyzing the nature of sports, as well as particular ethical questions that arise from current practices in a variety of sports.

Components: Lecture

Attributes: Given When Needed

Req. Designation: Technology

**PHIL 330(3)** Course ID:011668

2022-02-11

**Logic for Critical Thinking**

This course helps students develop practical reasoning ability, i.e., the ability to analyze the arguments that they encounter every day (for example, editorials, political speeches, memos and reports at work, and their roommate's, friends', and parents' infuriating, but apparently irrefutable, arguments) and decide whether or not these arguments really support the conclusions, as well as to construct sound arguments of their own.

Components: Lecture

Attributes: Individual and Group Behavior, Given When Needed

Requirement Group: Prerequisites: UNIV 190 and one additional course within the humanities and social sciences.

Req. Designation: Technology

**PHIL 350(3)** Course ID:013085

2022-02-11

**Philosophy of Artificial Intelligence**

This course investigates ethical and metaphysical questions that are prompted by artificial intelligence and machine learning. The ethical questions concern the best way to integrate artificial intelligence into society. How much of our critical infrastructure should we leave up to artificial intelligence? When is it wrong to replace human labor with machines? Can AI show prejudice? The metaphysical questions concern the possibility of computer minds. Is a conscious AI possible? How do the processes of current AI differ from human cognition? Can computers be creative? Throughout this course, students will discover what the development of AI has revealed about individual and group behavior, and will learn how these innovations in science and technology promise to impact society.

Components: Lecture

Attributes: Individual and Group Behavior, Science, Technology and Society, University Course, Given When Needed

Req. Designation: Technology

**PHIL 485(3)****Advanced Topics**

Course ID:011833

2013-03-11

**Instructor Consent Required**

An advanced topics seminar open to students with at least 12 credit hours in the discipline or permission from the instructor. Limited to 12 students. Topics to be covered will be selected to conform to the mutual interests and needs of students and faculty. Additional prerequisites may be required depending on the topic. Graduate students will be required to perform additional work.

Components: Lecture

Req. Designation: Technology

**PHIL 490(1 - 10)**

Course ID:008646

2015-02-09

**Department Consent Required****Independent Study**

[Formerly LP490] Designed primarily for an advanced student who wishes to pursue special interests in philosophy for one or more semesters, this series allows students to design and conduct independent study projects under faculty guidance.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Philosophy**

**PHIL 491(1 - 10)** Course ID:008647 2015-02-09 Department Consent Required  
**Independent Study**

[Formerly LP491] Designed primarily for an advanced student who wishes to pursue special interests in philosophy for one or more semesters, this series allows students to design and conduct independent study projects under faculty guidance.

Prerequisite: consent of the instructor.

Components: Independent Study  
Attributes: Offered Each Term  
Req. Designation: Technology

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**PHIL 499(0)** Course ID:008654 2015-02-09

**Minor Portfolio**

In this course, students complete their Liberal Arts Minor Portfolios under the direction of their minor advisor. The course is graded on a Pass-No Credit basis.

Components: Independent Study  
Attributes: Offered Each Term  
Req. Designation: Technology

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**PHIL 590(1 - 10)** Course ID:012777 2016-12-06 Instructor Consent Required

**Independent Study**

Working under the direction of a faculty member, this course allows a graduate student to pursue topics of interest in philosophy.

Components: Independent Study  
Attributes: Given When Needed  
Req. Designation: Technology

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**Institute for STEM Education - CRC Education Program - Subject: Educational Physics**

PHY 580(3) Course ID:012672 2021-10-08

**MAT Project in Physics (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Political Science**

POL 1(2 - 4) Course ID:008614 2015-01-19

**POL Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

POL 2(2 - 4) Course ID:008615 2015-01-19

**POL Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Humanities or Social Science Foundation Curriculum Requirement, depending on the specific designator.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

POL 220(3) Course ID:008622 2015-03-03

**American Politics**

[Formerly LP250] An introduction to the approaches to political inquiry, and the use of these to acquire an understanding of: the social and economic environment and purposes of the American political system; the political behavior of Americans; the patterns of decision-making within the American political system, and the consequences of public policy.

Components: Lecture

Attributes: One communication unit, Individual and Group Behavior, Offered Each Term

Req. Designation: Technology

POL 230(3) Course ID:012014 2015-03-05

**Introduction to Global Politics**

This course introduces students to key concepts, theories, and patterns for understanding politics in the international arena and within states. It aims to expose students to a broad spectrum of ideas and theories in international relations and comparative politics, and it does so by examining some enduring questions in the study of politics. Topics include the structure of the international system, causes of war and peace, economic globalization, international organizations, democratic processes and democratization, economic and political development, political institutions, civil society, and other issues and processes within and across national borders. Cases from different parts of the world are examined to provide grounding in comparative analysis. In addition to simply learning more about world politics, the course will equip students with key political science concepts, theories and explanations, through which they can improve their capacity to critically interpret current events. By the end of the course, students should have a strong

Components: Lecture

Attributes: Contemporary and Global Issues, Given When Needed

Req. Designation: Technology

POL 240(3) Course ID:011488 2022-02-11

**Politics, Decisions and War**

The main objective of this course is to inquire into the causes of war. Following critical engagement with traditional theoretical approaches to the question of conflict and cooperation in international politics, students will be introduced to systemic, group, and individual-level explanations of war, as well as to case study discussions regarding the influence of these factors. The course provides students with a set of tools for the analysis of classic and contemporary civil and international conflicts and strives to show how evidence and theory can be effectively used in understanding peace and conflict. The course draws on a wide range of disciplines, including international relations, political theory, social psychology, economics, and environmental studies. By the end of the term, students should be able to understand the main factors that drive war, as well as to outline solutions for preventing them.

Components: Lecture

Attributes: Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed

Req. Designation: Technology

POL 250(3) Course ID:008623 2020-02-18

**Government & Politics around the World**

[Formerly LP260] This course introduces students to the study of political development and constitutionalism. By studying at least four countries, course participants will learn to develop and test explanations intended to account both for common patterns of modernization and for the unique features of social and political evolution in each nation-state. Countries to be studied represent developed Western democracies (France and Germany), post-communist regimes (Russia), and 'third world' political systems (Mexico).

Components: Lecture

Attributes: Contemporary and Global Issues, Given When Needed

Req. Designation: Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Political Science****POL 251(3)** Course ID:010960 2022-02-11**Introduction to International Politics**

This course introduces students to the prevailing explanations of international relations, and how they are used and misused in the analysis of contemporary policy issues. The main topics to be discussed include the definition and distribution of power in the international system, the role of individual leadership, the influence of international institutions, the impact of globalization and the future of international governance. Policy issues will include: national security strategy, the rise of China, democracy promotion, the role of the United Nations, terrorism and energy security.

Components: Lecture

Attributes: Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed

Req. Designation: Technology

**POL 260(3)** Course ID:012071 2015-03-27**Introduction to Public Policy**

This is an introductory course to policy analysis. Policy analysts are responsible for defining and framing public problems, identifying and evaluating possible strategies for addressing problems, and recommending solutions that make the most sense. The goals of this course are to provide students with an understanding of the role that analysis plays in the policymaking process, and to make students critical consumers of policy analysis

Components: Lecture

Attributes: One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Offered Fall Term

Req. Designation: Technology

**POL 301(3)** Course ID:008624 2015-02-20**Political Theory**

[Formerly LP301] An historical and topical consideration of some prominent yet divergent conceptions of 'justice' and 'community' within the Western political tradition. Theorists to be considered include: Plato, Aristotle, Hobbes, Locke, Rousseau, Mill and Marx.

Components: Lecture

Attributes: One communication unit, Individual and Group Behavior, Offered Fall Term

Req. Designation: Technology

**POL 302(3)** Course ID:008625 2015-01-28**Contemporary Political Theory**

[Formerly LP302] This course will begin by examining contemporary versions of liberalism, the still-dominant paradigm of political thought in the United States. Students will then read and discuss various critical perspectives on liberalism, such as communitarianism, 'civil society' theory, postmodernism, multiculturalism, and 'green' political thought. We shall try to decide whether liberalism has outlived its usefulness as a model of justice and/or political organization, or whether it can renew itself by responding to the countercurrents noted above.

Components: Lecture

Attributes: One communication unit, Individual and Group Behavior, Given When Needed

Req. Designation: Technology

**POL 303(3)** Course ID:012982 2019-10-21**Foreign Policy Analysis**

The course seeks to introduce the ways in which scholars of foreign policy analysis have understood the nature of decision-making processes prevalent within governments and their agencies. It seeks to understand the intentions of actors and the complex global contexts and challenges they face in pursuing their goals. Foreign policy analysis, a distinct subfield within international relations has adopted research from several other subfields such as American politics, comparative politics, political psychology and cultural studies. To that end the course covers two knowledge areas, 1) Contemporary/Global Issues and 2) Cultures and Societies.

Components: Lecture

Attributes: Contemporary and Global Issues, Cultures and Societies, University Course, Given When Needed

Req. Designation: Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Political Science****POL 330(3)****Course ID:012890****2018-10-08****Politics in the Americas**

This class is an introduction to the politics and governments of the countries that comprise the American continents and the Caribbean. It will focus predominantly on the Spanish & Portuguese-speaking countries in Mexico, Central & South America, and the Caribbean. It also may address relationships between or among Latin American countries and the United States and Canada. The course will address the region's political history, including periods of authoritarian rule, revolution and democratization. It also will examine the causes and consequences of these countries' institutional design, as well as the challenges to economic and political development they face, such as crime and corruption. Additionally the course will evaluate policy failures and successes from agrarian and land reform to economic development and wealth redistribution.

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Cultures and Societies, University Course, Offered Odd Springs**Req. Designation:** Technology**POL 333(3)****Course ID:012935****2019-03-08****Latin American politics & Society through Cinema**

This class is a course about Latin American politics and society through the use of film and literature. It is neither a critical film course, nor a course about the use of film in politics.

This course does not offer a broad overview of the politics of Latin America, but rather explores in greater depth particular political and social issues that popular films from around the world have brought to light. As many of these films have made their way to the United States (several have been entrants or winners in the Best Foreign Language Film category of the Academy Awards), they have raised global awareness of these issues. However, films that achieve success, particularly at an international level, often focus on very dramatic issues. As such, please be conscious that this course does not offer a comprehensive portrayal of Latin America. Nevertheless, we deal with very important and influential issues in Latin American political

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Cultures and Societies, University Course, Given When Needed**Req. Designation:** Technology**POL 334(3)****Course ID:013094****2022-02-11****War-Making and World Order**

A relatively small number of states have been responsible for an overwhelming number of wars over the last century. States that are engaged in security competitions and are active in the security sphere tend to shape the conflict space based on innovation in technology, the type of adversaries they are facing, and the nature of their regional and global ambitions. In this class a set of complex questions are address. The questions include: 1) how security competitions between states affects states' war-making capacity which includes technological innovation and institutional efficiency and its polity; 2) how changes in state capacity affects the probability of major and minor wars; and 3) how such wars along with escalating tensions changes regional and world orders. The course draws on scholarship in conflict processes and international relations theory and also considers major case studies that include the rise of China and the global response to the same. To understand global security competitions and conflict, it is important for students to be able to

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology**POL 335(3)****Course ID:011934****2022-02-11****Violence and Reconciliation**

[Cross-listed with LIT 335] While scholars have labeled the 20th century 'the century of genocide,' the past two decades have catalyzed global changes in the ways we think about peace-building and reconciliation. But reconciliation after mass conflict remains a difficult process. Can you forgive someone who has done irreparable harm to you or your loved ones? Can you reconcile -literally, return to a previous state of harmony- with someone if you never shared a harmonious relationship with that person? Is reconciling with a whole community the same as reconciling with an individual? This course examines the challenges to reconciliation after political trauma and assesses the strengths and weaknesses of major reconciliation mechanisms. Through the lens of two case studies, South Africa and Northern Ireland, and the disciplines of film, fiction, and political theory, students will compare the consequences of criminal trials, truth commissions, and informal efforts at communal healing. As a final project, the class will participate in a

**Components:** Lecture**Course Equivalents:** LIT 335**Attributes:** One communication unit, Contemporary and Global Issues, Imaginative Arts, University Course, Offered Odd Springs**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Political Science****POL 337(3)****Course ID:012978****2019-10-21****Dictatorships and Democracies**

In this class students learn about differences among political regimes, not only between dictatorships and democracies, but also among subtypes within those broad categories. The focus of the course will be on political transitions from one regime type to another, examining revolutions, military and constitutional coups, bottom-up and top-down processes of democratization as well as the latest trend of democratic backsliding that has taken place in several countries around the world. Students will learn what distinguishes democracies from dictatorships in order to understand the various types of political transitions. The course material compares different paths countries have taken to democratize in order for students to understand the benefits and drawbacks of each path for the long-term health and survival of democracies. Students will read about a number of specific country cases to learn about regime changes around the world—including the causes and consequences of these political changes. Additionally, some of the

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Given When Needed**Req. Designation:** Technology**POL 340(3)****Course ID:012980****2021-08-26****Lawmaking in the United States: How the Sausage is Made**

There are two things that you don't want to see made: laws and sausages. This course examines the institutions responsible for producing laws and public policy in the United States, especially the president, Congress, the federal bureaucracy, interest groups, and elections. The course makes extensive use of active learning through in-class simulations and games, including an immersive multi-week digitized simulation of lawmaking in American government. Students will also produce advertisements from the perspective of a given interest group.

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology**POL 342(3)****Course ID:012981****2019-10-21****The American Nightmare? American Political Ideas in Literature and Film**

This course explores the nature of political ideas in contemporary America through analyzing films and books. Through classroom discussion and close engagement with source material, we will consider topics such as America's place in the world, the benefits and costs of capitalism, scapegoating, race relations, and the necessity of government. Our intent is neither to defend nor attack America; rather, our objective is to think critically about the society in which we live.

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Imaginative Arts, University Course, Given When Needed**Req. Designation:** Technology**POL 345(3)****Course ID:012983****2020-01-15****Happiness: Politics, Policy, and More**

[Cross-listed with POL545] The U.S. Constitution argues for the rights of "life, liberty, and the pursuit of happiness." What makes us happy? Should we be happy? Why might happiness be critical to democracy? How do political decisions make us happy? Should happiness be a political goal? That said, this course will go well beyond politics and political science. It is explicitly multi-disciplinary in nature: we will study the question of happiness from disciplines based in the sciences, humanities, and social sciences, and we will study material informed by psychology, public policy, economics, biology, medicine, philosophy, literature, and film.

**Components:** Lecture**Course Equivalents:** POL 545**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology**POL 350(3)****Course ID:010204****2018-10-23****Political Economy of Development**

[Cross-listed with SOC 350] [Formerly LP370] Explanations of social change and development in an international context are covered. The course moves from a starting point of the presentation of theories and explanations of how nations have historically attempted to modernize themselves and develop their economies, and concludes with a brief introduction to current discussions of the global economy and globalization. Students are introduced to competing explanations of the modernization process and the movement of nations from less industrialized to industrialized status. Other topics covered are the causes and consequences of poverty and famine and hunger, and policies to alleviate these social ills. This course is recommended for students interested in taking POL351: Globalization.

**Components:** Lecture**Attributes:** Economics and Organizations, Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Political Science**

**POL 351(3)** Course ID:010205 2020-09-22

**Globalization**

[Cross-listed with SOC 351] [Formerly LP 371] This seminar style class addresses the economic, political and social change collectively referred to as 'globalization.' The concept of globalization will be analyzed from a number of perspectives. Macro-level changes are addressed as are local adaptation strategies of individuals, communities and organized groups. Special attention is paid to the role of institutions, such as corporations, national and subnational governments and non-governmental and multilateral organizations, in the globalization process. The class will work through and discuss books critical of, and sympathetic to, the globalization process.

**Components:** Lecture

**Course Equivalents:** SOC 351

**Attributes:** One communication unit, Contemporary and Global Issues, Given When Needed

**Req. Designation:** Technology

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**POL 353(3)** Course ID:012975 2019-10-21

**Politics of Protest**

To protest means to express strong disapproval or objection to something. With regard to the politics of protest, individuals or groups express their dissent or disapproval to a particular audience—usually local, national or even international governments, but also corporations, school administrations, etc. and the broader public—with the objective to change the behavior or policies that provoked their protest or to force a leadership or regime change. Protestors use myriad tactics to assert and publicize their dissent such as provocative art, cyber-attacks, street demonstrations and even violent rebellion. When protestors organize and carry out campaigns toward a common goal, we refer to the protesters as social movements. Social movements, however, do not monopolize protest. People also engage in less systematic protest. In this course, we study who engages in protest and to whom they protest. We study a variety of theories about social movements, collective organization and collective action. In this course, students examine why various people

**Components:** Lecture

**Attributes:** Individual and Group Behavior, Given When Needed

**Req. Designation:** Technology

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**POL 355(3)** Course ID:011757 2017-09-28

**Sex, Gender and Power**

This course addresses the political, social, and economic circumstances of women in global perspective. Topics include: theories of gender and politics; intersectionality; the public / private divide; the construction and maintenance of gendered political interests; friction between feminism and multiculturalism in both the developed and developing worlds; issues surrounding the promotion of women's rights; women as political candidates; and women as office-holders.

**Components:** Lecture

**Attributes:** One communication unit, Contemporary and Global Issues, Given When Needed

**Req. Designation:** Technology

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**POL 360(3)** Course ID:013063 2020-10-15

**Politics of Pandemics**

Pandemics act as major shocks to regional and international system(s) and have the potential to change global power distribution, initiate new technological advancements and reshape domestic politics. In other words, pandemics can shape politics and the course of history. Likewise, politics and public policies affect pandemics from their geographic scope to their social and political costs. This course delves into the relationships between domestic and global institutions and politics and pandemics. Students will study how pandemics affect political behavior at different levels of analyses. Students learn about how national and subnational politics evolve in different countries on account of global shocks from pandemics, such as HIV/AIDS, H1N1 (Swine Flu), and COVID-19. Students also will explore how pandemics shape international aid programs and investigate who benefits from such programs. During the course, students will read and analyze literature on why states act through international organizations, such as the World Health Organization, and

**Components:** Lecture

**Attributes:** Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Political Science**

POL 362(3)

Course ID:010738

2022-02-11

**Human Rights Law and Politics**

The politics and law framed around various conceptions of Human Rights are primarily responses to perceived crimes against people based on their ethnicity, religion, gender and/or age. This course is a historical, institutional, and political inquiry, therefore, on how we go about protecting and improving the lot of the most vulnerable populations throughout the world. The first half of the semester will examine the institutional responses to Human Rights (the formation of the Declaration of Human Rights, various international aid agencies, and war crimes tribunals). The second half of the semester will involve investigation into legal and political responses to torture, political repression, war crimes and genocide, the status of refugees, women's rights, children's rights, and humanitarian intervention.

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Given When Needed**Req. Designation:** Technology

**Liberal Arts - Humanities & Social Sciences - Subject: Political Science**

POL 370(3)

Course ID:011997

2015-01-28

**Close and Contested Elections**

Course material includes the study of electoral rules worldwide, including social and political consequences of these rules. The first section of this course examines the role of elections in both democratic and non-democratic systems. What are elections intended to accomplish? How do they work? The second, longer, section of the course turns to a series of case studies of contemporary close and contested elections in a number of different contexts, including cases ranging from the United States (2000) to Iran (2009). This latter portion of the course addresses such questions as (1) the tools and procedures that various kinds of states/regimes have for dealing with such contestation, (2) the extent to which such contested elections may de-legitimize the entire political system, and (3) the role of the media. The final week addresses international election monitoring bodies.

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Political Science**

POL 374(3)

Course ID:011606

2015-03-05

**Environmental Political Theory**

This course is designed for students with interests in environmental science and policy, and political theory, or both. We will examine the relationship between nature, politics, and the political economy. We will also examine a wide spectrum of ideas on political, economic, social and scientific matters expressed by contemporary environmental thinkers, though we will also discuss thinkers from the past (Thoreau, Muir, Leopold, Carson). In particular, we will focus our discussions on the relationship between environmental concerns and dominant ideas in liberal capitalism and democracy. We will also study feminist, socialist, communitarian, authoritarian, and anarchist perspectives.

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Science, Technology and Society, University Course, Offered Odd Springs**Req. Designation:** Technology

**Liberal Arts - Humanities & Social Sciences - Subject: Political Science**

POL 375(3)

Course ID:010517

2015-03-05

**Environmental Law**

In this course we will be examining the relationship between the Courts and various policies, laws, and regulations pertaining to the restoration and management of the environment. The central issues in the cases we will be examining emerge from the tension between property rights and what has been conceived as a constitutional right to a clean, healthy environment. Areas where this tension plays out include: the Clean Air Act, the Clean Water Act, The Superfund Law, and the National Environmental Policy Act. In general, the course is designed to help students assess whether environmental laws provide us with a route for attaining ecological goals, and to think critically about the role of the Courts as a defender of the environment.

**Components:** Lecture**Course Equivalents:** POL 575**Attributes:** Contemporary and Global Issues, Given When Needed**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Political Science**

**POL 380(3)** Course ID:010800 2015-01-21

**The Law and Bioethics**

This course explores the relation between law, ethics, and new technologies. In particular, we will be exploring issues of the right to privacy, abortion, state sterilization programs, cloning, rights of surrogate parents, doctor/patient confidentiality, the right to die, new definitions of death, the human genome project and intellectual property rights, and organ transplantation. This inquiry will be guided by the question: 'Who Owns Life?' There is no definitive answer to this question offered by the American court system. Through readings and discussions students will gain political and ethical perspective on how legal standards are formed in response to new demands by the public and government, and how new ethical questions are inspired by innovations in germline bioengineering, medical and rehabilitative technology, robotics, virtual reality, and nanotechnology. The material for the course will be case law and articles by leading scientists, physicians, ethicists, and legal scholars in this young field.

**Components:** Lecture

**Attributes:** One communication unit, Contemporary and Global Issues, Science, Technology and Society, University Course, Offered Spring Term

**Req. Designation:** Technology

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**POL 388(3)** Course ID:012040 2020-02-18

**Terrorism and Insurgencies**

This course will focus on terrorism as political violence carried out by non-state actors, although we will also explore the topic of state sponsorship of terrorist groups. The purpose of the course is to familiarize students with the theoretical approaches to and contemporary challenges in the study of terror and terrorism. Topics will include the nuances involved in defining terrorism; the political context in which terrorist groups emerge; the ideologies, motivations, organizational structure, and decision-making processes of important terrorist groups; the effectiveness of various counter-terrorism tools; and the role of technology in the evolution of terror and terrorism. The course will provide a basis for discussing and analyzing contemporary terror/terrorist events and related security issues.

**Components:** Lecture

**Attributes:** One communication unit, Contemporary and Global Issues, Given When Needed

**Req. Designation:** Technology

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**POL 391(3)** Course ID:011037 2017-10-11

**Special Topic: American Politics in Comparative Perspective**

In what ways is the United States an outlier among western democracies, and in what ways does the United States resemble other democratic nations? To the extent that the United States is distinctive, what explains the differences between the United States and other advanced industrial societies? What do the structural differences of the American political system mean for democratic performance? Is the American way more or less effective than comparably developed states in Asia, Latin America, North America, or Europe? In order to explore these questions, this class examines major features of American democracy – political culture and public opinion, electoral institutions and behavior, interest groups, political parties, and social movements, the division of power between state and federal governments – from a comparative perspective. Understanding American politics in the twenty-first century requires moving beyond national boundaries and situating the United States and its interventions in the world.

**Components:** Lecture

**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed

**Req. Designation:** Technology

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**POL 400(3)** Course ID:008644 2019-09-02

**Constitutional Law**

[Formerly LP400] [Cross-listed with POL500] An introduction to American Constitutional law and jurisprudence. Using a case study approach that focuses upon Supreme Court decision making, the course will pay particular attention to the evolution of discourse on 'rights' in the United States.

**Components:** Lecture

**Course Equivalents:** POL 500

**Attributes:** Contemporary and Global Issues, Given When Needed

**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Political Science****POL 470(3)****Course ID:010203****2015-03-05****Environmental Policy**

[Cross-listed with SOC 470] [Formerly LP360] Public policy is developed in response to problems or issues in society that are presumed, for whatever reasons, not to be resolvable by the private sector. In theory, public policy as it relates to environmental issues is used to intervene to alleviate problems, such as industrial pollution, that threaten the integrity of the natural resource base and the natural and built environments on which our lives and livelihoods depend. However, public policy development and implementation in general, and environmental policy in particular, are not immune to political forces and influences. Even scientific institutions that often provide the empirical basis for environmental policy are potentially influenced and shaped by the political process and political and economic interests. This course introduces students to the distinctive features or characteristics of environmental policy development and implementation. The course primarily focuses on the United States but includes international environmental

**Components:** Lecture**Attributes:** One communication unit, Science, Technology and Society, Given When Needed**Req. Designation:** Technology**POL 471(3)****Course ID:011489****2015-03-05****Energy Policy**

Energy policy is a critical component of state and national public policy. Issues surrounding the reliability and security of energy supplies directly affect national domestic and foreign policy, as well as state level environmental, economic development, and land use concerns. Via emphasis on specific issues unique to North American energy policy (US and Canada), the class will introduce students to the major theoretical frameworks used by political scientists, sociologists, economists, and other intellectual disciplines to understand how societies design and implement public policies related to energy, and how the energy industry responds. Topics covered will include theories of the state, monopoly and regulation, public choice, organizational behavior, international agreements, and innovation. The class will apply these theories to major current and historical issues in energy policy, such as ethanol, climate change, and renewable energy systems, nuclear power, energy efficiency, energy security, the world oil market, and OPEC, electricity production and markets

**Components:** Lecture**Course Equivalents:** POL 571**Attributes:** One communication unit, Economics and Organizations, Science, Technology and Society, University Course, Offered Spring Term**Req. Designation:** Technology**POL 490(1 - 10)****Course ID:010775****2015-02-09****Department Consent Required****Independent Study**

Designed primarily for an advanced student who wishes to pursue special interests in political science for one or more semesters, this series allows students to design and conduct independent study projects under faculty guidance.

Prerequisite: consent of the instructor.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology**POL 499(0)****Course ID:010793****2015-02-09****Minor Portfolio**

In this course, students complete their Liberal Arts Minor Portfolios under the direction of their minor advisor. The course is graded on a Pass-No Entry basis.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology**POL 500(3)****Course ID:012968****2019-09-02****Constitutional Law**

[Cross-listed with POL400] This course will cover the same subject area and topics as POL 400. Additional materials at the graduate level will be expected of those who register under this catalog number. (The attached syllabus includes the additional requirements for graduate students.)

**Components:** Lecture**Course Equivalents:** POL 400**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Political Science**

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POL 545(3) Course ID:013026 2020-01-15

**Happiness: Politics, Policy and More**

[Cross-listed with POL345] This course will cover the same subject area and topics as POL 345. Additional materials at the graduate level will be expected of those who register under this catalog number.

**Components:** Lecture

**Course Equivalents:** POL 345

**Attributes:** Given When Needed

**Req. Designation:** Technology

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POL 570(3) Course ID:011653 2011-09-19

**Environmental Policy**

A course description has not been provided for this course. Please check with the Humanities & Social Science department for a description.

**Components:** Lecture

**Req. Designation:** Technology

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POL 571(3) Course ID:011490 2015-03-05

**Energy Policy**

Energy policy is a critical component of state and national public policy. Issues surrounding the reliability and security of energy supplies directly affect national domestic and foreign policy, as well as state level environmental, economic development, and land use concerns. Via emphasis on specific issues unique to North American energy policy (US and Canada), the class will introduce students to the major theoretical frameworks used by political scientists, sociologists, economists, and other intellectual disciplines to understand how societies design and implement public policies related to energy, and how the energy industry responds. Topics covered will include theories of the state, monopoly and regulation, public choice, organizational behavior, international agreements, and innovation. The class will apply these theories to major current and historical issues in energy policy, such as ethanol, climate change, and renewable energy systems, nuclear power, energy efficiency, energy security, the world oil market, and OPEC, electricity production and markets

**Components:** Lecture

**Course Equivalents:** POL 471

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: Political Science**

POL 575(3)

Course ID:011766

2020-08-01

**Environmental Law**

[Cross-listed with EV 575] In this course we will be examining the relationship between the Courts and various policies, laws, and regulations pertaining to the restoration and management of the environment. The central issues in the cases we will be examining emerge from the tension between property rights and what has been conceived as a constitutional right to a clean, healthy environment. Areas where this tension plays out include: the Clean Air Act, the Clean Water Act, The Superfund Law, and the National Environmental Policy Act. In general, the course is designed to help students assess whether environmental laws provide us with a route for attaining ecological goals, and to think critically about the role of the Courts as a defender of the environment. Graduate students are required to perform additional assignments above those required by undergraduates.

**Components:** Lecture**Course Equivalents:** POL 375**Attributes:** Offered Spring Term**Req. Designation:** Technology

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**Health Sciences - Physical Therapy - Subject: Physical Therapy****PT 1(1 - 4)****Course ID:009414****2015-01-19****PT Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology**PT 2(1 - 4)****Course ID:009415****2015-01-19****PT Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Science Foundation Curriculum Requirement.

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology**PT 105(1)****Course ID:011759****2016-04-04****Introduction to Physical Therapy I**

Introduction to the profession of physical therapy, the pre-physical therapy and DPT programs at Clarkson, the problem-based learning (PBL) mode of curriculum, and the concept of the medical model and team in the U.S.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology**PT 300(1 - 3)****Course ID:009419****2016-01-11****Instructor Consent Required****Independent Study**

An opportunity for Pre-PT students to undertake a research project or clinical observation with approval by a PT faculty member. A portfolio or written report must be handed in at the end of the semester.

Prerequisite: consent of the instructor.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology**PT 305(1)****Course ID:011758****2016-04-04****Introduction to Physical Therapy II**

Introduction to the requirements and process of graduate physical therapy education, participation in the (PBL) mode of curriculum, and issues of professionalism in physical therapy practice.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PT105 or Permission of Instructor.**Req. Designation:** Technology**PT 505(9)****Course ID:010620****2015-02-20****Foundation Sciences for Physical Therapy**

Using a Problem-Based Learning (PBL) format in small tutorial groups, clinical lab, gross anatomy lab, inquiry seminars, and self-directed learning students will develop the early cognitive, psychomotor, and affective skills necessary to be physical therapists. Cases related to the foundation sciences of anatomy (musculoskeletal and neurological) and kinesiology are covered in the different learning environments. Students will gain an appreciation for, and ability to implement physical therapy professional practice core values, in addition to skills in communication, cultural competence, clinical reasoning, evidence-based practice, and education. Students also will gain inductor clinical skills that relate to patients with all types of movement disorders who require physical therapy services.

**Components:** Clinical, Discussion, Laboratory, Lecture**Attributes:** Offered Fall Term**Requirement Group:** Corequisites: PT506 and PT508.**Req. Designation:** Technology

**Health Sciences - Physical Therapy - Subject: Physical Therapy**

**PT 506(2)** Course ID:010621 2015-02-20

**Professional Foundation for Physical Therapy**

This course assists the student in an exploration of the structure of the health care system and the evolving role of the physical therapy profession as a primary participant. The course integrates topics such as history, ethics, politics, sociology, and economics, using seminal articles from a variety of healthcare fields to broaden the learning experience. Utilizing a largely discussion-based format, each student and faculty member will have the opportunity to facilitate interaction by drawing from assigned readings, clinical examples, and students' life experiences. This course will be integrated with case discussions in PT 505 and will provide the foundation for growth as a professional throughout the physical therapy curriculum and beyond.

Prerequisite: Admission to graduate physical therapy professional curriculum (DPT).

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Corequisites: PT505 and PT508.

**Req. Designation:** Technology

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**PT 508(1)** Course ID:010622 2019-06-07

**Literature Critique and Review**

This course provides students with foundational concepts of evidence-based practice (EBP), and skills for critical evaluation of physical therapy research literature related to both background questions (e.g., risk factors) and foreground questions (e.g., interventions). Students will contrast and critique different types of intervention research and relate to levels of evidence. Students learn how to search for, identify, obtain, analyze and summarize appropriate literature using appropriate tools such as PubMed, PEDro, PTNow, and clinical practice guidelines. The capstone project is a literature review poster presentation.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Corequisites: PT505 and PT506.

**Req. Designation:** Technology

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**PT 515(9)** Course ID:010623 2021-09-10

**Cardiopulmonary-Exercise Science**

Using a Problem-Based Learning (PBL) format in small tutorial groups, clinical lab, anatomy lab using cadavers, inquiry seminars and self-directed learning students will develop the cognitive, psychomotor and affective skills necessary to be physical therapists and provide services to individuals with cardiorespiratory disorders, acute conditions found in hospital settings, and exercise and fitness environments. Foundational sciences, behavioral sciences, and clinical science related to cardiorespiratory disorders are covered in different learning environments. Students will gain an appreciation for and ability to implement physical therapy professional practice core values, in addition to skills in communication, cultural competence, clinical reasoning, evidence-based practice, and education. In the different learning environments, the skills and knowledge related to the management (screening, examination, evaluation, diagnosis, prognosis, plan of care, intervention and outcomes assessment) of patients/clients with

**Components:** Clinical, Discussion, Laboratory, Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: PT505, PT506, PT508. Good standing in the graduate physical therapy professional curric

**Req. Designation:** Technology

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**PT 517(2)** Course ID:010624 2021-09-10

**Professional Practice I**

Participation in planned small group part time professional practice experiences. Observation and participation in Phase II and III cardiac rehabilitation, pulmonary rehabilitation, and acute care, with emphasis on examination and intervention for patients with cardiac and pulmonary illness or disease. Emphasis on addressing administrative and professional issues inherent to such clinical environments. Integration of these professional practice experiences with the case studies used in PT 515 Cardiopulmonary-Exercise Science.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: PT505, PT506, PT508. Good standing in the graduate physical therapy professional curric

**Req. Designation:** Technology

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**Health Sciences - Physical Therapy - Subject: Physical Therapy**

**PT 518(1)** Course ID:010625 2021-09-10

**Principles of Tests and Measures**

Students will participate in discussions and activities focused on understanding principles of measurement and concepts related to measurement error, reliability, validity, sensitivity, specificity, minimal detectable change, minimal clinically important difference, likelihood ratios, odds/risk ratios, and clinical prediction rules. Practical interpretation of the psychometric properties for standardized tests and measures in physical therapist practice will occur through critical analysis of research articles, discussion, practice and comprehensive review of commonly utilized standardized measures in physical therapist practice.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: PT505, PT506, PT508. Good standing in the graduate physical therapy professional curriculum

**Req. Designation:** Technology

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**PT 525(9)** Course ID:010626 2015-01-21

**Musculoskeletal Physical Therapy**

Using a Problem-Based Learning (PBL) format in small tutorial groups, clinical lab, musculoskeletal lab, inquiry seminars and self-directed learning students will develop the cognitive, psychomotor and affective skills necessary to be physical therapists and provide services to individuals with musculoskeletal disorders. Foundational sciences, behavioral sciences, and clinical science related to musculoskeletal disorders are covered in the different learning environments. Students will gain an appreciation for and ability to implement physical therapy professional practice core values, in addition to skills in communication, cultural competence, clinical reasoning, evidence-based practice, and education. In the different learning environments, the skills and knowledge related to the management (screening, examination, evaluation, diagnosis, prognosis, plan of care, intervention and outcomes assessment) of patients/clients with musculoskeletal disorders are covered. Students also will gain skills in practice management for

**Components:** Discussion, Laboratory, Lecture

**Attributes:** Offered Summer Term

**Requirement Group:** Prerequisites: PT515, PT517, PT518. Good standing in the graduate physical therapy professional curriculum

**Req. Designation:** Technology

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**PT 527(2)** Course ID:010627 2015-01-21

**Professional Practice Preparation**

PT527 is the capstone course for preparation of upcoming internship courses throughout the curriculum. This course includes both scheduled course and individual meeting sessions. Students will discuss clinical education objectives, professional issues, select upcoming clinical internship sites, develop interview and daily organization skills, and learn how to utilize the full-time PT CPI website.

**Components:** Lecture

**Attributes:** Offered Summer Term

**Requirement Group:** Corequisites: PT515, PT517 and PT518

**Req. Designation:** Technology

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**PT 528(1)** Course ID:010628 2019-04-24

**Analytical Methods for Evidence Based Practice**

Students will learn about various analytical methods used in evidence based practice, with an emphasis on statistical methods. Students will learn to select, apply, and interpret statistical methods commonly used in physical therapy research, and will critique analytical methods used in research.

**Components:** Lecture

**Attributes:** Offered Summer Term

**Requirement Group:** Prerequisites: PT515, PT517 and PT518 Corequisites: PT525, PT527 and PT528

**Req. Designation:** Technology

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**PT 537(6)** Course ID:010629 2021-05-10

**Professional Practice II**

The first full-time internship course within the DPT curriculum, students participate in eight weeks of full-time internship at an orthopedic or acute care/cardiorespiratory setting following the third semester. Students synthesize their knowledge of musculoskeletal and/or cardiopulmonary disorders and gain an appreciation for managing multiple patients and responsibilities. The focus of this internship is on the patient/client management process-examination, evaluation, diagnosis, prognosis, intervention, and outcomes -- for patients within these settings with a variety of impairments leading to activity and participation limitations.

**Components:** Lecture

**Attributes:** Offered Fall and Summer

**Requirement Group:** Prerequisites: PT525, PT527, PT528. Good standing in the graduate physical therapy professional curriculum

**Req. Designation:** Technology

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**Health Sciences - Physical Therapy - Subject: Physical Therapy**

PT 604(5) Course ID:010634

2021-03-19

**Physical Therapy for Multiple System Disorders I**

Using a Problem-Based Learning (PBL) format in small tutorial groups, clinical lab, neuroanatomy lab, inquiry seminars, and self-directed learning students will develop the cognitive, psychomotor, and affective skills necessary to be physical therapists and provide services to individuals with disorders of multiple systems. Foundational sciences, behavioral sciences, and clinical science related to disorders of multiple system disorders are covered in the different learning environments. Students will gain an appreciation for and ability to implement physical therapy professional practice, and education. In the different learning environments, the skills and knowledge related to the management (screening, examination, evaluation, diagnosis, prognosis, plan of care, intervention and outcome assessment) of patients/clients with multiple system disorders are covered. Students also will gain skills in practice management for individuals with multiple systems disorders who require physical therapy services.

**Components:** Clinical, Discussion, Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: PT525, PT527, PT528, PT537. Good standing in the graduate physical therapy professional curric

**Req. Designation:** Technology

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PT 605(4) Course ID:010630

2015-08-01

**Neuromuscular Physical Therapy I**

Using a Problem-Based Learning (PBL) format in small tutorial groups, clinical lab, neuroanatomy lab, inquiry seminars and self-directed learning, students will develop the cognitive, psychomotor, and affective skills necessary to be physical therapists and provide services to individuals with neuromuscular disorders. Foundational sciences, behavioral sciences, and clinical science related to neuromuscular disorders are covered in the different learning environments. Students will gain an appreciation for and ability to implement physical therapy professional practice core values, in addition to skills in communication, cultural competence, clinical reasoning, evidence-based practice, and education. In the different learning environments, the skills and knowledge related to the management (screening, examination, evaluation, diagnosis and prognosis, plan of care, intervention, and outcomes assessment) of patients/clients with neuromuscular disorders are covered. Students will also gain skills in practice management for individuals

**Components:** Clinical, Discussion, Laboratory, Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: PT537, PT604, PT608. Good standing in the graduate physical therapy professional curric

**Req. Designation:** Technology

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PT 607A(1) Course ID:010631

2019-02-13

**Professional Practice III-A**

Students will participate in the first 8 weeks of a part-time clinical experience integrating clinical skills and practice management related to individuals with neurological impairments and disorders. Students will have the opportunity to practice patient interaction and management skills, clinical skills, and increase their knowledge of this complex patient population. Students will work with patients similar in diagnosis as discussed within tutorial cases and study concepts related to case management and policies that govern the clinical setting. The clinic portion of this course is highly integrated with PT 605 and PT 606, Neuromuscular Physical Therapy.

**Components:** Clinical

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: PT537, PT604, PT608. Good standing in the graduate physical therapy professional curric

**Req. Designation:** Technology

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PT 608(1) Course ID:010632

2021-05-07

**Research Methods**

Students will examine and contrast a variety of research methods, including both primary and secondary research (i.e. original data collection vs. systematic review/meta-analysis). Students will learn to integrate critique of multiple research articles and apply to clinical situations. This course will address a variety of ethical issues associated with research. By the end of the semester, students will have selected and developed a plan for their capstone research project.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: PT525, PT527, PT528, and good standing in the graduate physical therapy professional cu

**Req. Designation:** Technology

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**Health Sciences - Physical Therapy - Subject: Physical Therapy**

**PT 613(2)** Course ID:009439 2021-05-10

**Professional Practice III**

Students will participate in a part-time clinical education experience integrating clinical skills and practice management related to individuals with neurological impairments and disorders. Students will have the opportunity to practice patient interaction and management skills, clinical skills, and increase their knowledge of this complex patient population. Students will work with patients similar in diagnosis as discussed within tutorial cases and study concepts related to case management and policies that govern the clinical setting. The clinic portion of this course is highly integrated with PT 614 Neuromuscular Physical Therapy.

**Components:** Clinical

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: PT537, PT604, PT608. Good standing in the graduate physical therapy professional curriculum

**Req. Designation:** Technology

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**PT 616(6)** Course ID:010637 2021-05-07

**Physical Therapy for Multiple System Disorders II**

Using a Problem-Based Learning (PBL) format in small tutorial groups, clinical lab, neuroanatomy lab, inquiry seminars, and self-directed learning students will develop the cognitive, psychomotor, and affective skills necessary to be physical therapists and provide services to individuals with disorders of multiple systems. Foundational sciences, behavioral sciences, and clinical science related to disorders of multiple system disorders are covered in the different learning environments. Students will gain an appreciation for and ability to implement physical therapy professional practice, and education. In the different learning environments, the skills and knowledge related to the management (screening, examination, evaluation, diagnosis, prognosis, plan of care, intervention and outcome assessment) of patients/clients with multiple system disorders are covered. Students also will gain skills in practice management for individuals with multiple systems disorders who require physical therapy services.

**Components:** Clinical, Discussion, Lecture

**Attributes:** Offered Summer Term

**Requirement Group:** Prerequisites: PT613, PT614, PT617, PT618. Good standing in the graduate physical therapy professional curriculum

**Req. Designation:** Technology

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**PT 617A(1)** Course ID:010635 2021-05-10

**Professional Practice IV-A**

Students will develop and implement a community-based health and wellness project during PT 617A, with continuation in PT 617B. Each student will participate in at least six hours of wellness/prevention activities and/or education by developing and implementing a project selected by the faculty (4-6 hours estimated per session based on preparation, performance, analysis of outcomes, and program changes for future sessions). Throughout the project, each student will need to attend to his or her established program goals in order to prepare and implement an effective wellness session. The students, working with peers, are also expected to assess outcomes on an ongoing basis in order to modify methodologies to most effectively obtain the desired behavioral response from the participants. Through this project, it is expected that students will develop independent thinking and problem solving skills by utilizing available resources to meet the needs of their assigned facility and through continuous self-reflection. The format of this course is

**Components:** Seminar

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: PT537, PT604, PT608. Good standing in the graduate physical therapy professional curriculum

**Req. Designation:** Technology

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**PT 617B(1)** Course ID:012042 2021-05-10

**Professional Practice IV-B**

Students will develop and implement a community-based health and wellness project during PT 617A, with continuation in PT 617B. Each student will participate in at least six hours of wellness/prevention activities and/or education by developing and implementing a project selected by the faculty (4-6 hours estimated per session based on preparation, performance, analysis of outcomes, and program changes for future sessions). Throughout the project, each student will need to attend to his or her established program goals in order to prepare and implement an effective wellness session. The students, working with peers, are also expected to assess outcomes on an ongoing basis in order to modify methodologies to most effectively obtain the desired behavioral response from the participants. Through this project, it is expected that students will develop independent thinking and problem solving skills by utilizing available resources to meet the needs of their assigned facility and through continuous self-reflection. The format of this course is

**Components:** Seminar

**Attributes:** Offered Summer Term

**Requirement Group:** Prerequisites: PT 537, PT 605, PT 607A, PT613, PT614, PT 617A and good standing in the graduate physical therapy professional curriculum

**Req. Designation:** Technology

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**Health Sciences - Physical Therapy - Subject: Physical Therapy**


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PT 618(1) Course ID:010636 2021-05-10

**Research Practicum**

Students work in small groups to implement their research plans from the previous semester. Students will either collaborate with faculty on primary research, or conduct a systematic review of literature related to a clinical question. By the end of this semester, students should have completed most or all components of their projects except for writing.

**Components:** Independent Study

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: PT537, PT604, PT608. Good standing in the graduate physical therapy professional curriculum

**Req. Designation:** Technology

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PT 627A(5) Course ID:010638 2021-05-10

**Professional Practice V-A**

PT627A is the second full-time internship course within the curriculum. Students will participate in the first 7 weeks of a total 10 weeks of full-time clinical internship (remaining 3 weeks through PT627B). This is scheduled during the summer semester of their second year at designated clinical education sites. Prior to this internship, students have completed five semesters of academic coursework covering the cardiopulmonary, musculoskeletal, neurologic, and integumentary systems throughout the lifespan, a 10-week full-time clinical internship, and multiple part-time clinical experiences. The focus of this internship will be on the examination, evaluation, diagnosis, prognosis, intervention, and outcomes for complex patients with a variety of impairments leading to activity and participation limitations. The financial aspects of patient care, supervision of support personnel, communication and education of patients, their families, peers, and interdisciplinary team members, and professional behavior development will be emphasized and progressed

**Components:** Clinical

**Attributes:** Offered Summer Term

**Requirement Group:** Prerequisites: PT613, PT614, PT617, PT618. Good standing in the graduate physical therapy professional curriculum

**Req. Designation:** Technology

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PT 627B(2) Course ID:012043 2016-01-01

**Professional Practice V-B**

PT627B is the second full-time internship course within the curriculum. Students will participate in the final 3 weeks of a total 10 weeks of full-time clinical internship (first seven weeks in PT627A). This is scheduled during the fall semester of their second year at designated clinical education sites. Prior to this internship, students have completed five semesters of academic coursework covering the cardiopulmonary, musculoskeletal, neurologic, and integumentary systems throughout the lifespan, an eight week full-time clinical internship, and multiple part-time clinical experiences. The focus of this internship will be on the examination, evaluation, diagnosis, prognosis, intervention, and outcomes for complex patients with a variety of impairments leading to activity and participation limitations. The financial aspects of patient care, supervision of support personnel, communication and education of patients, their families, peers, and interdisciplinary team members, and professional behavior development will be emphasized and progressed

**Components:** Clinical

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: PT 627A

**Req. Designation:** Technology

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PT 645(8) Course ID:010639 2015-02-20

**Practice Management in the Autonomous Environment**

Using a Problem-Based Learning (PBL) format in small tutorial groups, clinical lab, administrative workshops, inquiry seminars and self-directed learning students will develop the cognitive, psychomotor, and affective skills necessary to be physical therapists and provide services to individuals with varied complex disorders. Foundational sciences, behavioral sciences, and clinical science related to neuromuscular, musculoskeletal, cardiopulmonary, practice management, and women's health are covered in the different learning environments. Students will gain an appreciation for and ability to implement physical therapy professional practice core values, in addition to skills in communication, cultural competence, clinical reasoning, evidence-based practice, and education. In the different learning environments screening, examination, evaluation, diagnosis, prognosis, plan of care, intervention and outcomes assessment are covered.

**Components:** Clinical, Discussion, Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: PT616, PT627. Good standing in the graduate physical therapy professional curriculum (D)

**Req. Designation:** Technology

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**Health Sciences - Physical Therapy - Subject: Physical Therapy**

**PT 648(2)** Course ID:010640 2019-06-07

**Writing and Presenting Research**

Students work in small groups to write up their systematic review or primary research as an abstract and full manuscript and will give a platform presentation. During the process, students will participate in a peer review process within the class to improve their scientific writing and to become familiar with the publication process.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: Good standing in the graduate physical therapy professional curriculum (DPT). Corequisites:

**Req. Designation:** Technology

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**PT 657(2)** Course ID:010641 2015-02-20

**Advanced Clinical Skills**

Emphasis is placed on advanced clinical skills that progress, refine, and expand skills previously acquired. Includes topics such as: pediatrics, geriatrics, neurological treatment, exercise progression, post-surgical care, alternative modalities, manual therapy. Didactic presentations of evidence-based practice literature and clinical laboratory skills. Presentations by students who have had the opportunity to develop advanced clinical skills under mentorship during their clinical experiences. Application of principles of professional practice education through planning, supervising and assessing peers' clinical skills practice. Integration of professional practice experiences with case studies used in PT 645 Practice Management in the Autonomous Environment.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisites: PT616, PT627. Good standing in the graduate physical therapy professional curriculum (DPT).

**Req. Designation:** Technology

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**PT 667(8)** Course ID:010643 2015-04-24

**Professional Practice VI**

The third full-time internship course within the curriculum, students will participate in a 10-week, full-time clinical internship scheduled during the first half of the final spring semester at selected clinical education sites. The focus of this internship is on the application and refinement of the PT patient/client management process for complex patients with a variety of impairments leading to activity and participation limitations. The administrative and financial aspects of patient care; consultation; communication and education of patients, their families, peers and interdisciplinary team members; and continued professional development will be emphasized and progressed during this experience.

**Components:** Clinical

**Requirement Group:** Prerequisites: PT645, PT648, PT657. Good standing in the graduate physical therapy professional curriculum (DPT).

**Req. Designation:** Technology

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**PT 677(8)** Course ID:010644 2015-04-24

**Professional Practice VII**

The fourth and final full-time internship course within the curriculum, students will participate in a 10-week, clinical internship scheduled during the second half of the final spring semester at selected clinical education sites. The focus of this internship is on the application and refinement of the PT patient/client management process for complex patients with a variety of impairments leading to activity and participation limitations. Continued professional development, administrative and financial aspects of patient care; promotion of the profession, pro bono opportunities, and communication and education of patients, their families, peers and interdisciplinary team members will be emphasized and progressed during this experience.

**Components:** Clinical

**Attributes:** Offered Spring Term

**Requirement Group:** Corequisites: PT667. Good standing in the graduate physical therapy professional curriculum (DPT).

**Req. Designation:** Technology

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**PT 999A(1 - 4)** Course ID:013184 2022-08-28

**Independent Study in Physical Therapy**

Students have options to participate in independent study work with faculty in the areas of research, focused learning, advanced clinical and professional formation development. Credit assignment variable and determined by the Department Chair in collaboration with the faculty supervising the effort each semester.

**Components:** Independent Study

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**Health Sciences - Physical Therapy - Subject: Physical Therapy****PT 999B(1 - 4)** Course ID:013185 2022-10-06**Independent Study in Physical Therapy**

Students have options to participate in independent study work with faculty in the areas of research, focused learning, advanced clinical and professional formation development. Credit assignment variable and determined by the Department Chair in collaboration with the faculty supervising the effort each semester.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology**PT 999C(1 - 4)** Course ID:013186 2022-10-06**Independent Study in Physical Therapy**

Students have options to participate in independent study work with faculty in the areas of research, focused learning, advanced clinical and professional formation development. Credit assignment variable and determined by the Department Chair in collaboration with the faculty supervising the effort each semester.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology**PT 999D(1 - 4)** Course ID:013187 2022-10-06**Independent Study in Physical Therapy**

Students have options to participate in independent study work with faculty in the areas of research, focused learning, advanced clinical and professional formation development. Credit assignment variable and determined by the Department Chair in collaboration with the faculty supervising the effort each semester.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology**PT 999E(1 - 4)** Course ID:013188 2022-10-06**Independent Study in Physical Therapy**

Students have options to participate in independent study work with faculty in the areas of research, focused learning, advanced clinical and professional formation development. Credit assignment variable and determined by the Department Chair in collaboration with the faculty supervising the effort each semester.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology

**School of Arts and Sciences - Psychology - Subject: Psychology****PY 1(2 - 4)** Course ID:009466 2015-01-19**Psychology Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology**PY 2(2 - 4)** Course ID:009467 2015-01-19**Psychology Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Social Science Foundation Curriculum Requirement.

**Components:** Lecture**Attributes:** Transfer Credit Only**Req. Designation:** Technology**PY 151(3)** Course ID:009469 2015-02-12**Introduction to Psychology**

Emphasizes the scientific study of the human mind. Appropriate research methods and philosophical questions will be considered. Topics include the brain, memory, perception, development, personality, social behavior, emotion, motivation, psychological disorders, stress, and states of consciousness.

**Components:** Lecture**Attributes:** Individual and Group Behavior, Offered Fall, Spring, and Summer**Req. Designation:** Technology**PY 246(3)** Course ID:012748 2016-09-16**Educational Psychology**

This course will examine the ways in which theories of child development and learning inform classroom teaching methods, assessment, behavioral interventions, and student motivation.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: PY151 or permission of the instructor**Req. Designation:** Technology**PY 253(3)** Course ID:009485 2015-01-21**Social Psychology**

Emphasis on the relative influences of society and other people on the individual. Topics include persuasion, attitude formation and change, group decision making, prejudice, social influence, altruism and aggression. Fundamental to the discussion of each topic is the scientific research that underlies it. A focus of the course is the means by which the individual can influence and be influenced by the organizations that play a major role in our lives

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: PY151.**Req. Designation:** Technology**PY 255(3)** Course ID:009487 2015-01-21**Cognitive Psychology**

Cognitive psychology is the study of how the mind perceives, attends to, remembers, and interacts with the world. The mental processes that will be examined include perception, attention, memory, language, decision-making, and problem solving. During this course, each topic will be explored by investigating theories and results from laboratory experiments, computer simulations and work in artificial intelligence.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: PY151.**Req. Designation:** Technology

**School of Arts and Sciences - Psychology - Subject: Psychology****PY 268(3)****Diversity Science**

This course introduces the links between diversity and psychological processes at individual and interpersonal levels. The study of diversity in this course includes an understanding of the presence of, as well as the problems and issues associated with social and cultural differences in our society. The topics of this course cover concept and processes for understanding topics such as categorization, stereotyping, prejudice, and social stigma. This course is designed to be an active learning experience, providing students an opportunity to identify and reflect on their own cultures, values and preferences, and how this impacts their individual sphere of influence and the various contexts in which they interface.

Requisites: PY151 recommended, but not required.

**Components:** Lecture

**Attributes:** Contemporary and Global Issues, Cultures and Societies, University Course, Offered Spring Term

**Req. Designation:** Technology

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**Business - School of Business - Subject: Psychology****PY 286(3)****Course ID:009496****2015-07-06****Organizational Behavior I**

[Cross-listed with EM 286, OS 286] (May be used to satisfy a CUSB MBA or MS foundation requirement.) An introduction to the processes required to manage contemporary organizations with a focus on individual behaviors as they relate to the functions of planning, organizing, controlling, and leading. The most recent concepts of behavioral science in the practice of management are presented to assist the student in gaining understanding of the pervasiveness of the discipline in all types of organizations and processes. Topics include motivation, leadership, perceptions, personality theory, learning theory, personnel issues, stress management, organizational culture, and decision making.

**Components:** Lecture**Course Equivalents:** OS 286, EM 286**Attributes:** Individual and Group Behavior, Offered Each Term**Requirement Group:** Prerequisites: sophomore standing or the permission of the instructor.**Req. Designation:** Technology

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**School of Arts and Sciences - Psychology - Subject: Psychology****PY 310(3)** Course ID:009476

2021-12-06

**Human Sexuality**

The course objective is to provide an informed perspective on human sexual behavior. Topics include anatomy and physiology, contraception, sexually transmitted diseases, sexual development and identity, varieties of sexual behavior across cultures and species, disorders and difficulties of sexual expression, therapeutic issues on the treatment of sexual disorders and the role of sex in interpersonal relationships.

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology**PY 311(3)** Course ID:012722

2016-09-06

**Cyberpsychology**

Cyberpsychology is the branch of psychology that examines human behavior in the context of interaction with modern technologies. The research in this field is primarily focused on the use of Internet, particularly social media sites, but other technologies, such as gaming, mobile device applications, artificial intelligence and virtual reality are also within the scope of this area of psychological research and practice. The goal of this course is to provide students with an in-depth understanding of the psychological factors associated with using technologies and interacting in on-line environment.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisite: PY151**Req. Designation:** Technology**PY 317(3)** Course ID:009479

2021-12-06

**Psyc of Psychoactive Drugs**

The Psychology of Psychoactive Drugs will examine a number of medicinal and so-called recreational drugs that affect consciousness, including cocaine, morphine, LSD, marijuana, alcohol, nicotine and caffeine. The course will include a description of the drugs, their pharmacological action, and side-effects.

Psychological, physiological, and pharmacological theories of tolerance and addiction, and addiction treatment programs will also be covered.

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Biology - Subject: Psychology****PY 319(1)** Course ID:011493

2014-11-19

**Current Readings in Animal Behavior**

[Cross-listed with BY 319] The field of animal behavior is a rapidly advancing one, especially at the interface of neurobiology and cognition, and the interface of cognition and functional analysis of behavior (behavioral ecology and sociobiology). This one credit hour course is designed as a 'journal club' with a focus on the latest developments in theory and empirical research on animal behavior. The course is intended for any student who has a sincere interest in integrative animal behavior.

**Components:** Lecture**Course Equivalents:** BY 319**Requirement Group:** Prerequisites: BY222 or PY151**Req. Designation:** Technology

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**Business - School of Business - Subject: Psychology****PY 321(3)** Course ID:009480

2015-07-06

**Consumer Behavior**

[Cross-listed with MK 321] Extensive coverage of selected consumer behavior theories and models. Special emphasis given to the most recent research along with marketing mix applications. Topics include classic and operant conditioning, motivation and attribution theories and the elaboration likelihood model. Students are required to complete a term project.

**Components:** Lecture**Course Equivalents:** MK 321**Requirement Group:** Prerequisite: MK320.**Req. Designation:** Technology

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**School of Arts and Sciences - Psychology - Subject: Psychology****PY 335(3)** Course ID:009482 2015-01-28**Personality**

Examines research evidence that treats various features of personality. Includes introversion-extroversion, authoritarian personality, the psychoanalysis, aggression, sexuality, dream interpretation, self-monitoring, locus of control, defense mechanisms, and unconscious motivation.

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology**PY 340(3)** Course ID:009483 2015-03-05**Behavioral Ecology and Sociobiology**

[Cross-listed with BY 340] This course is concerned with the adaptive functions of animal behavior, emphasizing ecological and evolutionary perspectives. Topics covered include foraging behavior, sexual selection, social systems, parental care, and cooperation and conflict. One major focus will be on evaluating the arguments of proponents and critics of sociobiology on whether the fields is useful at explaining human behavior.

**Components:** Lecture**Course Equivalents:** BY 340**Attributes:** Individual and Group Behavior, Offered Odd Springs**Requirement Group:** Prerequisites: BY140 or PY151 or consent of instructor.**Req. Designation:** Technology**PY 357(3)** Course ID:011326 2014-11-19**Human Cognitive Evolution**

[Cross-listed with BY 357] Evolutionary psychology is concerned with the adaptive problems and selective pressures our ancestors encountered in their environments, the psychological mechanisms that evolved to help them solve those problems, and the way those evolved mechanisms function in current environments. This way of thinking about the brain, mind, and behavior is changing how scientists approach old topics, and is opening up new ones. This course will focus on current developments and selected topics in evolutionary psychology (e.g., foraging, mate choice, parental investment, cooperation and culture) and explore the evolution of cognition from a broad comparative perspective.

**Components:** Lecture**Course Equivalents:** BY 357**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology**PY 358(3)** Course ID:009489 2014-11-20**Animal Learning and Cognition**

[Cross-listed with BY 358] This course focuses upon how animals acquire, process, store and recall information about their environment and social partners. Topics that will be examined include how animals perceive and classify stimuli; how they learn and remember; how they orient and navigate; how they measure time, number, and amount; how they acquire abstract concepts; how they perceive social relationships; and how they communicate. A diversity of invertebrate and vertebrate organisms will be included (sea slugs to primates!), and there will be an emphasis on understanding taxon-specific specializations as well as general patterns across animals.

**Components:** Lecture**Course Equivalents:** BY 358**Requirement Group:** Prerequisites: BY140 or PY151 or consent of the instructor.**Req. Designation:** Technology**PY 359(3)** Course ID:009490 2022-06-07**Perception**

Perception deals with our conscious experience of the world, ourselves and each other. This course will examine how perceptions are measured (psychophysics); how visual, auditory, touch and pain sensory stimulation is actively organized into conscious perceptions; developmental aspects of perception; the role of cognitive factors, such as attention; and how altered conscious states (e.g., achieved through meditation, hallucinogenic drugs) affect perception. Fundamental principles of perception discussed in this course will be used to explain how we experience the world, ourselves, and each other.

**Components:** Lecture**Course Equivalents:** BY 359**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology

**School of Arts and Sciences - Psychology - Subject: Psychology****PY 360(3)****Course ID:009491****2015-02-20****Learning and Memory**

The basic principles, major theories, and practical applications of learning and memory processes will be explored in humans and animals. Topics will include how knowledge is acquired (learning), how it is represented, stored and accessed (memory), and how these learning and memory principles can be applied in education and in clinical settings. The course will take a multidisciplinary approach that will allow examining the processes underlying learning and memory at the behavioral, cognitive, neurobiological, and genetic levels.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology**PY 361(3)****Course ID:009492****2015-02-20****Motivation and Emotion**

This course examines the forces of personality, environment, and culture that lead people to want what they want, and do what they do. Motivation will be explored in the contexts of education, work, therapy, sports, and relationships. Topics include: self-efficacy, self-regulation, earned helplessness, intrinsic and extrinsic motivation, achievement motivation, goal-setting, implementation intentions, self-determination, and emotion. Recent developments in the field of motivation will be applied to the practice of motivating others.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology**PY 363(3)****Course ID:010050****2023-05-25****Judgment and Decision Making for the Biomedical Sciences**

Decision making is using information (and in some cases emotion) to guide behavior among multiple possible courses of action—for example, which foods to choose, which stocks to invest in, who to select for a romantic partner, or which products to buy. These choices determine our success in meeting the challenges of life. This course will cover a wide variety of topics regarding how individuals and groups form judgments and make decisions, by drawing on findings from psychology, economics, and biology. We will investigate the various techniques used to study and assess human judgment and decision making, explore how people reason under risk and uncertainty and apply the research addressed in class to real-world problems and issues. Particular focus will be given to judgment and decision-making in applied health contexts that are of high relevance for students with career goals in the biomedical sciences.

**Components:** Lecture**Attributes:** Offered Even Springs**Requirement Group:** Enrollment is limited to students participating in the Trudeau Semester.**Req. Designation:** Technology**PY 366(3)****Course ID:013101****2021-04-08****Cultural Psychology**

This course introduces the field of cross-cultural psychology and intricate connections between cultural experiences and psychological processes. With critical examinations of the study of culture within the field of psychology, the focus will be on developing an understanding of recent cultural theory, research methods, and critical interpretation of research results. This course includes topics such as cross-cultural psychology's contributions to human development and socialization, identity and personality, emotions and cognition, motivation, and behaviors.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PY151 or Junior or Senior standing**Req. Designation:** Technology**PY 370(3)****Course ID:009495****2015-02-20****Developmental Psychology**

This course will examine normal development from conception through old age and will cover theories of development and current developmental research. Consideration will be given to interaction of physical, social and cognitive aspects. Topics include the development of self, identity, moral beliefs, language, friendship, attachment, sexuality, and death/dying.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology

**School of Arts and Sciences - Psychology - Subject: Psychology**

PY 372(3) Course ID:013052 2020-09-04

**Community Psychology**

This course is designed to introduce students to the field of Community Psychology, which aims to improve community mental health through research and social intervention programs such as prevention, citizen participation, environmental change, and influence of public policy. This course will introduce the background and content of community mental health and community psychology, present the key concepts involved, and engage students in practical applications of the methods used by community psychologists.

Components: Lecture

Attributes: Offered Spring Term

Requirement Group: Prerequisite: PY151, or Junior or Senior standing.

Req. Designation: Technology

PY 400(3) Course ID:012936 2023-05-25

**Internship - Professional Experience (Class Structure)**

This course entails completing a professional experience (90 - 120 hours) through volunteer or work activities associated with psychology and writing an APA style paper that integrates the professional experience with relevant psychological literature. Examples of professional experiences include, but are not limited to, St. Lawrence Psychiatric Facility, Reach Out Crisis Hotline, Renewal House, Canton-Potsdam Hospital Chemical Dependency Unit, working in Human Resources or marketing/advertising departments, Hospice, patient advocacy, counseling, or mental health diagnoses. Note that the professional experience must be approved BEFORE the student begins the experience; please contact the Psychology Front Office for details.

Components: Independent Study

Attributes: Two communication units, Offered Spring Term

Requirement Group: PY400 Requirements: Junior or Senior standing.

Req. Designation: Technology

PY 401(3) Course ID:009497 2022-06-07 Instructor Consent Required

**Internship - Clinical/Counseling Psychology (individual study format)**

This course entails completing a professional experience (90 - 120 hours) through volunteer or work activities associated in clinical/counseling psychology and writing an APA style paper that integrates the professional experience with relevant psychological literature. Note that the professional experience must be approved BEFORE the student begins the experience; please contact the Psychology Front Office for details.

This class is taught in an individual study format and can replace, if needed, the PY400 Internship - Professional Experience class.

Components: Independent Study

Attributes: Two communication units, Given When Needed

Requirement Group: Prerequisites: Must have junior or senior standing.

Req. Designation: Technology

PY 402(3) Course ID:009498 2022-06-07 Instructor Consent Required

**Internship: Personnel Relations (individual study format)**

This course entails completing a professional experience (90 - 120 hours) through volunteer or work activities associated in relevant organizations and writing an APA style paper that integrates the professional experience with relevant psychological literature. Note that the professional experience must be approved BEFORE the student begins the experience; please contact the Psychology Front Office for details.

This class is taught in an individual study format and can replace, if needed, the PY400 Internship - Professional Experience class.

Components: Independent Study

Attributes: Two communication units, Given When Needed

Requirement Group: Prerequisites: Must have junior or senior standing.

Req. Designation: Technology

PY 403(3) Course ID:009499 2022-06-07 Instructor Consent Required

**Internship - Psychology in Health Care Environments (individual study format)**

This course entails completing a professional experience (90 - 120 hours) through volunteer or work activities associated in health care environments and writing an APA style paper that integrates the professional experience with relevant psychological literature. Note that the professional experience must be approved BEFORE the student begins the experience; please contact the Psychology Front Office for details.

This class is taught in an individual study format and can replace, if needed, the PY400 Internship - Professional Experience class.

Components: Independent Study

Attributes: Two communication units, Given When Needed

Requirement Group: Prerequisites: Must have junior or senior standing.

Req. Designation: Technology

**School of Arts and Sciences - Psychology - Subject: Psychology****PY 411(3)** Course ID:011045

2023-05-25

**Counseling Psychology: Theory and Practice**

This course builds a foundation of clinical knowledge and skills for those who may pursue work in counseling or psychotherapy. It surveys the most widely accepted theories of counseling and provides experiential opportunities to learn and practice facilitative communication skills. Students explore basic concepts for integrating diagnosis, evaluative testing, treatment planning, and appropriate referral into the counseling process. The various types of counseling professions and the ethical issues surrounding counseling are also discussed.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: Psychology major with Senior or Junior standing, or consent of the instructor.**Req. Designation:** Technology**PY 412(6)** Course ID:012135

2023-01-30

**Instructor Consent Required****Mental Health Professional Experience**

Students will spend one full day per week (or equivalent) observing and working with mental health professionals in a local mental health agency. Past experiences have included placements at the St. Lawrence Psychiatric Center (SLPC) in Ogdensburg, NY, including rounds at the Sex Offenders Treatment Program, Child and Youth Program, and the Adult Services Program. Future placements may be at SLPC and/or other locations as determined by site availability. Activities may include assisting with psychosocial support, observing group psychotherapy and other group meetings, developing therapy "lesson plans," delivering a supervised therapy session, and observing treatment team meetings. This course is only open to Psychology majors.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PY151 and instructor permission Recommended prerequisites: PY462 and/or PY464 (or equiv**Req. Designation:** Technology**PY 453(3)** Course ID:011752

2015-03-05

**Advanced Topics in Social Psychology**

In this course students will receive an intensive treatment of several classic and cutting-edge topics in social psychology, including social motivation, self-esteem, social identity and intergroup relations, the psychology of meaning, embodied social cognition and social neuroscience. Students will develop their understanding and communication of social psychological concepts, theories, and research by engaging in class debate and discussion, giving oral presentations, and writing scientific literature reviews.

**Components:** Lecture**Attributes:** Two communication units, Offered Spring Term**Requirement Group:** Prerequisite: PY151 and PY253 or consent of the instructor.**Req. Designation:** Technology**PY 454(3)** Course ID:009501

2023-05-25

**Biological Psychology**

[Cross-listed with BY 454] A comprehensive investigation of the neuroanatomical and neurophysiological foundations of behavior. Topics include, but are not limited to: perception, motivation, emotion, states of consciousness, learning, memory and mental illness.

**Components:** Lecture**Course Equivalents:** BY 454**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology**PY 456(3)** Course ID:009502

2023-05-05

**Research Methods in Psychology**

This course involves research design, hypothesis testing, measurement and analysis, and includes the application and interpretation of statistics. The research methodologies covered will include experimental and quasi-experimental designs.

**Components:** Laboratory, Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisite: Must be a Psychology major with at least Junior standing. PY151, and one of: STAT282, S**Req. Designation:** Technology

**School of Arts and Sciences - Psychology - Subject: Psychology****PY 457(3)** Course ID:012140 2023-05-05**Data Analysis in Psychology**

Students will work in teams to design and conduct an experiment, analyze the results and write up their findings in the American Psychological Association format.

**Components:** Laboratory**Attributes:** Two communication units, Offered Fall Term**Requirement Group:** Corequisite: PY456**Req. Designation:** Technology**PY 458(3)** Course ID:009503 2023-05-25**Cognitive Neuroscience**

[Cross-listed with BY 458] This course introduces a sampling of the theories and research concerning how various mental processes are accomplished within the brain. Emphasis will be placed on developing an understanding of both the physiological bases of the techniques and the issues involved in relating measures of brain activity to cognitive functioning. Students will be exposed to current topics of study in a number of areas of cognition: perception, language, memory, among others. In this course we will study a number of different techniques for studying the brain, including electrophysiological recording techniques, functional imaging techniques, and methods that involve brain lesions and disrupting neural activity.

**Components:** Lecture**Course Equivalents:** BY 458**Attributes:** Individual and Group Behavior, Science, Technology and Society, University Course, Offered Fall Term**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Psychology****PY 459(3) Course ID:011215 2015-03-05 Instructor Consent Required****Neuroscience and Society**

[Cross-listed with HIST 459] The word 'neuroscience' is of recent origin. Yet we can trace neuroscientific ideas back to Rene Descartes. Since Decartes, social understanding of madness, the relationship between mind and brain, and the nature of sensation and perception has changed frequently. Beginning in the Age of Mechanical Man, and ending in the Age of Prozac, this course examines how society has influenced neuroscientific thought and how, in turn, neuroscience has influenced society.

**Components:** Lecture**Course Equivalents:** HIST 459**Attributes:** One communication unit, Science, Technology and Society, Offered Spring Term**Requirement Group:** Restriction: Junior or senior standing, and permission of the instructor**Req. Designation:** Technology

**School of Arts and Sciences - Biology - Subject: Psychology****PY 460(3)****Neurobiology**

[Cross-listed with BY 460] Neurons are electrically excitable cells that initiate and control many complex functions such as sensory perception, locomotion, memory, and learning. This course introduces the study of neuronal mechanisms at the cellular and molecular level. Topics include: membrane biophysics, ion channels, electrical signaling, synaptic transmission, glia, sensory transduction, neuromodulation, and neuronal plasticity.

**Components:** Lecture**Course Equivalents:** BY 460, BY 561**Requirement Group:** Prerequisites: BY160 or BY360 or consent of instructor.**Req. Designation:** Technology

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**School of Arts and Sciences - Psychology - Subject: Psychology****PY 461(3)** Course ID:011656

2015-01-21

**Judgment and Decision Making**

Decision making is using information (and in some cases, emotion) to guide behavior among multiple possible courses of action - which foods to choose, who to select for a romantic partner, or which products to buy. These choices determine our success in meeting the challenges of life. This course will cover a wide variety of topics regarding how people form judgments and make decisions by drawing on findings from psychology, economics, and biology. We will investigate the various techniques used to study and assess human judgment and decision making, explore how people reason under risk and uncertainty and apply the research addressed in class to real-world problems and issues.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: PY 151 and Junior or Senior standing**Req. Designation:** Technology**PY 462(3)** Course ID:009505

2015-02-20

**Abnormal Psychology**

This course surveys the major syndromes of psychopathology, including schizophrenia, depression and manic-depression, anxiety disorders, and psychopathic personality. Reviews know causes, symptomatology, and both pharmacological and psychological modes of intervention.

**Components:** Lecture**Attributes:** Offered Fall Term**Requirement Group:** Prerequisites: PY151 or junior or senior standing.**Req. Designation:** Technology**PY 463(3)** Course ID:009506

2015-02-20

**Health Psychology**

This course will provide an introduction to the field of health psychology, which is concerned with the role of psychological and social factors in health and illness. The course will address three general subject areas: 1) attitudes, behavior, and lifestyle factors affecting disease prevention and development, 2) stress and the related personality and social processes associated with disease development and progression, and 3) the psychological and social consequences of physical illness.

**Components:** Lecture**Attributes:** One communication unit, Offered Fall Term**Requirement Group:** Prerequisites: PY151 or permission of the instructor.**Req. Designation:** Technology**PY 464(3)** Course ID:012885

2018-09-17

**Clinical Psychology**

This course is designed to introduce students to the theoretical, empirical, and ethical foundations of clinical psychology. We will focus on the major roles of clinical psychologists, particularly psychotherapy, assessment, and issues in education and training. Students will also be asked to engage in self-reflection throughout the course, as the ongoing development of self-awareness and self-knowledge are essential to effective and ethical practice. Contemporary issues and controversies that are currently shaping the field of clinical psychology will also be addressed. Prior enrollment in PY462 (Abnormal Psychology) is recommended.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Prerequisites: PY151 or Junior or Senior standing.**Req. Designation:** Technology**PY 480(1 - 6)** Course ID:009508

2022-06-07

**Directed Study in Psychology**

This is a directed reading course that will allow the student the opportunity to pursue special interests in the general psychology.

Prerequisite: consent of the instructor.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology**PY 481(1 - 6)** Course ID:009509

2022-06-07

**Directed Study in Social Psychology**

This is a directed reading course that will allow the student the opportunity to pursue special interests in social psychology.

Prerequisite: consent of the instructor.

**Components:** Independent Study**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Psychology - Subject: Psychology**

**PY 482(1 - 6)** Course ID:009510 2022-06-07

**Directed Study in Physiological Psychology**

This is a directed study course that will allow the student the opportunity to pursue special interests in physiological psychology.

Prerequisite: consent of the instructor.

Components: Independent Study  
 Attributes: Given When Needed  
 Req. Designation: Technology

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**PY 483(1 - 6)** Course ID:009511 2022-06-07 Instructor Consent Required

**Directed Study in Cognitive Psychology**

This is a directed reading course that will allow the student the opportunity to pursue special interests in cognitive psychology.

Components: Independent Study  
 Attributes: Given When Needed  
 Req. Designation: Technology

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**PY 490(1 - 6)** Course ID:013141 2023-01-11 Instructor Consent Required

**Directed Research in Cultural Psychology**

The student works on-on-one with a faculty member on a cultural psychology research project. The Student will learn about the major theories related to the research topic, and gain first-hand experience with research methodology issues, data collection, and analysis. Does not count towards the directed research requirement for the psychology major.

Components: Research  
 Attributes: Offered Each Term  
 Req. Designation: Technology

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**PY 491(1 - 6)** Course ID:009513 2017-01-13 Instructor Consent Required

**Directed Research in Health Psychology**

The student works one-on-one with a faculty member on a health psychology research project. The student will learn about the major theories related to the research topic and gain first-hand experience with research methodology issues, data collection, and analysis. Does not count towards the directed research requirement for the psychology major. Instructor consent required to enroll.

Components: Research  
 Attributes: Offered Each Term  
 Req. Designation: Technology

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**PY 492(1 - 6)** Course ID:009514 2017-01-13 Instructor Consent Required

**Directed Research in Psychophysiology**

The student works one-on-one with a faculty member on a psychophysiological research project. The student will learn about the major theories related to the research topic and gain first-hand experience with research methodology issues, data collection, and analysis. Does not count towards the directed research requirement for the psychology major. Instructor consent required to enroll.

Components: Research  
 Attributes: Offered Each Term  
 Req. Designation: Technology

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**PY 493(1 - 6)** Course ID:009515 2017-01-13 Instructor Consent Required

**Directed Research in Cognitive Psychology**

The student works one-on-one with a faculty member on a cognitive psychology research project. The student will learn about the major theories related to the research topic and gain first-hand experience with research methodology issues, data collection, and analysis. Does not count towards the directed research requirement for the psychology major. Instructor consent required to enroll.

Components: Research  
 Attributes: Offered Each Term  
 Req. Designation: Technology

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**PY 494(1 - 6)** Course ID:009516 2017-01-13 Instructor Consent Required

**Directed Research in Social Psychology**

The student works one-on-one with a faculty member on a social psychology research project. The student will learn about the major theories related to the research topic and gain first-hand experience with research methodology issues, data collection, and analysis. Does not count towards the directed research requirement for the psychology major. Prerequisite: consent of the instructor.

Components: Research  
 Attributes: Offered Each Term  
 Req. Designation: Technology

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**School of Arts and Sciences - Psychology - Subject: Psychology****PY 495(1 - 6)** Course ID:009517 2018-10-23**Directed Research in Clinical Psychology**

The student works on-on-one with a faculty member on a clinical psychology research project. The student will learn about the major theories related to the research topic, and gain first-hand experience with research methodology issues, data collection, and analysis. Does not count towards the directed research requirement for the psychology major.

**Components:** Independent Study**Attributes:** Offered Each Term**Req. Designation:** Technology**PY 496(1 - 6)** Course ID:009518 2017-01-13 **Instructor Consent Required****Directed Research in Psychology**

The student works one-on-one with a faculty member on a cognitive psychology research project. The student will learn about the major theories related to the research topic and gain first-hand experience with research methodology issues, data collection, and analysis. The student will write an APA style research paper. Can be used to satisfy the directed research requirement for the psychology major. Instructor consent required to enroll.

**Components:** Research**Attributes:** One communication unit, Offered Each Term**Req. Designation:** Technology**PY 498(1 - 10)** Course ID:009520 2022-06-07 **Instructor Consent Required****Senior Thesis**

Research under the direction of a faculty sponsor, who assists the student in the choice of a problem and in the planning and execution of the research.

**Components:** Research**Attributes:** One communication unit, Given When Needed**Requirement Group:** Prerequisites: senior psychology major and consent of the department faculty.**Req. Designation:** Technology**PY 499(1 - 10)** Course ID:009521 2022-06-07**Senior Thesis**

Continuation of the research from PY498 leading to a written due at the end of the course. Can be used to satisfy the directed research requirement for the psychology major.

**Components:** Research**Attributes:** One communication unit, Given When Needed**Requirement Group:** Prerequisite: PY498.**Req. Designation:** Technology**PY 900(1 - 15)** Course ID:011970 2015-02-09**Thesis, Dissertation or Special Project in Psychology**

Student performs research toward a masters degree under the guidance of a faculty thesis advisor. A graduate thesis committee monitors student progress and provides guidance toward completion of the project. Work done in satisfaction of the requirements for a degree will be assigned a grade when the thesis is submitted and approved.

**Components:** Thesis Research**Attributes:** Offered Each Term**Req. Designation:** Technology

**School of Arts and Sciences - School of Arts & Sciences - Subject: School of Arts and Sciences**


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SA&S 1(2 - 4) Course ID:013002 2019-05-01

**School of Arts and Science Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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SA&S 2(2 - 4) Course ID:011807 2015-01-19

**School of Arts and Science Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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SA&S 3(2 - 4) Course ID:013003 2019-05-01

**School of Arts and Science Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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SA&S 4(2 - 4) Course ID:011808 2015-01-19

**School of Arts and Science Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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SA&S 100(1) Course ID:011737 2015-02-20

**Co-Writing**

A writing workshop to be taken concurrently with UNIV190, Clarkson Seminar. Provides supplementary instruction and practice in critical analysis and in writing and editing techniques. Each week students have a group session and also meet one-to-one with the course instructor about work in progress in their UNIV190 classes.

Components: Lecture

Attributes: Offered Fall Term

Requirement Group: Corequisite: UNIV190

Req. Designation: Technology

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SA&S 300(1) Course ID:011435 2015-02-09

**Arts and Sciences Seminar**

Students attend seminars by alumni, faculty, and guest speakers. Students will attend one seminar per week. The School of Arts and Sciences will typically sponsor most of these seminars. Students may also attend seminars sponsored by the various Departments comprising Arts and Sciences. Students will write responses to at least three of the colloquia they attend over the semester.

Components: Seminar

Attributes: Offered Each Term

Requirement Group: Prerequisites: Major in the School of Arts and Sciences, and at least Sophomore standing

Req. Designation: Technology

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SA&S 399(1) Course ID:012931 2019-03-01

**The Adirondack Speaker Series**

In this weekly seminar, students will learn about our region. The purpose of the series is to give Clarkson students a sense of place. The weekly seminar will feature talks by researchers, community members, and storytellers who will discuss all things Adirondack, including geology, economy, history, agriculture, rivers, parks, animals, art, politics, and social issues. This seminar is open to all - students, faculty, and community members.

Components: Lecture

Attributes: Offered Fall Term

Req. Designation: Technology

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**School of Arts and Sciences - School of Arts & Sciences - Subject: School of Arts and Sciences****SA&S 400(1 - 3)****Course ID:011942****2019-05-20****Instructor Consent Required****Internship**

Students gain practical work experience by working with a professional outside their department on issues, problems, or projects that draw on concepts and methods from multiple fields. Students also prepare a report about their learning experiences in the internships.

This course may be repeated for credit.

**Components:** Independent Study

**Req. Designation:** Technology

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**SA&S 410(0)****Course ID:012756****2016-09-23****Department Consent Required****Professional Experience**

This course number is used to matriculate the Professional Experience requirement of the Clarkson Common Experience curriculum. The student must participate in a project-based professional experience such as a co-op, internship, other professional-level work experience, directed research, significant responsibility in an appropriate team project, or a community project clearly related to the student's professional goals.

Enrollment requires approval by the Associate Dean or Dean of Arts and Sciences.

Requirement: Pre-approval of the experience (contact the Office of the School of Arts & Sciences for details).

**Components:** Independent Study

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**School of Arts and Sciences - Biology - Subject: School of Arts and Sciences****SA&S 499(1) Course ID:011772 2022-03-18 Instructor Consent Required****Biology, Behavior and Society Minor Portfolio**

The student will provide a portfolio based on (a) term papers or equivalent products from the three major required courses in the BiBS minor, (b) representative course material that shows mastery of subject matter area, and (c) will use the portfolio and materials from other courses taken for the BiBS minor to prepare a 10 page self-reflective essay on what the student has learned about the biological, psychological, and socio-cultural influences on human behavior, human cultural evolution, and human social organization.

**Components:** Independent Study**Requirement Group:** Prerequisites: HIST270, BY/PY340, and BY/PY357**Req. Designation:** Technology

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**Business - School of Business - Subject: School of Business**


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**SB 1(2 - 4)** Course ID:009526 2015-01-19

**Business Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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**SB 2(2 - 4)** Course ID:009527 2015-01-19

**Business Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

This course may be used to satisfy a Management/Business Foundation Curriculum Requirement.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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**SB 100(2.5)** Course ID:009528 2022-07-01 **Instructor Consent Required**

**Quantitative Methods of Business and Economics**

This course is restricted to the HEOP Summer Program for incoming students. It is designed to prepare students for the required courses in the School of Business at Clarkson, and will emphasize the understanding of mathematical methods and their application to the fundamentals of business and economics. Topics will include algebraic and functional interpretation, geometry, creating and using graphs to understand and communicate data, marginal analysis, and other mathematical concepts as they are used in selected topics in business and economics. This course may not be used to satisfy business major requirements.

Components: Lecture

Attributes: Offered Summer Term

Requirement Group: Prerequisite: For HEOP students only.

Req. Designation: Technology

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**SB 113(3)** Course ID:009529 2015-02-20

**Entrepreneurship and Business Innovation I**

(CUSB Freshmen Only) SB113 provides you with exposure to a range of business theories and skills by applying and reinforcing this knowledge through actual management and entrepreneurial experience. This "learning-by-doing" approach is designed to provide you with a solid foundation for critical, analytical and lateral thinking about management and increase your confidence and competence as practicing managers, leaders, and entrepreneurs. Additionally, this course will serve as an introduction to familiarize you with the Clarkson University School of Business curriculum and introduce you to each of the business disciplines. You will be exposed to theories, applications, and skills relevant to creating an effective business plan. These include: innovation, decision making, leadership, team building, oral and written communication, market research, financial analysis, and working under conditions of uncertainty. Ultimately, the course is centered on helping you become aware of and able to manage risk, resources, and opportunities, while understanding the

Components: Laboratory, Lecture

Attributes: One communication unit, Offered Fall Term

Requirement Group: Restriction: Must be a CUSB Freshmen.

Req. Designation: Technology

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**SB 114(3)** Course ID:009530 2015-01-21

**Entrepreneurship & Business Innovation II**

SB114 provides you with exposure to a wide range of business theory and skills. Using the experiences gained in SB113, students will learn about the various types of business structures and how individual and group behavior can positively or negatively impact an organization's success. Students will be exposed to topics including financial analysis, asset management, human resource management, supply chain management, intellectual property, international business and group behavior. Specifically, students will study concepts associated with managing a start up venture or new product introduction, leadership, personal accountability, stress, tolerance for uncertainty, change management and organizational flexibility. This foundation of learning is also designed to support the student's choice of emphasis in future course selection.

Components: Laboratory, Lecture

Attributes: One communication unit, Offered Spring Term

Requirement Group: Prerequisite: SB113.

Req. Designation: Technology

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**Business - School of Business - Subject: School of Business**

SB 115(3) Course ID:011673

2021-10-20

**Foundations of Innovation and Entrepreneurship**

This course will expose the student to a wide range of business theories and skills and serves as an introduction to the curriculum of the School of Business. The course will provide the student with an introduction to each of the business disciplines and an introduction to the theories, application, and skills necessary to create an effective business plan. These skills and topics include: innovation, analytically thinking, decision making, leadership, team building, oral and written communication, market research, and financial analysis. This course is offered only to second semester freshmen students who have internally transferred to the School of Business. This course cannot be taken by a student who has taken SB113. The course will serve as a substitute for SB113 for those students who internally transfer into the School of Business.

**Components:** Laboratory, Lecture

**Attributes:** One communication unit, Offered Spring Term

**Requirement Group:** Restriction: This course cannot be taken by any student who has taken SB113.

**Req. Designation:** Technology

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SB 310(0) Course ID:010988

2015-02-09

**CUSB Professional Experience: Internship**

Project-based professional internship experience in business, related to student career interests and/or field of study. Fulfills Clarkson Common Experience Professional Experience Requirement for School of Business students. Course registration requires CUSB approval of application. Completion of course requires CUSB approval of post-internship assessment by student and employer. Offered Pass/No Credit.

**Components:** Independent Study

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisite: Sophomore standing, consent of the instructor.

**Req. Designation:** Technology

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SB 322(3) Course ID:009009

2015-02-09

**Designing and Leading Innovative Ventures**

This course will provide students with opportunities to understand how the shifting business environment requires innovative ventures to adapt, change and respond to ensure competitiveness. Students will explore traditional organizational structures as well as cross-functional and virtual teams and networks, and will gain an understanding of the value of rewards and incentives in helping influence innovation and structural/organizational evolution. Students will also consider benchmark techniques and approaches used to inform and advocate innovation to key internal and external stakeholders.

**Components:** Lecture

**Attributes:** Offered Each Term

**Requirement Group:** Prerequisite: At least Sophomore standing.

**Req. Designation:** Technology

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SB 356(3) Course ID:012796

2022-02-10

**Invention Development & Protection**

[Cross-listed with EM356] In this course, students learn how to develop inventions and protect them. Students will work in small teams to develop and describe their inventions in a form suitable for filing provisional patent applications with the U.S. Patent and Trademark Office. Aspects of intellectual property laws in the US and other countries will be covered to guide the student inventing process. Not open to E&M students.

**Components:** Lecture

**Course Equivalents:** EM 356

**Attributes:** Given When Needed

**Requirement Group:** SB356 Prerequisites: Junior Standing, not open to E&M majors.

**Req. Designation:** Technology

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SB 361(3) Course ID:010252

2014-11-18

**Supply Chain Environmental Management**

[Cross-listed with EM 361] In recent years, manufacturing organizations have increased their interest in environmental management through activities such as green purchasing, reverse logistics, product stewardship and design-for-the environment. These activities, usually involving several organizations, are often part of what is known as supply chain environment management. This course aims to gain a greater understanding of supply chain environmental management by examining: (i) the advantages and business risks of adopting and implementing environmental practices and technologies in the supply chain, (ii) the role of suppliers and customers to facilitate the adoption/ implementation of environmental practices and technologies, and (iii) the implications of such supply chain activities on an organization's operations strategy. This course consists of a mix of lectures and class discussion and relies primarily on a set of readings and a series of cases that will be analyzed in class.

**Components:** Lecture

**Course Equivalents:** EM 361

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: OM331.

**Req. Designation:** Technology

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**Business - School of Business - Subject: School of Business**

**SB 381(3)** Course ID:011984 2016-12-31

**Logistics Management**

[Cross-Listed EM381] Logistics involves planning, implementation and control of the forward and reverse flow and storage of goods, services, and information in the supply chain in order to effectively meet customer demand. Primary topics covered include management and location of facilities, management of channel networks, warehousing, transportation, management and design of integrated logistics networks, distribution strategies, third-party logistics, international logistics, and vehicle routing. In addition to lectures, case studies, numerical assignments and simulation of logistics systems may be utilized.

**Components:** Lecture

**Course Equivalents:** EM 381

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: MK 320 and OM/EM 331

**Req. Designation:** Technology

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**SB 396(3)** Course ID:011508 2022-11-01

**Global Business Strategies**

This course takes a transnational perspective on strategic management. It explores the integrative and cross-functional nature of organizational strategy and decision-making within a global environment. Students are exposed to a wide range of strategic problems, opportunities, challenges, dilemmas/puzzles and paradoxes involved in forming and implementing organizational strategies in an era of globalization. The aim is to develop the sophisticated, critical thinking skills and understanding necessary to manage effectively in an increasingly globalized world.

**Components:** Lecture

**Attributes:** Contemporary and Global Issues, Cultures and Societies, Offered Spring Term

**Requirement Group:** Prerequisites: Must have junior or senior standing.

**Req. Designation:** Technology

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**SB 437(3)** Course ID:010980 2015-01-21

**Commercializing Innovation**

This course focuses on how to successfully commercialize an innovation. While it is important to come up with an innovative idea and develop a product concept, it is equally critical to effectively design and launch the product in the market and ensure its long-term success. This is where the innovation efforts of a large number of entrepreneurs and companies fail. The course provides an exposure to various product design approaches and strategies. Understanding commercialization activities such as pre-product launch planning, market testing, actual product launch, and post-launch follow-up is a major part of the course. These commercialization activities among other things involve developing a marketing plan for the product, carefully testing the plan, modifying the plan based on test market results, and crafting a long-term strategy for the product. The course also provides an exposure to how market data is generated and analyzed during these activities.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: MK436, MK332.

**Req. Designation:** Technology

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**SB 440(3)** Course ID:010981 2015-01-21

**Innovation and Entrepreneurship Strategy**

The employment of comprehensive case problems in the formulation of action programs and business policy is a major feature in this integrated course in innovation and entrepreneurship strategy. As a capstone course, it is designed to allow students to apply their knowledge in a complex case analysis environment. The hallmark of the course is the application of learned material to realistic, multifarious management issues. Thus, each case represents a complex web of managerial issues that must be resolved. The cases will cover many different content subjects that may vary from semester to semester. The course will also focus on the process of critical thinking in the context of management decision making.

**Components:** Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: MK320, MK321, MK332, MK436, and senior standing.

**Req. Designation:** Technology

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**Business - School of Business - Subject: School of Business**

**SB 441(3)** Course ID:010982 2022-02-10

**Advanced Topics in Global Supply Chain Management**

[Cross-listed with EM 441] This course introduces several emerging topics in supply chain management, including: demand management, revenue management, risk management, supply chain agility and flexibility, supply chain disruption management, and supply chain contracts. This course also provides students with the opportunity to gain experience dealing with complex supply chain issues by utilizing a simulation game. The simulation deals with both strategic and tactical aspects of management the supply chain.

**Components:** Lecture

**Course Equivalents:** EM 441

**Attributes:** Offered Fall and Spring

**Requirement Group:** Prerequisite: OM341.

**Req. Designation:** Technology

**SB 487(1 - 3)** Course ID:012151 2017-01-13 **Instructor Consent Required**

**Special Project in Business**

An investigation of a problem or in-depth topic undertaken by the student under the guidance of a faculty member.

Prerequisites: Permission of the instructor

**Components:** Research

**Attributes:** Given When Needed

**Req. Designation:** Technology

**SB 490(1 - 3)** Course ID:012152 2016-04-05 **Instructor Consent Required**

**Internship**

An unpaid internship that is related to the student's professional goals.

Prerequisite: Permission of the Instructor

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

**SB 500(0)** Course ID:010707 2023-06-09

**Pre-MBA Module:Information Systems**

This course provides students with a broad overview of information systems and their uses in organizations. The course will examine basic components of organizational IT infrastructure, such as standard hardware and software components, network and the Internet technologies, as well as databases and business applications. In addition, students will understand the roles these components play in an organizational information system.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture

**Same As Offering:** SB 500

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

**SB 500(0)** Course ID:010707 2023-06-09

**Pre-MBA Module:Information Systems**

This course provides students with a broad overview of information systems and their uses in organizations. The course will examine basic components of organizational IT infrastructure, such as standard hardware and software components, network and the Internet technologies, as well as databases and business applications. In addition, students will understand the roles these components play in an organizational information system.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture

**Same As Offering:** SB 500

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

**SB 510(0)** Course ID:010708 2018-05-01

**Pre-MBA Module:Macroeconomics**

An introduction to macroeconomics including the analysis of national income determination, interest rate determination, and economic growth. Monetary and fiscal policy and selected issues in international macroeconomics are also covered.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

**Business - School of Business - Subject: School of Business**

SB 520(0) Course ID:010709 2018-05-01

**Pre-MBA Module:Microeconomics**

An introduction to microeconomics covering the role of the price system in, and public policies toward, the allocation of goods and resources. Topics include supply and demand, market structures, analysis of firm behavior, household behavior, and the gains from international trade.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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SB 530(0) Course ID:010710 2018-05-01

**Pre-MBA Module:Accounting**

An introduction to accounting concepts necessary for an understanding of financial reporting, and managerial planning and control. Basic elements of the balance sheet, the income statement and the statement of cash flows are introduced. Cost concepts important for business decision making are also covered.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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SB 540(0) Course ID:010711 2023-06-09

**Pre-MBA Module:Law and Society**

A course designed to provide a basic understanding of (1) the nature, functions and limitations of law and legal systems; (2) the basic relationship among justice, ethics, legal systems and social structure; and (3) the relationship among society, law and business activity. In addition, this course is designed to enlighten with respect to rules, principles, standards and doctrines of law fundamental to a free enterprise system. The course covers the substantive areas of constitutional law, torts and contracts.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture

**Same As Offering:** SB 540

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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SB 540(0) Course ID:010711 2023-06-09

**Pre-MBA Module:Law and Society**

A course designed to provide a basic understanding of (1) the nature, functions and limitations of law and legal systems; (2) the basic relationship among justice, ethics, legal systems and social structure; and (3) the relationship among society, law and business activity. In addition, this course is designed to enlighten with respect to rules, principles, standards and doctrines of law fundamental to a free enterprise system. The course covers the substantive areas of constitutional law, torts and contracts.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture

**Same As Offering:** SB 540

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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SB 550(0) Course ID:010712 2018-05-01

**Pre-MBA Module:Statistics**

Introduction to statistical methodology. Topics include descriptive statistics, probability distributions, point and interval estimation, hypothesis testing, two-sample tests, comparisons, measuring and testing association, correlation, regression. Emphasis on business applications, intuitive development, and problem solving technique using a statistical software.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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SB 560(0) Course ID:010713 2018-05-01

**Pre-MBA Module:Marketing**

This course provides a basic understanding of management of marketing activities in contemporary organizations. The course is based on the premise that the purpose of a firm is to satisfy the needs and desires of its customers. Topics covered include: segmentation and target market selection, buyer behavior, market research, and marketing strategy (including product planning, pricing, distribution, and promotion.) The changing nature of marketing and the trends in domestic and international marketing are also examined.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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**Business - School of Business - Subject: School of Business****SB 570(0)** Course ID:010714 2023-06-09**Pre-MBA Module:Organizational Behavior**

An introduction of the fundamental theories and concepts required to manage contemporary organizations. This course focuses on individual behaviors as they relate to the functions of planning, organizing, controlling, and leading. Critical concepts and theories in behavioral science related to the practice of management are presented and discussed to assist the student in developing understanding of the pervasiveness of the discipline in all types of organizations and processes. Topics include motivation, leadership, perceptions, personality theory, team processes and group behavior, and decision making.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture**Same As Offering:** SB 570**Attributes:** Offered Summer Term**Req. Designation:** Technology**SB 570(0)** Course ID:010714 2023-06-09**Pre-MBA Module:Organizational Behavior**

An introduction of the fundamental theories and concepts required to manage contemporary organizations. This course focuses on individual behaviors as they relate to the functions of planning, organizing, controlling, and leading. Critical concepts and theories in behavioral science related to the practice of management are presented and discussed to assist the student in developing understanding of the pervasiveness of the discipline in all types of organizations and processes. Topics include motivation, leadership, perceptions, personality theory, team processes and group behavior, and decision making.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture**Same As Offering:** SB 570**Attributes:** Offered Summer Term**Req. Designation:** Technology**SB 580(0)** Course ID:010715 2018-05-01**Pre-MBA Module:Operations/Production Management**

An introduction to the planning, analysis and control of production systems. Topics include, inventory management models, materials requirements planning, manufacturing process types, supply chain management, lean concepts, and quality management tools including statistical process control.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture**Attributes:** Offered Summer Term**Req. Designation:** Technology**SB 590(0)** Course ID:010716 2023-06-09**Pre-MBA Module:Finance**

A study of the problems associated with the financial management of business organizations. Topics include: a review of time value of money, analysis of capital investments, valuation, capital structure, short and long term financing, and business failure.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture**Same As Offering:** SB 590**Attributes:** Offered Summer Term**Req. Designation:** Technology**SB 590(0)** Course ID:010716 2023-06-09**Pre-MBA Module:Finance**

A study of the problems associated with the financial management of business organizations. Topics include: a review of time value of money, analysis of capital investments, valuation, capital structure, short and long term financing, and business failure.

Prerequisite: graduate standing (admitted to the MBA program).

**Components:** Lecture**Same As Offering:** SB 590**Attributes:** Offered Summer Term**Req. Designation:** Technology

**Business - School of Business - Subject: School of Business****SB 609(2)** Course ID:010718

2023-01-11

**Corporate Ethical Decision Making**

[Cross-listed with SB 610] This course provides a basis for integrating the MBA curriculum, and enable students to develop the ethical awareness and understanding needed to cope with ongoing problems and challenges in corporate and industrial contexts. Students will acquire a basic understanding of moral theories and principles, become familiar with well known case studies, understand the role of business in society (including the influences of various macro-environmental forces, such as technological, social/cultural, political, that influence corporate decision making), and become adept at applying sound ethical reasoning and decision making in their daily professional lives.

Prerequisites: completion of all CUSB MBA foundation requirements and admission to the MBA program.

**Components:** Lecture

**Course Equivalents:** SB 610, HC 681, OS 681, OS 681

**Req. Designation:** Technology

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**Business - CRC Business - Subject: School of Business**

SB 610(3) Course ID:011255

2023-01-11

**Corporate Ethical and Social Responsibility**

[Cross-listed with SB 609] The central goal of the course is to give students an intellectual foundation to frame a wide range of ethical/moral issues/dilemmas facing contemporary business organizations operating within a global environment. As the business environment grows increasingly complex, managers are confronted with important questions that have ethical ramifications. These questions include: Does a company have any obligation to help solve social problems such as poverty, corruption, pollution, unemployment, and income inequality? What are the ethical responsibilities of a multinational corporation operating in foreign countries, especially those characterized as corrupt? What obligation does a manufacturer have to the consumer with respect to product defects and safety? A wide selection of case studies provides students with the opportunity to hone their skills for applying ethical principles and decision making approaches to address complex, 'real-world' business problems within the context of an evolving political, economic,

**Components:** Lecture**Course Equivalents:** SB 609, HC 681, OS 681, OS 681**Attributes:** Offered Fall Term**Req. Designation:** Technology

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**Business - School of Business - Subject: School of Business****SB 611(1.5)**                   **Course ID:009540****2021-02-11****Supply Chain Ethics**

The main goal of this course is to give students an intellectual foundation to analyze and evaluate a variety of ethical issues involved in designing and implementing global supply chain systems. The course equips students with the knowledge and tools for identifying ethical dilemmas, discerning issues, and developing options for resolving those issues in order to build and manage socially and ethically responsible supply chain systems that accomplish triple bottom-line performance. Utilizing case studies, readings, and participants' personal experience, this course will outline and apply various concepts and tools to develop and gain moral insights about ethical dilemmas in supply chain systems (including sourcing/purchasing, customer-supplier relationship management, relational governance, labor relations, and stakeholder management). A wide selection of case studies provide students the opportunity to hone their skills for applying ethical principles and decision making approaches to address complex, "real-world" supply-chain

**Components:**                 Lecture**Attributes:**                 Offered Each Term**Req. Designation:**         Technology**SB 613(3)**                   **Course ID:009542****2015-01-21****Entrepreneurship and New Venture Creation**

In this course, students will execute the 'entrepreneurial process,' a sequence of activities related to the creation of a new business venture. As such, this course is intended for students whose personal and near-term objectives involve entrepreneurship. The major components of the entrepreneurial process include idea creation and opportunity assessment, industry research and analysis, strategic and operational planning, and resource mobilization and implementation. These process components will be discussed and implemented throughout the semester; as such, this course is very experiential in nature. Fulfillment of these activities will include extensive out-of-class research, in-class peer reviews and brainstorming sessions, and the development of formal business plan proposals. Students are required to sign non-disclosure agreements, and may elect to present their finished proposals to a panel of small business executives for review.

Prerequisite: consent of the instructor.

**Components:**                 Lecture**Attributes:**                 Offered Spring Term**Req. Designation:**         Technology

**Business - CRC Business - Subject: School of Business****SB 620(3)****Course ID:013075****2020-12-11****Business Process Analysis**

This course introduces the fundamentals of business process analysis and its role in driving efficient and innovative organizations. Students examine business process mapping, workflow, change initiatives, process improvements with particular emphasis on effective change initiatives, and adoption of IT solutions that solve specific business needs.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Admission to the MGMTD-MBA program**Req. Designation:** Technology**SB 640(3)****Course ID:012005****2017-07-14****Advanced Topics in Supply Chain Management: Simulation & Analysis**

[Cross-listed with SB 641] This course provides a theoretical and analytical framework for managing critical supply chain components. Topics include revenue management, dynamic pricing, supply chain risk and disruption management, supply chain agility and flexibility, supply chain network design under uncertainty, and supply chain contracts. Hands-on simulation provides an opportunity to gain experience dealing with complex strategic and tactical global supply chain issues.

**Components:** Lecture**Course Equivalents:** SB 641**Attributes:** Offered Fall Term**Req. Designation:** Technology

**Business - School of Business - Subject: School of Business****SB 641(3)** Course ID:011064 2015-03-05**Advanced Topics in Supply Chain Management: Simulation & Analysis**

[Cross-listed with SB 640] This course provides a theoretical and analytical framework for managing critical supply chain components. Topics include revenue management, dynamic pricing, supply chain risk and disruption management, supply chain agility and flexibility, supply chain network design under uncertainty, and supply chain contracts. Hands-on simulation provides an opportunity to gain experience dealing with complex strategic and tactical global supply chain issues.

Prerequisite: OM606 or OM607.

**Components:** Lecture**Course Equivalents:** SB 640**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Business - CRC Business - Subject: School of Business****SB 651(3)****Course ID:012564****2018-08-22****Communicating Globally**

[Formerly MBA 651] An increasingly global marketplace affords organizations all over the globe the opportunity to conduct business and distribute goods and services to new customer bases with unique needs and interests. At the same time, globalization presents company leaders, corporate communicators, and organizational gatekeepers with the challenges inherent in intercultural communication. The course: "Communicating Globally" introduces a way of thinking that enables students to acquire cultural competence and function effectively in diverse cultural situations. It presents essential concepts of corporate and national cultures and examines key differences in communication, decision making styles, and pattern of interactions in multi-cultural teams and cross-cultural negotiations - laying the foundation for necessary behavioral adaptations. The course begins with a discussion of the major facets of international business with the cultural aspect presented as the most challenging dimension. Students discover the reasons that cultures

**Components:** Lecture**Same As Offering:** SB 651**Req. Designation:** Technology**SB 651(3)****Course ID:012564****2018-08-22****Communicating Globally**

[Formerly MBA 651] An increasingly global marketplace affords organizations all over the globe the opportunity to conduct business and distribute goods and services to new customer bases with unique needs and interests. At the same time, globalization presents company leaders, corporate communicators, and organizational gatekeepers with the challenges inherent in intercultural communication. The course: "Communicating Globally" introduces a way of thinking that enables students to acquire cultural competence and function effectively in diverse cultural situations. It presents essential concepts of corporate and national cultures and examines key differences in communication, decision making styles, and pattern of interactions in multi-cultural teams and cross-cultural negotiations - laying the foundation for necessary behavioral adaptations. The course begins with a discussion of the major facets of international business with the cultural aspect presented as the most challenging dimension. Students discover the reasons that cultures

**Components:** Lecture**Same As Offering:** SB 651**Req. Designation:** Technology

**Business - School of Business - Subject: School of Business****SB 655(3)** Course ID:013164

2022-04-13

**Building and Managing Effective Teams**

In today's global workforce and "gig economy," it is imperative that managers continually identify, organize, lead and assess the "intellectual capital" available for either short or long-term team commitments. The skillset needed to lead teams varies, depending upon organizational strengths and weaknesses. However, specific and agreed upon management behaviors assist managers in leading today's diversified teams toward attaining - and exceeding - corporate goals. This course provides an examination of several important management KSA's (Knowledge, Skills, and Abilities) for those responsible for team development and direction.

**Components:** Lecture**Attributes:** Offered Summer Term**Requirement Group:** Prerequisite: Admission to the MBA Program**Req. Designation:** Technology**SB 658(3)** Course ID:012849

2017-10-25

**Bridging the Innovation Gap**

"Bridging the Innovation Gap" is an MBA course for the Innovation and New Venture track. The "innovation gap" refers to the hard-to-navigate space between invention and innovation/commercialization. The course examines successful and unsuccessful "bridging the gap" practices across a range of industries, including communicating and translating inventions to diverse stakeholders, engaging stakeholders, gaining commitment, resourcing, and managing gaps over time and across different settings (e.g., solo startups, not-for-profits, and corporate environments). Students will become more adept at managing the various stakeholders and processes within a given invention-innovation space, and at choosing between bridging strategies for different settings. The course uses a studio-based, make-to-learn pedagogy, where learning happens through creative experimentation with live problems.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Business - CRC Business - Subject: School of Business****SB 662(3)****Course ID:012571****2016-07-25****International Business**

[Formerly MBA 662] This course examines international business management as influenced by the important economic, political and cultural environment within which businesses must conduct international trade and investment. The problems and issues confronting international managers are evaluated related to a firm's strategy, organizational structure, manufacturing, material management, marketing, R&D, human resources and finance. Competitive strategies are examined that have been successful in leading international companies. Case studies are used extensively to illustrate the relevance of these topics in the practice of international business.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology**SB 664(3)****Course ID:012572****2018-12-06****Entrepreneurship**

[Formerly MBA 664] The primary objective of this course is to develop an awareness of the process of new venture creation, whether it is an intrapreneurial or entrepreneurial event. The skills, knowledge and attitudes important for creating new ventures, and the complex tasks faced by individuals who start and manage new and growing businesses as well as corporate ventures and franchises will be addressed. The course is designed to provide a broad overview of management and financial issues. We will pay particular attention to: entrepreneurial decision-making, techniques entrepreneurs and investors use for evaluating and testing the feasibility of business opportunities, understanding the impact of market and industry forces on start up, performance and survival of new ventures, financing a business opportunity, etc.

**Components:** Lecture**Same As Offering:** SB 664**Attributes:** Offered Fall Term**Req. Designation:** Technology**SB 664(3)****Course ID:012572****2018-12-06****Entrepreneurship**

[Formerly MBA 664] The primary objective of this course is to develop an awareness of the process of new venture creation, whether it is an intrapreneurial or entrepreneurial event. The skills, knowledge and attitudes important for creating new ventures, and the complex tasks faced by individuals who start and manage new and growing businesses as well as corporate ventures and franchises will be addressed. The course is designed to provide a broad overview of management and financial issues. We will pay particular attention to: entrepreneurial decision-making, techniques entrepreneurs and investors use for evaluating and testing the feasibility of business opportunities, understanding the impact of market and industry forces on start up, performance and survival of new ventures, financing a business opportunity, etc.

**Components:** Lecture**Same As Offering:** SB 664**Attributes:** Offered Fall Term**Req. Designation:** Technology**SB 668(3)****Course ID:012575****2016-07-25****MBA Global Study**

[Formerly MBA 668] This course includes intensive study of issues in a country or region outside of the United States followed by a one-to-two-week trip abroad to that location. Each section, centered on a unifying theme and geographic location, will include these components: case studies and research work prior to and following the trip, practitioner presentations, in-country university lectures and visits to companies, governmental agencies, and important cultural sites. Students successfully completing this course will gain a better perspective on the economic, political, cultural issues as well as the business practices prevalent in another region of the world. Students should develop cultural awareness, an understanding of economic, cultural, and political differences between the US and other countries, and the role cultural, historical and political factors play in the conduct of business in a global economy.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

**Business - CRC Business - Subject: School of Business**

SB 674(3) Course ID:012578

2016-07-01

**Growing an Entrepreneurial Business**

[Formerly MBA 674] This course will focus on the challenges in growing a small to medium size business. The issues facing an entrepreneur when starting a new venture are very different than those he/she faces when growing an existing company or business. The course focuses on the unique issues an entrepreneurial leader faces as he/she looks to grow and scale their business. We will discuss and analyze the issues surrounding effectively scaling a business, and the impact that various decisions and initiatives have on the chance of success. How issues such as strategic marketing, team building and top-grading, financing, partnerships and leadership impact the growing business will be presented and discussed from the perspective of the business leader or entrepreneur. The course will include case studies, lectures, guest speakers, and discussions.

**Components:** Lecture**Req. Designation:** Technology

**Graduate Interdisciplinary - School of Business - Subject: School of Business**

SB 678(3)

Course ID:012850

2017-10-25

**Inventive Practices**

This interdisciplinary graduate course focuses on 1) the practices of exemplary inventors around the world, 2) students' current invention practices, and 3) considers how student practices might be improved via applied, in-course projects and the use of exemplary inventor's practices. Students will gain a fine-grained understanding of the strengths and weaknesses of their invention practices, acquire new invention tools, and improve their abilities to inventively tackle and reframe difficult problems across a variety of disciplines. The course is deliberately open to graduate students throughout CU, particularly Master of Science and PhD students.

**Components:** Lecture**Attributes:** Offered Spring Term**Req. Designation:** Technology

**Business - School of Business - Subject: School of Business**

**SB 681(3)**                   **Course ID:011983**                   **2015-01-21**

**Logistics Strategies**

This course will examine effective strategies to manage forward and reverse flow of goods in a supply chain. Students will develop the skills to perform logistical functions within an organization, as well as assess and design the overall logistics strategy of the organization. Primary topics covered include management and design of integrated logistics networks, supply chain distribution management, coordinating strategic alliances with distributive intermediaries, warehousing, transportation, international logistics and the current trends and impact of technology on contemporary supply chain channels. Case studies, articles, numerical assignments, and simulation exercises may be utilized.

**Components:**              Lecture

**Attributes:**                Offered Spring Term

**Req. Designation:**        Technology

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**SB 682(3)**                   **Course ID:013080**                   **2021-01-15**

**Logistics Strategies**

Never in the history of business, customers have found it easier to order and suppliers have found it more difficult to fulfill the order than it is today. Logistics management aims to address this critical challenge in supply chains. Specifically, it concerns with cost-effective storage and movement of goods and information. Although logistics is one of the oldest commercial activity, today, it faces numerous challenges due to continuous changes in the market and technology. Effective and efficient planning, organizing, and execution of logistic activities involve appropriate material and information flows through a vast network of warehouses, transportation fleet and routes.

This course covers strategic, tactical, and operational aspects of logistics planning and execution. The topics aim to impart decision-making skills with respect to multiple logistical operations that impact the

**Components:**              Lecture

**Req. Designation:**        Technology

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**SB 684(3)**                   **Course ID:012765**                   **2016-10-18**

**Venture Capital and Private Equity**

The course will focus on the venture capital and private equity industries. The course will introduce students to the concepts of private equity and its various forms with a focus on venture capital. The course will explore the impact of Venture Capital and Private Equity on the US and global economy. The course will also cover the corporate and organizational structures, decision making processes, and the transactions common in the Venture Capital and Private Equity industry. The course will have examples of investment criteria, term sheets, due diligence, and investment agreements taking into account both the investor and the entrepreneurs.

**Components:**              Lecture

**Attributes:**                Given When Needed

**Req. Designation:**        Technology

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**SB 687(1 - 3)**                   **Course ID:009543**                   **2018-03-07**                   **Instructor Consent Required**

**Special Graduate Topics**

An investigation of a problem undertaken by the student which is acceptable to and under the guidance of the faculty member and chairperson. The course provides an opportunity for the student to investigate and analyze a problem in depth on an independent study basis.

Requirement: Instructor and Program Chair permission

**Components:**              Independent Study

**Same As Offering:**        SB 687

**Attributes:**                Given When Needed

**Req. Designation:**        Technology

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**Business - CRC Business - Subject: School of Business****SB 687(1 - 3)****Special Graduate Topics**

An investigation of a problem undertaken by the student which is acceptable to and under the guidance of the faculty member and chairperson. The course provides an opportunity for the student to investigate and analyze a problem in depth on an independent study basis.

Requirement: Instructor and Program Chair permission

**Components:** Independent Study

**Same As Offering:** SB 687

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Business - School of Business - Subject: School of Business**

SB 690(6) Course ID:013022

2019-11-01

**Business Analytics Capstone Project**

This course is a capstone project for students who have completed a foundation business analytics education. The purpose of this course is to prepare students for a career in the quantitative analysis by developing their ability to solve complex analytical business problems in real-world settings. Primarily designed for the Master of Science in Business Analytics (MSBA) program, this course provides students with an experience that allows them to demonstrate the application of the business knowledge aimed at addressing a data-driven decision-making problem in students' chosen disciplines. This class requires both written reports and oral presentations.

**Components:** Independent Study

**Attributes:** Offered Fall and Summer

**Requirement Group:** Prerequisites: AC620, FN610, MK630, and OM620

**Req. Designation:** Technology

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SB 691(6) Course ID:013021

2019-11-01

**Business Analytics Thesis**

This course is required for the Master of Science degree in Business Analytics (MSBA), as an alternative to the capstone project. The purpose of this course is to complete a research project in students' chosen disciplines, culminating their experiences in the MSBA Program and validating them as master practitioners. This course requires individual effort that is overseen by the course instructor, the Thesis Advisor. Weekly or bi-weekly meetings will be held to discuss progress and review submitted documents. Based upon the thesis proposal and with the approval of the Thesis Committee, students should undertake the writing of the thesis, which involves the literature review, data collection and analysis, result compilation and iterative thesis chapter revisions before the document is ready for submission to the Thesis Committee. With the approval of the Thesis Committee, a defense of the thesis will be held. Following successful completion of the Defense, the manuscript is revised a final time and once approved, can be submitted officially.

**Components:** Thesis Research

**Attributes:** Offered Fall and Summer

**Requirement Group:** Prerequisites: AC620, FN610, MK630, and OM620

**Req. Designation:** Technology

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SB 693(3) Course ID:009547

2017-03-28

**Seminar in International Business I**

This course includes intensive study of business that represents an international experience for the students followed by a two-week trip to the area of study. Each section, centered on a unifying theme and geographic location, will include three components: structured classes, practitioner presentations, and visits to companies, governmental agencies, and important cultural sites. Students successfully completing this course will gain an understanding of the economic, political, cultural issues as well as the business practices prevalent in a region of the world that is foreign to them.

**Components:** Seminar

**Attributes:** Given When Needed

**Req. Designation:** Technology

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SB 696(3) Course ID:009550

2015-08-19

**Global Business Strategies**

This course attempts to familiarize and sensitize students to current issues and practices relating to the globalization of markets. Topics include global manufacturing and international competitiveness, international marketing, international finance and international management strategies. The case study approach is used to introduce a diversity of perspectives into the classroom. This course is team-taught by faculty from the Production/Operations Management, Marketing, Finance and Organizational Studies areas.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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SB 999(1 - 10) Course ID:011188

2015-01-19

**Special Graduate Topics**

A graduate level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Lecture

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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School of Arts and Sciences - School of Science - Subject: School of Science

SC 1(2 - 4) Course ID:009551 2015-01-19

SC Elective

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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SC 2(2 - 4) Course ID:009552 2015-01-19

SC Elective

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

This course may be used to satisfy a Science Foundation Curriculum Requirement.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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**Institute for STEM Education - Inst for STEM Education - Subject: School of Science**

SC 31(2.5) Course ID:012943

2022-05-23

**Introduction to STEM**

How do scientists and engineers think as they approach a problem? Biologists, chemists and physicists have unique approaches to problems in their respective fields and classes. Introduction to STEM provides students the basic skills and concepts they need to succeed in their first year science courses. The class is composed of three modules of Biology, Chemistry and Physics led by first year faculty in the sciences. Intended for HEOP SPREE students. Check with major department to determine whether credits count toward graduation.

**Components:** Lecture**Attributes:** Offered Summer Term**Req. Designation:** Technology

**Science - School of Science - Subject: School of Science**

SC 110(4) Course ID:011456 2015-01-19

**Environmental Science Elective with a Lab**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 4 or 5 on the AP Environmental Science Exam or 2) satisfactory completion of an approved college-level introductory environmental science course with a laboratory component. Biology, Bimolecular Science, and Environmental Science (EHS and ES&P) majors may not use credit for SC110 as one of their required biology or professional science electives.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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**School of Arts and Sciences - School of Science - Subject: School of Science**

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**SC 141(4)**                   **Course ID:011632**                   **2015-01-19**

**Introduction to Physics I**

College-level non-calculus based physics course with lab that covers topics in mechanics. Transfer credit for this course is awarded only in the following cases: 1) receipt of a score of 4 or 5 on the AP Physics B Exam, 2) receipt of a score of 5, 6, or 7 on the International Baccalaureate Physics Higher-Level Examination, or 3) satisfactory completion of an approved college-level non-calculus based physics course.

**Components:**              Lecture

**Attributes:**              Transfer Credit Only

**Req. Designation:**      Technology

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**SC 142(4)**                   **Course ID:011633**                   **2015-01-19**

**Intro to Physics II**

College-level non-calculus based physics course with lab that covers topics in electricity, magnetism, heat, and/or optics. Transfer credit for this course is awarded only in the following cases: 1) receipt of a score of 5 on the AP Physics B Exam, 2) receipt of a score of 7 on the International Baccalaureate Physics Higher-Level Examination, or 3) satisfactory completion of an approved college-level non-calculus based physics course.

**Components:**              Lecture

**Attributes:**              Transfer Credit Only

**Req. Designation:**      Technology

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**School of Arts and Sciences - Civil & Environmental Eng - Subject: School of Science****SC 301(3) Course ID:011428 2020-08-18****Introduction to Geospatial Analysis and Geographic Information Systems**

[Cross-listed with CE 301] An introductory course in the concepts and uses of Geographic Information Systems (GIS) including analysis of GIS-based local and global geographic datasets. Provides basic knowledge of GIS theory and applications using existing state-of-the-art GIS software and current spatial data resources. Applications include: overlay analysis, spatial data query, map generation and terrain surface analysis. Students will also learn the basics of GPS data collection, remote sensing, 3D visualization, probability, statistics, and error analysis.

**Components:** Laboratory, Lecture**Course Equivalents:** CE 301**Attributes:** Offered Each Term**Req. Designation:** Technology

**Engineering - Civil & Environmental Eng - Subject: School of Science**

SC 502(3) Course ID:013049 2022-06-06

**Applications in Geospatial Analytics, Science, and Engineering**

[Cross-listed with CE 502, EV 502] This course will use techniques in geospatial analytics, science, and engineering to address applied challenges in various contextual situations. Geotagging, network analysis, spatial visualization, geospatial data manipulation, cartographic presentations, and other similar methods will be studied and applied to real-world or research applications. Students will develop a set of tools that enable completion of projects in the major field using geospatial capabilities.

Prerequisites: Graduate standing, CE 301, or consent of the instructor

**Components:** Laboratory, Lecture

**Course Equivalents:** CE 502, EV 502

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**School of Arts and Sciences - CRC Education Program - Subject: School of Science**

SC 575(3) Course ID:012834

2021-10-08

**Science Demonstrations**

Science is more than just a body of knowledge, it is way of thinking and a process to be experienced. Students best learn science by engaging in its practices as they investigate observable phenomena. They must also think deeply about the concepts that cross science disciplines in order to explain those phenomena. This is the premise of the Next Generation Science Standards and the New York State Science Learning Standards modeled from them. Yet many traditional secondary science courses focus mainly on the topics or core ideas without adequately addressing the other dimensions of the course. The design of this 3-credit course is to meet the needs of students currently conducting their internship or anticipating an internship as they prepare to teach three dimensionally. Students will research publications and internet sites in order to compile a usable resource binder of activities that promote a deep understanding of science for themselves and for their adolescent students. The activities they investigate will relate to all conceptual

**Components:** Seminar

**Attributes:** Offered Spring Term

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: Social Documentation**

SD 200(3) Course ID:011481 2015-03-05

**History of Social Documentation**

This course will survey the history and ethics of photographic and time-based media in the representation of factual material commonly described as documentary media. From the earliest photographs of battles and other spectacles of the 19th century to the first documentary films of differing cultures of the early 20th century through the socially-charged and the propagandistic photography and films of the Soviet Union, the US Depression, and World War II and onto the networked and interactive social documentaries of today's new media, this course will attempt to define the ever-moving boundaries of terms such as reality, nonfiction, documentary, and social action. Students will study the history of documentary media across cultures, view and analyze notable examples, do research on particular types and movements, present their findings to the class and develop documents that help explain the new, digitally-mediated documentaries.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course,  
Offered Odd Springs**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Social Documentation**

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**SD 332(4) Course ID:012900 2018-10-22 Instructor Consent Required****Documenting Social Activism**

The course explores social movements in Untied States after World War II and allows students to describe and interpret the complex nature of cultures and societies in historical context. The movements will focus on issues of racial civil rights, workers' rights, the women's movement, the gay rights movement, the American Indian Movement and the Students' Movements. Ranging from 1945 until the present day the course illustrates the process of social, cultural, and geopolitical change over time. This is a team taught course in which students will be required to create a documentary film. Therefore students will split their time between history lectures, seminar style discussion and documentary film production. The course has 3 hours of class and 3 hours of lab per week, and students should expect to do extensive out-of-class work. Limit of 20 students. Permission of one of the instructors required.

**Components:** Lecture**Attributes:** One communication unit, Cultures and Societies, Imaginative Arts, University Course, Given When Needed**Req. Designation:** Technology

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**SD 480(3) Course ID:011514 2015-02-09 Instructor Consent Required****Major Research Seminar**

Student will confer with the client to pick a topic and direction for her/his research, and coordinate this with the instructors for SD 480 and SD 490; students will do research and complete bibliographic assignments, working with both the instructor and client; each will produce a written proposal beginning with a review of research, and then outlining the project's theoretical perspective and rhetorical strategy, concluding with an outline of how this project will translate into images (if relevant) as well as words; produce a practical plan of action for the project and present it to both client and instructor; and present the developing project in a professional context to faculty and majors from both departments.

**Components:** Seminar**Attributes:** Two communication units, Offered Each Term**Requirement Group:** Prerequisites: Must be a social documentation major, and at least junior standing**Req. Designation:** Technology

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**SD 490(3) Course ID:011677 2015-02-09 Department Consent Required****Major Research Project**

Using the proposal and plan of action developed in SD 480, student will work with her/his client and the course instructor to complete the project. As part of this process, student will document her/his ongoing work to keep both client and instructor informed of her/his progress, filing periodic reports and drafts of the project as required by the instructor . The semester should conclude with a presentation of the completed project to the client and to the instructor.

**Components:** Independent Study**Attributes:** Two communication units, Offered Each Term**Req. Designation:** Technology

Other - Student Affairs - Subject: Semester in Industry**SI 300(1 - 9)** Course ID:010530 2018-01-16 Instructor Consent Required**Professional Internship**

Practical, hands-on experience that focuses on an area directly related to the student's field of study, the internship course is an integral part of the curriculum. The student must develop all details for the internship under the supervision of the instructor and within the established course objectives; the latter will include a project that carries the course credit and is due after completion of the internship.

Prerequisites: Permission from the course instructor/student's academic advisor, the Career Center, and the International Student Advisor (if applicable.)

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

**SI 333(0)** Course ID:011665 2015-05-05 Department Consent Required**Research for International Students**

Practical, hands-on experience that focuses on an area directly related to the student's field of study. The student must develop all details for the research under the supervision of the instructor. Consent by the International Education Office is required.

Components: Independent Study

Course Equivalents: SI 533

Req. Designation: Technology

**SI 500(1 - 9)** Course ID:010531 2018-01-16 Instructor Consent Required**Professional Internship**

Practical, hands-on experience that focuses on an area directly related to the student's field of study, the internship course is an integral part of the curriculum. The student must develop all details for the internship under the supervision of the instructor and within the established course objectives; the latter will include a project that carries the course credit and is due after completion of the internship.

Prerequisites: Permission from the course instructor/student's academic advisor, the Career Center, and the International Student Advisor (if applicable.)

Components: Independent Study

Attributes: Given When Needed

Req. Designation: Technology

**SI 533(0)** Course ID:011666 2014-11-20 Department Consent Required**Research for International Students**

Practical, hands-on experience that focuses on an area directly related to the student's field of study. The student must develop all details for the research under the supervision of the instructor. Consent by the International Education Office is required.

Components: Independent Study

Course Equivalents: SI 333

Req. Designation: Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Sociology**

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SOC 1(2 - 4) Course ID:010822 2015-01-19

**SOC Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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SOC 2(2 - 4) Course ID:010818 2015-01-19

**SOC Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy a Humanities or Social Science Foundation Curriculum Requirement, depending on the specific designator.

Components: Independent Study

Attributes: Transfer Credit Only

Req. Designation: Technology

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SOC 201(3) Course ID:011801 2016-09-12

**Introduction to Society**

This course is intended to introduce students to the basic principles, concepts, and perspectives used as 'tools' in sociology to develop a more scientific approach to understanding human society. Major theoretical perspectives and concepts are presented, including sociological imagination, culture, social inequality, social change, and social structure. Students also explore the influence of social class and social institutions, such as churches, education, healthcare, government, economy, and environment. The family as a social structure is also examined. Students will investigate the origin and design of political, economic and social institutions, such as religion, the family, class and caste, education, urban and rural life styles, values, norms, roles, and sociocultural change. Students will learn to analyze, evaluate and critique social structures.

Components: Lecture

Attributes: Cultures and Societies, Individual and Group Behavior, University Course, Offered Fall and Spring

Req. Designation: Technology

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SOC 210(3) Course ID:012833 2022-02-11

**Sociology of the Family**

This course will provide an opportunity to look at something familiar (the family) in a new way. We will focus on the family as a social institution—a set of structured social arrangements for meeting certain human needs—and we will examine the larger social forces that shape those structures. We will use a comparative approach to families, emphasizing their diversity both across time and space and within present-day U.S. society—paying particular attention to how social inequality shapes family experiences. By the end of the semester, you should be able to place your own personal experience of families in a larger social, cultural, and historical context.

STUDENT LEARNING OUTCOMES: 1. Understand the causes of social inequities in family experiences. Students will learn how systems of privilege organized around gender, race, class, and sexual orientation structure family life. 2. Think critically about how family shapes social life at both individual and structural levels. 3.

Components: Lecture

Attributes: One communication unit, Individual and Group Behavior, Offered Even Springs

Req. Designation: Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: Sociology**

SOC 230(3) Course ID:010084 2022-02-11

**Introduction to Race and Ethnicity**

[Cross-Listed with ANTH230] Variations in phenotype--skin color--have always existed, but has 'race'? What are the bases of racial identity in the contemporary United States? How have they changed? How are 'race' and 'ethnicity' related? In this course we will address broader questions about race by focusing on contemporary racial and ethnic divisions and by examining the history of these concepts in the Western Hemisphere.

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Sociology**

SOC 310(3) Course ID:011755 2022-02-11

**Women and Religion**

This course will examine the position of women in the major religious traditions of the world, with a special concentration on Christianity. Historically and cross-culturally women have largely been relegated to the status of the profane and passive other in the domain of the religious. This religious alienation has profound implications not only for the spiritual lives of women but for the personal, social, political, and economic aspects of their existence as well. This course will explore andocentric patterns of domination as they are grounded in and legitimated by religious systems of meaning. We will also explore transformative alternatives that exist within the worlds' religious traditions themselves in an effort to identify sources of empowerment, mutuality and justice for women and men.

**Components:** Lecture**Attributes:** One communication unit, Contemporary and Global Issues, Cultures and Societies, University Course, Offered Odd Falls**Req. Designation:** Technology

SOC 320(3) Course ID:012839 2022-02-11

**Medical Sociology**

This course provides an introduction to the sociological study of health and the institution of medicine. This includes exploring questions such as: How is social inequality connected to our health? Is healthcare enough to remedy any health inequalities that might exist? Why is it that so many things are being classified as diseases these days, when we used to just think of them as eccentricities? Nowadays, people often think of themselves as customers as well as patients- how is this change related to broader social changes about the role of medicine? Through this course, you will develop a strong understanding of the contributions that sociology has made to the study of health and illness, as well as a mature perspective on many of our society's pressing health issues.

NOTE: SOC201 (intro to society) or pre-health focus are recommended, but not required.

**Components:** Lecture**Attributes:** One communication unit, Individual and Group Behavior, Given When Needed**Req. Designation:** Technology

SOC 330(3) Course ID:011414 2022-02-11

**Health, Wealth, Inequality and the Environment**

[Cross-listed with SOC530/EV530] This course will examine how social inequality impacts the relationship of people to their environment and how it affects their physical well being. We will look at how social and political structures perpetuate conditions of injustice for low-income communities and communities of color. One emphasis of this course will be on how social inequality impacts environmental factors involved in transmission of communicable diseases and hazards due to exposure to chemical and physical materials in our environment. We will examine sociological and public health literature pertaining to environmental health on a global level and also address public policies that may affect health and environmental justice.

**Components:** Lecture**Course Equivalents:** SOC 530**Attributes:** One communication unit, Contemporary and Global Issues, Science, Technology and Society, University Course, Offered Odd Springs**Req. Designation:** Technology

SOC 335(3) Course ID:012989 2019-10-24

**Poverty in the Modern USA**

This discussion based course provides an introductory sociological examination of the issue of poverty as it appears in present day America. Reading both popular trade books and peer reviewed research, you will develop a deep intersectional understanding of both the causes and consequences of living below "the line."

Prerequisites: SOC201 recommended but not required.

**Components:** Lecture**Attributes:** One communication unit, Individual and Group Behavior, Given When Needed**Req. Designation:** Technology

SOC 340(3) Course ID:013055 2022-02-11

**Global Advocacy for Women's Sexual Reproductive Health & Rights**

[Cross Listed as SOC540] Women are not waiting to be saved or 'given their rights.' They act on their own behalf, and advocate for others. In many cases, women-led movement. Victory is denied, delayed, or arrives disguised in unexpected packages. This course will examine advocacy for women's sexual and reproductive health and rights (SRHR). Students will identify, design and implement an advocacy project to address an SRHR concern on campus. Project outcomes will be presented in class.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: Sociology**

**SOC 351(3)** Course ID:011222 2020-09-22

**Globalization**

[Cross-listed with POL 351] [Formerly LP371] This seminar style class addresses the economic, political and social change collectively referred to as 'globalization.' The concept of globalization will be analyzed from a number of perspectives. Macro-level changes are addressed as are local adaptation strategies of individuals, communities and organized groups. Special attention is paid to the role of institutions, such as corporations, national and subnational governments and non-governmental and multilateral organizations, in the globalization process. The class will work through and discuss books critical of, and sympathetic to, the globalization process.

**Components:** Lecture

**Course Equivalents:** POL 351

**Attributes:** One communication unit, Contemporary and Global Issues, Given When Needed

**Req. Designation:** Technology

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**SOC 490(1 - 10)** Course ID:010745 2015-02-09 Department Consent Required

**Independent Study**

Designed primarily for an advanced student who wishes to pursue special interests in sociology for one or more semesters, this series allows students to design and conduct independent study projects under faculty guidance.

Prerequisite: consent of the instructor.

**Components:** Independent Study

**Attributes:** Offered Each Term

**Req. Designation:** Technology

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**SOC 498(1 - 3)** Course ID:010761 2020-01-15

**Undergraduate TA**

A student assists a faculty member in teaching a course. The student engages in substantial pedagogical work beyond mastery of the course material. Such activities may include mentoring students in course work, leading class discussions, designing and presenting course modules, etc. The primary objective is for the students to work with a faculty member to learn and practice pedagogical approaches in the discipline.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**SOC 530(3)** Course ID:011857 2020-01-15

**Health, Wealth, Inequality and the Environment**

[Cross-listed with SOC330/EV530] This course will examine how social inequality impacts the relationship of people to their environment and how it affects their physical well being. We will look at how social and political structures perpetuate conditions of injustice for low-income communities and communities of color. One emphasis of this course will be on how social inequality impacts environmental factors involved in transmission of communicable diseases and hazards due to exposure to chemical and physical materials in our environment. We will examine sociological and public health literature pertaining to environmental health on a global level and also address public policies that may affect health and environmental justice. Graduate students will have additional work as stated on syllabus.

**Components:** Lecture

**Course Equivalents:** SOC 330

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Spanish Language**

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SPN 580(3) Course ID:012695 2021-10-08

**MAT Project in Spanish (Content Area)**

The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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SPN 988(3) Course ID:012702 2017-07-01

**Independent Study in Spanish**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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SPN 989(3) Course ID:012703 2017-07-01

**Independent Study in Spanish**

A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program.

**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Social Sciences**

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SS 1(1 - 9) Course ID:010087 2015-03-09

**Social Science Elective**

For transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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SS 2(1 - 9) Course ID:010088 2015-03-09

**Social Science Elective**

For transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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SS 4(1 - 9) Course ID:012944 2019-05-17

**Social Science Elective**

For transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

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SS 6(1 - 9) Course ID:012945 2019-05-17

**Social Science Elective**

For transfer credit only.

Components: Lecture

Attributes: Transfer Credit Only

Req. Designation: Technology

**Liberal Arts - Humanities & Social Sciences - Subject: Social Sciences**

SS 220(3) Course ID:011259 2022-02-11

**Introduction to Gender**

This introductory course examines how being male or female translates into the social relationships of gender. It explores the ways gender roles, identities and institutions are constructed in relation to race, ethnicity, class, and sexuality. This course provides a general introduction to the wide array of historical, cultural, social, political, economic, and philosophical topics usually included within the boundaries of gender studies.

Instructors for this course come from various disciplinary backgrounds. Course content will vary among the sections as instructors draw on their diverse disciplinary backgrounds in order to instruct students in critical thought, intellectual empathy and global perspectives.

**Components:** Lecture

**Attributes:** One communication unit, Contemporary and Global Issues, Individual and Group Behavior, University Course, Given When Needed

**Req. Designation:** Technology

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SS 221(3) Course ID:011797 2022-02-11

**Introduction to Sexuality**

This introductory course examines how sexuality is constructed from a social perspective. It explores the ways sex acts, sexual roles, identities, relationships and institutions are constructed in relation to race, ethnicity, class, and sexuality. This course provides a general introduction to the wide array of historical, cultural, social, political, economic, and philosophical topics usually included within the boundaries of sexuality studies. Students will learn how the study of sexual intercourse and sexuality differ among disciplines and how the interdisciplinary approach differs from a singular disciplinary focus.

**Components:** Lecture

**Attributes:** One communication unit, Cultures and Societies, Individual and Group Behavior, University Course, Given When Needed

**Req. Designation:** Technology

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**Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: Social Sciences**

SS 320(3)

Course ID:011946

2022-03-17

Instructor Consent Required

**Social and Political Issues in the Adirondacks**

[Cross-listed with EV 320] The historical, social, political, and environmental factors contributing to the fabric of the Adirondack Park is an evolving social experiment. The course readings will focus upon the New York State constitutional provisions that engendered the park, the policies that shaped the park, along with the political actions that influence the park today. The Adirondack State Park is extraordinary for its history and because it is a place where human residents live and recreate in sustainable ways that conserve resources and 'forever wild' regions of the park.

Enrollment is limited to those students participating in the Adirondack Semester Program.

**Components:** Lecture

**Course Equivalents:** EV 320

**Attributes:** Two communication units, Cultures and Societies, Given When Needed

**Req. Designation:** Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: Social Sciences**

SS 380(3)

Course ID:011386

2014-11-20

**Research Methods**

This course provides an introductory survey of social science research methods. The course covers a variety of quantitative and qualitative methods. Course topics include sampling strategies, use of basic population statistics, testing differences between groups, conducting in-depth interviews and participate and non-participant observation. Students will understand different approaches to conducting research in the social sciences and which approaches to utilize to maximize the effectiveness and accuracy of social inquiry.

**Components:** Lecture**Course Equivalents:** SS 580**Req. Designation:** Technology

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**School of Arts and Sciences - Humanities & Social Sciences - Subject: Social Sciences**

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SS 490(1 - 10) Course ID:011226 2015-02-09 Department Consent Required

**Independent Study**

Designed primarily for an advanced student who wishes to pursue special interests in social sciences for one or more semesters, this series allows students to design and conduct independent study projects under faculty guidance.

Prerequisite: consent of the instructor.

Components: Independent Study

Attributes: Offered Each Term

Req. Designation: Technology

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SS 499(0) Course ID:011228 2008-09-23

**Minor Portfolio**

In this course, students complete their Liberal Arts Minor Portfolios under the direction of their minor advisor. The course is graded on a Pass-No Entry Basis

Components: Independent Study

Req. Designation: Technology

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SS 580(3) Course ID:011925 2014-11-20

**Graduate Research Methods in the Social Sciences**

In addition to all of the requirements of SS 380, graduate students will engage in additional readings and techniques determined by the instructor to enrich the specific research agenda and/or project of those students. These materials may include survey design, additional statistical training for Stata or other software packages, embedded approaches for mixed method design, implementation of semi-structured interviews, etc.

Components: Lecture

Course Equivalents: SS 380

Req. Designation: Technology

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**School of Arts and Sciences - Mathematics - Subject: Statistics and Probability**


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STAT 1(2 - 4) Course ID:011885 2015-01-19

**STAT Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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STAT 2(2 - 4) Course ID:012751 2017-03-23

**STAT Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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STAT 282(3) Course ID:008747 2017-01-11

**General Statistics**

(May be used to satisfy a CUSB MBA or MS foundation requirement.) Introduction to statistical methodology. Topics include descriptive statistics, probability distributions, use of computer packages for statistical data analysis, point and interval estimation, hypothesis testing, two-sample tests, comparisons, measuring and testing association, correlation, regression, and analysis of variance (ANOVA). Emphasis on applications to life sciences, social sciences, business.

**Components:** Discussion, Lecture

**Attributes:** Offered Each Term

**Requirement Group:** Restriction: Not open to mathematics, applied math and statistics, or computer science majors; not open

**Req. Designation:** Technology

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STAT 301(3 - 4) Course ID:012832 2017-09-28

**Statistics Elective**

An upper-division statistics or probability course for which there is no comparable Clarkson course. Used for transfer credit only. This course may be used to satisfy the requirements of the Mathematics or Applied Mathematics and Statistics major or the Statistics minor.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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STAT 318(4) Course ID:011398 2015-03-05

**Biostatistics**

[Cross-listed with BY 318] This course introduces students to descriptive statistics, fundamentals of probability, probability distributions, and methods of statistical inference. Topics include correlation, regression, Bayes theorem, estimation, hypothesis testing, nonparametric methods, and categorical data analysis. A required 2 hour lab practicum will enable students to apply statistical concepts and analytical methods to data from a wide range of biology-related fields, such as ecology, evolution, environmental science, psychology, biotechnology, and biomedical sciences. The use of statistical software is required and data interpretation is emphasized.

**Components:** Laboratory, Lecture

**Attributes:** Offered Spring Term

**Requirement Group:** Prerequisites: BY140 or BY160 or equivalent; MA181 or equivalent; or consent of the instructor

**Req. Designation:** Technology

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STAT 381(3) Course ID:011182 2016-08-15

**Probability**

[Cross-listed with MA 381] Sample spaces; axioms of probability; basic theorems; random variables (discrete and continuous); combinatorial methods; Bayes' Theorem and conditional probability; expected values and variances; distribution functions, including: binomial and multinomial, Poisson, normal and bivariate normal distributions, and others such as geometric, hypergeometric, negative binomial, exponential, gamma and beta; joint distributions; covariance and correlation; central limit theorem; geometric probability; method of transformations; introduction to stochastic processes.

**Components:** Lecture

**Course Equivalents:** MA 381, MA 581, STAT 581

**Requirement Group:** Prerequisite: MA231 or MA230 (MA211 Recommended)

**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Statistics and Probability**

STAT 382(3) Course ID:011184 2014-11-18

**Mathematical Statistics**

[Cross-listed with MA 382] A rigorous course in statistics. Topics include random variables and their distributions, data reduction, estimation, sampling distributions, testing, optimal tests, analysis of variance and nonparametric statistics.

**Components:** Lecture

**Requirement Group:** Prerequisites: MA/STAT381

**Req. Designation:** Technology

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STAT 383(3) Course ID:008779 2019-04-04

**Probability and Statistics**

A calculus based introduction to topics in probability and statistics. Probability content includes events and sample spaces, the basic axioms of probability, discrete and continuous random variables (definitions and basic characterizations such as the means and variances) including binomial, Poisson, normal, exponential, student-t, and uniform distributions. Topics in statistics include the central limit theorem, statistical inference including confidence intervals and hypothesis testing for one and two sample data, and linear regression. Students will use statistical software to read data and interpret software generated output. Students may not receive credit for both STAT 383 and STAT 389.

**Components:** Lecture

**Attributes:** Offered Fall, Spring, and Summer

**Requirement Group:** Prerequisites: MA132

**Req. Designation:** Technology

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STAT 384(3) Course ID:008780 2019-09-11

**Advanced Applied Statistics**

(Continuation of STAT 383.) Review of basic concepts (estimation, testing and simple linear regression). Multiple regression, analysis of variance and experimental design. Additional topics may include nonparametric statistics, goodness of fit tests, analysis of covariance and quality control. This course will require use of statistical software. Interpretation of computer output and applications will be emphasized throughout.

**Components:** Lecture

**Requirement Group:** Prerequisites: MA230 or MA231, and STAT383 or STAT389

**Req. Designation:** Technology

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STAT 385(3) Course ID:011982 2016-08-15

**Bayesian Data Analysis**

This course will introduce both the principles and practice of Bayesian methods for data analysis. This is a hands-on course that will use MATLAB software. Students will learn to write their own Bayesian computer programs to solve problems relevant to engineering, biology, chemistry, physics, earth science, ecology, economics, signal processing and machine learning. Topics that will be included are parameter estimation, model selection, time series and error analysis.

**Components:** Lecture

**Attributes:** Given When Needed

**Requirement Group:** Prerequisites: STAT 383 or MA/STAT 381, or by instructor consent

**Req. Designation:** Technology

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STAT 389(3) Course ID:012934 2019-04-04

**Probability and Statistics with Multivariate Analysis**

A multivariate-calculus based introduction to probability and statistics. Probability content includes sample spaces; axioms of probability; basic theorems; random variables (discrete and continuous); Bayes' Theorem and conditional probability; expected values and variances; distribution functions, including: binomial Poisson, normal and bivariate normal distributions; joint, marginal, and conditional distributions. Optional material includes and moment generating functions, characteristic functions, and distributions of sums of RVs. Topics in statistics include sampling distributions, likelihood functions, descriptive statistics, central limit theorem, hypothesis testing and parameter estimation for normally distributed data, and maximum likelihood estimators. Optional topics include analysis of type 1 and 2 errors and statistical approaches to minimizing error. Students will use statistical software to read data and interpret software-generated output. Students may not receive credit for both STAT 383 and STAT 389.

**Components:** Lecture

**Attributes:** Offered Fall Term

**Requirement Group:** Prerequisite: MA230 or MA231. Students may not enroll in STAT389 if they have credit for STAT383.

**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Statistics and Probability**

**STAT 409(1 - 10)** Course ID:011346 2014-12-04 **Instructor Consent Required**

**Directed Study in Probability and Statistics**

[Cross-listed with MA 409] A directed study in Probability and Statistics, intended to give a student the opportunity to further explore an area of interest to them under the supervision of a faculty member.

**Components:** Independent Study

**Course Equivalents:** MA 409

**Req. Designation:** Technology

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**STAT 488(1 - 3)** Course ID:008819 2015-01-29 **Instructor Consent Required**

**Statistics Projects**

Students engage in statistical projects under the supervision of a faculty member. The topic will be determined by student interest and faculty research programs. This course may be repeated for a maximum total of three credits.

Prerequisite: consent of the instructor.

**Components:** Independent Study

**Attributes:** One communication unit, Given When Needed

**Req. Designation:** Technology

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**STAT 518(3)** Course ID:013190 2022-11-08

**Essentials of Biostatistics**

This course covers basic concepts of statistics and statistical methods commonly used in the public health sciences. The courses is intended as an introductory statistics course for graduates students in biology, environmental policy, and health sciences fields, with applications to real data. The course will emphasize descriptive statistics, fundamentals of probability and probability distributions, and relevant methods of statistical inference. Topics include correlation, regression, Bayes theorem, estimation, hypothesis testing, nonparametric methods, and categorical data analysis. Coursework will include a significant project effort, to engage students in apply course techniques to real data, including the demonstration of ability to communicate results using statistical reports and visualizations. Students should expect to use cutting edge statistical software in this course. Coding experience is neither required nor assumed, but students should be willing to learn the necessary computer interface to modern statistical software.

**Components:** Laboratory, Lecture

**Attributes:** Offered Spring Term

**Req. Designation:** Technology

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**STAT 581(3)** Course ID:011183 2016-08-15

**Probability**

[Cross-listed with MA 581] Sample spaces; axioms of probability; basic theorems; random variables (discrete and continuous); combinatorial methods; Bayes' Theorem and conditional probability; expected values and variances; distribution functions, including: binomial and multinomial, Poisson, normal and bivariate normal distributions, and others such as geometric, hypergeometric, negative binomial, exponential, gamma and beta; joint distributions; covariance and correlation; central limit theorem; geometric probability; method of transformations; introduction to stochastic processes.

**Components:** Lecture

**Course Equivalents:** MA 381, MA 581, STAT 381

**Req. Designation:** Technology

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**STAT 582(3)** Course ID:011185 2014-11-18

**Mathematical Statistics I**

[Cross-listed with MA 582] A rigorous course in statistics. Topics include random variables and their distributions, data reduction, estimation, sampling distributions, testing, optimal tests, analysis of variance and nonparametric statistics. A large project is required.

Prerequisites: STAT381.

**Components:** Lecture

**Req. Designation:** Technology

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**STAT 584(3)** Course ID:008849 2014-12-05

**Advanced Applied Statistics**

Review of basic concepts (estimation, testing and simple linear regression). Multiple regression, analysis of variance and experimental design. Additional topics may include nonparametric statistics, goodness of fit tests, analysis of covariance and quality control. This course will require use of statistical software. Interpretation of computer output and applications will be emphasized throughout.

Prerequisites: STAT383 or equivalent.

**Components:** Lecture

**Req. Designation:** Technology

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**School of Arts and Sciences - Mathematics - Subject: Statistics and Probability****STAT 585(3) Course ID:011705 2022-05-05****Bayesian Data Analysis**

[Cross-Listed MA585] This course will introduce both the principles and practice of Bayesian methods for data analysis. This is a hands-on course that will use MATLAB software. Students will learn to write their own Bayesian computer programs to solve problems relevant to engineering, biology, chemistry, physics, earth science, ecology, economics, signal processing and machine learning. Topics that will be included are parameter estimation, model selection, time series and error analysis.

**Components:** Lecture**Course Equivalents:** MA 585**Req. Designation:** Technology**STAT 709(1 - 10) Course ID:011347 2015-01-29 Instructor Consent Required****Directed Study in Probability and Statistics**

A directed study in Probability and Statistics, intended to give a student the opportunity to further explore an area of interest to them under the supervision of a faculty member.

**Components:** Independent Study**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: Science, Tech, Eng, Math**

STEM 330(3) Course ID:012780

2017-07-01

**History and Philosophy of Science and Math**

This course looks at teaching STEM-related content from historical and philosophical perspectives, as its title suggests. In this course you will not only assimilate the concepts presented but will also evaluate and create instructional strategies and materials that can infuse these concepts into your own secondary courses. This expectation is in many respects more demanding and time-consuming than expecting you to learn an abundance of historical detail and philosophical argument and regurgitate it back on an examination. This course will argue that historical and philosophical content can be used to enhance secondary students' understanding of the STEM concepts and methods they are expected to attain and ask you to develop or restructure lessons and materials to illustrate that enhancement. Ideally, having science, mathematics, and technology students in the course this year will enhance the general knowledge of all participants and help them distinguish between the unique elements of each enterprise.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

**School of Arts and Sciences - Inst for STEM Education - Subject: Science, Tech, Eng, Math**

STEM 497(1 - 3) Course ID:013182 2022-08-28

**Independent Study in STEM Education**

Students engage in a STEM Education research, educational outreach program, or a special topic course with a faculty member. The topic will be determined by student interest and faculty research programs. This course may be repeated for credit.

**Components:** Independent Study

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Institute for STEM Education - Inst for STEM Education - Subject: Science, Tech, Eng, Math**

STEM 501(4) Course ID:012942 2019-05-09

**STEM Pedagogy and Professionalism**

STEM Pedagogy and Professionalism is designed to help graduate students, particularly graduate TAs, develop the skills necessary to be successful in their graduate programs as instructors and in their future roles as academics. The course will highlight methods for developing and enhancing the pedagogical content knowledge and instructional skill set of graduate STEM teaching assistants. Within the context of STEM learning; audience, environment, nature of science, formative assessment, models of instruction, learning theory, and reflective practice will be studied. A focus on STEM literacy, will help TAs think critically about multiple data sources in order to promote higher-order thinking skills among their students. The course also addresses intercultural communication in the classroom; providing an opportunity for students to improve their cultural and sociolinguistic competence. In particular, students will work on developing their professional communication skill set including oral comprehensibility, impromptu speaking skills and

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Science, Tech, Eng, Math****STEM 530(3)****Course ID:012705****2022-04-08****Analyzing Scientific and Math Theories from Philosophical & Historical Perspectives**

This 3-credit course is neither a history of STEM disciplines course nor a philosophy of STEM disciplines course. Rather, it is a course that looks at teaching STEM-related content from historical and philosophical perspectives, as its title suggests. This is an important distinction for several reasons. First, we believe that you will be best served by an introduction to history and philosophy of STEM disciplines and nature of STEM core concepts which are taught in a manner and at a level that models effective teaching. Modeling the teaching of these concepts in the course will provide you with strategies you might use with your own middle and high school students. Second, we are hoping that you will not only assimilate the concepts presented but will also evaluate and create instructional strategies and materials that can infuse these concepts into your own secondary courses. This expectation is in many respects more demanding and time-consuming than expecting you to learn an abundance of historical detail and philosophical argument and

**Components:** Seminar**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program**Req. Designation:** Technology**STEM 590(3)****Course ID:013192****2023-01-10****Educational Research Methods**

This course is designed to introduce graduate students to various methodological frameworks in research and become more familiar specifically with STEM Education research. Although the course is designed with educational research in mind, it is appropriate for any early graduate student, especially interdisciplinary, who wishes to develop their skills in designing their research study. The course content gives an overview of how research is applied to educational settings, particularly focusing on a STEM environment. Graduate students will gain a firm foundation in STEM education research and will learn about both quantitative and qualitative research methods. Students will also better understand various ethical concerns when conducting research with people. The course culminates in developing a research plan for the students' area of interest in STEM Education. This course is geared towards students working on a Master's thesis or Ph.D. dissertation. This course is usually offered every fall in an online, synchronous format. There are no prerequisites for

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**Science - Humanities & Social Sciences - Subject: Science, Technology, & Society**

STS 2(2 - 4) Course ID:011276 2015-03-09

**Science, Technology & Society Elective**

A college level course for which there is no comparable Clarkson course. Used for transfer credit only.  
This course may be used to satisfy the Science, Technology & Society Knowledge Area requirement.

**Components:** Independent Study**Attributes:** Science, Technology and Society, Transfer Credit Only**Req. Designation:** Technology

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School of Arts and Sciences - Humanities & Social Sciences - Subject: Science, Technology, & Society

STS 100(2.5) Course ID:008616 2020-05-17 Instructor Consent Required

**HEOP Perspectives on Science & Technology**

[Formerly LP100] This course is designed to be used in the HEOP Summer Program for incoming students. It helps student develop their critical thinking and writing skills in preparation for their college courses. Offered Pass/No Credit.

**Components:** Lecture**Attributes:** One communication unit, Science, Technology and Society, Offered Summer Term**Requirement Group:** Prerequisite: For HEOP students only.**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: Teaching English**

TE 501(1) Course ID:012814

2023-01-10

**CAS Internship**

The TESOL Teaching Practicum course provides an opportunity for students to apply the skills learned concurrently in Foundations of Teaching TESOL (TE540), and English Grammar (TE530) in a classroom setting. The practicum provides TESOL students with an opportunity to observe TESOL instruction and practice instructional techniques in preparations for the Fall Teaching Internship. TESOL students will be placed in local settings and will participate in this online course to share and reflect upon classroom experiences. Students will be placed in summer school ENL classes, community-based English language classes, or local community college/university English language classes as a volunteer, first observing and then assisting in instruction. The goal of the practicum is to give the TESOL student practical experience in all areas of teaching ELLs through observation and participation.

**Components:** Field Studies**Attributes:** Given When Needed**Req. Designation:** Technology

TE 502(2) Course ID:013011

2023-01-30

**MAT ESOL Practicum**

The TESOL Teaching Practicum course (1 credit) provides an opportunity for students to apply the skills learned concurrently in Foundations of Teaching TESOL (TE540), and Curriculum and Methods of Teaching ESOL (TE513) in a classroom setting. The practicum provides TESOL students with an opportunity to observe ESOL instruction and practice instructional techniques in preparation for the first ENL Residency. TESOL students will be placed in local settings for at least 6 hours a week and will participate in this online course to share and reflect upon classroom experiences. Students will be placed in summer school ENL classes, community-based English language classes, or local community college/university English language classes as a volunteer, first observing and then assisting in instruction. The goal of the practicum is to give the TESOL student practical experience in all areas of teaching ELLs through observation and participation. 35 hours of filed experience in K-12 ENL are required in this 6 week course (6 hours per week).

**Components:** Practicum**Attributes:** Offered Each Term**Req. Designation:** Technology

TE 513(3) Course ID:012937

2019-03-27

**Curriculum and Methods of Teaching ESOL**

This course serves as an introduction to the theory and practice of ESOL teaching. We will examine key aspects of current theories, methods of instruction, and assessment in TESOL education. This course is based on a view of teaching and learning as facilitated by social interaction and that each individual brings unique background knowledge and beliefs to their learning.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**Graduate Interdisciplinary - CRC Education Program - Subject: Teaching English**

TE 515(3) Course ID:013156 2022-03-18

**Language and Identity in the Multicultural Classroom**

This asynchronous course provides a conceptual framework to examine the roles of language, culture, and identity in the multicultural classroom. We will consider the perception of language as an asset and source of conflict at home, in schools, and across communities. Candidates will study different linguistic and cultural groups representative of those across NYS, paying particular attention to attributes of collectivistic cultures that inform teaching within the local context. Additionally, we will explore classroom dynamics in a multilingual environment, including the intersectionality of race, gender, socioeconomic status, and immigrant status. Candidates will develop a deeper understanding of sociolinguistic factors that contribute to a culturally responsive classroom that yields equitable achievement outcomes for linguistically diverse students. (15 hours field work required)

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: Teaching English**

TE 517(3) Course ID:012815

2022-04-08

**Teaching & Assessment Methods for TESOL**

TESOL Teaching Methods will introduce students to the NYS New Language Arts Progressions (part of the Bilingual Common Core Initiative), TESOL and WIDA National Standards, formative and summative assessments (including NYSITELL and NYSESLAT), and methodology for integrated, stand-alone, and content-based instruction for ELLs. Students will gain expertise in lesson planning, delivery and assessment; collaboration and co-teaching; state regulations; culturally relevant instruction; advocating for ELLs; and practical pedagogy for English Language Learners, pre k-12.

**Components:** Seminar**Attributes:** Given When Needed**Req. Designation:** Technology

**Graduate Interdisciplinary - CRC Education Program - Subject: Teaching English****TE 519(3)** Course ID:013157 2022-03-18**Methods and Materials for Bilingual Instruction and Assessment**

This asynchronous course prepares candidates to teach and assess literacy in students' home and new languages. We will approach biliteracy and translanguaging practices with the view of language as an asset, and we will analyze and evaluate course content through a lens of equity. Specifically, we will explore effective methods of instruction and assessment of ELLs' skills in English and their native language in the bilingual classroom. As we discuss theories and components of reading, candidates will deepen their knowledge of reading processes in learners' first and new languages.

Through a comparative analysis of English and the native language, we will survey and evaluate texts and instructional materials to promote native language literacy development. As we consider strategies and tools for instruction and assessment, candidates will create an annotated bibliography of resources to support native language arts and bilingual instruction. Additionally, candidates will create a series of

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**TE 521(3)** Course ID:013158 2022-03-18**Teaching Content in a Bilingual Context**

The asynchronous course explores the role of academic language across the curriculum and the power of the native language in the bilingual classroom to increase access to grade-level content for English language learners. Through text, discussion, observation, and application, we will identify opportunities to leverage the role of ELLs' native languages to promote transfer of knowledge and skills while increasing students' membership and agency in the classroom. As we study and apply the principles of content-based instruction for ELLs, we will consider effective strategies and practical techniques for assessment in core curricular areas. Guided by the NYSED Culturally Responsive Sustaining Framework, we will approach this work with a shared vision of yielding equitable academic outcomes for ELLs.

Throughout the course, candidates will describe and evaluate culturally responsive pedagogy and materials to advance ELLs' content knowledge while differentiating instruction and assessment for diverse learners. The

**Components:** Lecture**Attributes:** Given When Needed**Requirement Group:** Prerequisites: TE513 or TE517**Req. Designation:** Technology

**Institute for STEM Education - CRC Education Program - Subject: Teaching English**


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TE 530(3) Course ID:012816 2023-05-19 Department Consent Required

**English Grammar for the ENL Teacher**

English Grammar is a course on the structure, analysis, and methods of teaching American English grammar to English language learners. The dual purpose of this course is to develop a thorough understanding of the forms and use of English grammar systems as well as develop instructional strategies for teaching English grammar to speakers of other languages in a communicative and meaningful way.

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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TE 531(3) Course ID:012818 2022-04-08

**TESOL English Linguistics**

English Linguistics is an introduction to linguistics for Teachers of English to Speakers of Other Languages. It presupposes little or no formal linguistic knowledge. We will study the rudiments of phonetics, phonology, syntax, morphology, semantics, sociolinguistics and language acquisition. We will study linguistics both as an end in itself and as it informs classroom teaching. This course will prepare students to teach English as a New/Second Language, with a firm knowledge of the linguistic challenges English presents to language learners. Discussions and connections between theory and practice are a significant component of this course.

**Components:** Seminar

**Attributes:** Given When Needed

**Req. Designation:** Technology

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TE 540(3) Course ID:012817 2019-04-12

**Foundations of Teaching TESOL**

Foundation of Teaching TESOL serves as an introduction to the theory and practice of second language (SL) teaching. In an intensive 6 week online format, students will be immersed in activities to create a strong foundation of knowledge on language development, standards and policy, and pedagogy. We will examine key aspects of historical and current theories of second language acquisition, as well as methods of instruction and assessment in SL education. Language modalities, language functions, content and context-based instruction will be introduced. This course is based on a view of teaching and learning as facilitated by social interaction in which each individual brings unique background knowledge and beliefs to their learning. It is expected that students will make connections between the readings and learning activities of the Foundations course to their experiences in the Teaching Practicum (TESOL501).

**Components:** Lecture

**Attributes:** Offered Summer Term

**Req. Designation:** Technology

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TE 542(3) Course ID:012819 2021-10-08

**TESOL Literacy (Online and In School Settings)**

TESOL Literacy introduces students to issues in reading, writing and new literacies for students who are learning a new or second language. We will review current instructional practices in light of theoretical foundations, educational policy, and culture forces that shape acquisition and development of a new/second language. In addition, we will dissect practical strategies for teaching English language learners. Your understanding of course ideas and issues will be assessed frequently through a variety of on-line discussions, assignments, activities, and a final project. This course includes 20 hours of required field experience.

**Components:** Seminar

**Attributes:** Given When Needed

**Req. Designation:** Technology

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TE 551(5) Course ID:012820 2023-05-04

**Internship/Residency I**

During the 5-credit internship/residency (either K-6 or 7- 12 ENL) the candidate will first observe and co-teach with their mentor and then gradually assume responsibility for two of the mentor's classes at the secondary level, or an equivalent block of instruction at the elementary level. The candidate should be teaching independently within 6 weeks, if prepared to do so. After successful completion of the first teaching internship/residency (either K-6 or 7-12), the candidate will complete a second placement to fulfill the K- 12 residency requirement. Candidates who are on the internship track must remain in their placements three  $\frac{1}{2}$  days and two full days per week. Candidates on the residency track must remain in their placements for 6 hours, every day.

**Components:** Field Studies

**Attributes:** Offered Each Term

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program

**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Teaching English**

TE 552(5) Course ID:012821 2023-05-04

**TESOL Internship/Residency II**

The 5-credit internship/residency (either grades K-6 or 7-12 ENL) follows TE 551. The candidate is expected to gradually assume responsibility for two of the mentor's classes at the secondary level, or an equivalent block of instruction at the elementary level, at first co-teaching with the mentor, but independently within 6 weeks, if prepared to do so. TE 552 fulfills the second half of a full year K-12 experience and follows the successful completion of a first semester residency/internship. Candidates who are on the internship track must remain in their placements there 1/2 days and two full days per week. Candidates on the residency track must remain in their placements for 6 hours, every day.

**Components:** Field Studies

**Attributes:** Offered Each Term

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program

**Req. Designation:** Technology

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TE 553(5) Course ID:013031 2023-05-04

**TESOL: Internship for Initially Certified Teachers I**

This course is open only to students matriculated in the Master of Arts in Teaching ESOL program who have been initially certified as teachers in NYS.

The candidate will first observe and co-teach with their mentor teacher. The candidate is expected to gradually assume responsibility for two of the mentor's classes, or the equivalent, at first co-teaching with the mentor, and then independently teaching when prepared to do so. Candidates will complete a minimum of 20 full days at the elementary level and 20 full days at the secondary level to reflect the NYS requirement. This course may take place in summer school settings.

**Components:** Field Studies

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program

**Req. Designation:** Technology

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TE 554(5) Course ID:013030 2023-05-04

**TESOL: Internship for Initially Certified Teachers II**

This course is open only to students matriculated in the Master of Arts in Teaching ESOL program who have been initially certified as teachers in NYS.

The 5-credit internship begins after the candidate completes TE 553. The candidate is expected to gradually assume responsibility for two of the mentor teacher's classes, or the equivalent, at first co-teaching with the mentor, and then independently teaching when prepared to do so. Students will complete a minimum of 20 full days at the elementary level and 20 full days at the secondary level to reflect the NYS requirement. This course may take place in summer school settings.

**Components:** Field Studies

**Attributes:** Given When Needed

**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program

**Req. Designation:** Technology

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TE 580(3) Course ID:012822 2023-01-10

**TESOL Project**

The TESOL Project is a one semester, online research project class whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in the field of TESOL. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern and their teaching setting. TESOL projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar

**Requirement Group:** Corequisites: TE517, TE502, and TE551 or TE553

**Req. Designation:** Technology

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**Liberal Arts - Humanities & Social Sciences - Subject: Technology**

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TECH 100(3) Course ID:011458 2015-01-19

**Design Technology**

Credit for this course is awarded only in the following cases: 1) receipt of a score of 5 through 7 on the International Baccalaureate Design Technology Higher-Level Examination or 2) satisfactory completion of a college-level course that meets the criteria for a Technology Course but for which there is not an appropriate Clarkson course prefix.

**Components:** Independent Study

**Attributes:** Transfer Credit Only

**Req. Designation:** Technology

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TECH 563(3) Course ID:013211 2023-05-05

**Introduction to Energy Systems**

The focus of this course is to prepare students to teach various topics related to energy systems in a K-12 school setting. Introduction to Energy Systems is a survey of both traditional and modern energy systems and technologies. The course introduces conventional primary energy sources such as coal, oil, gas, & nuclear, and examines the technologies used to capture, convert, distribute, store, and utilize these energy sources. Consideration is given to the economic, social, environmental, and political factors that affect the sustainability of these sources. Emerging technologies and renewable energy sources such as wind, solar, and biomass will be explored, including the challenges associated with adopting these technologies.

**Components:** Lecture

**Attributes:** Given When Needed

**Req. Designation:** Technology

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**Institute for STEM Education - CRC Education Program - Subject: Technology****TECH 575(3)** Course ID:013146 2021-12-03**Manufacturing Processes and Design for Manufacturing**

This course will introduce the student to the fundamentals of manufacturing processes and design for manufacturing. The course will begin by examining the history and evolution of modern manufacturing technology. This section will include an examination of scientific management and modern industrial management. Modern manufacturing operations will then be examined including machining, casting, forging, welding, brazing, soldering, finishing, heat treating, assembly, and plastic materials processing. This section will also include electronics manufacturing, covering both through-hole technology and surface mount devices. For each manufacturing process, capabilities and limitations will be discussed and how they relate to part design and cost. Design for manufacturing principles will be examined, including how the designer affects manufacturing cost, lean manufacturing, six sigma, value stream analysis, manufacturing rate, the cost of quality, process flexibility, process simulation, and process economics.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology**TECH 580(3)** Course ID:012712 2021-10-08**MAT Project in Technology (Content Area)**

[Formerly TEC 580] The MAT Project is a one-term research project whose purpose is to allow students time and supervision to develop breadth and/or depth of knowledge to become a better teacher in their certification field. What the project will entail varies greatly from student to student. The course is intended to be custom-tailored to meet the specific needs of an individual intern. MAT projects are well-grounded in research and theory, but also include a strong and extensive applied aspect, directly addressing the question: What would this look like in the classroom?

**Components:** Seminar**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program**Req. Designation:** Technology**TECH 988(3)** Course ID:012713 2018-06-13**Independent Study in Technology**

[Formerly TEC 988] A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Given When Needed**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program**Req. Designation:** Technology**TECH 989(3)** Course ID:012714 2018-06-13**Independent Study in Technology**

[Formerly TEC 989] A graduate level course for which there is no comparable Clarkson course. This course may be used to satisfy course requirements for a graduate degree.

**Components:** Independent Study**Attributes:** Given When Needed**Requirement Group:** Restriction: This course is open only to students matriculated in the Master of Arts in Teaching program**Req. Designation:** Technology

**Other - Student Affairs - Subject: University****UNIV 100(0) Course ID:011564 2023-05-24 Department Consent Required****The Success Seminar**

This course is designed to provide strategies to help students succeed in classes and empower them to become active, responsible learners. During this course, students will learn several useful strategies regarding self-awareness, establishing goals, developing supportive relationships, identifying preferred learning styles, managing time, taking notes, and developing strategies for more effective reading of texts.

**Components:** Lecture**Attributes:** Offered Spring Term**Requirement Group:** Restriction: Freshman &/or Sophomore Standing**Req. Designation:** Technology**UNIV 102(0) Course ID:012952 2022-11-08****Career Development and Professional Communication**

This course is designed to help students build professional skills along with a foundation for exploring self-knowledge and careers. Activities will include self-assessments, self-reflections, preparation of professional documents, interview practice and networking supported by workshops and in-class discussions.

**Components:** Seminar**Attributes:** Offered Fall Term**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: University**

UNIV 190(3) Course ID:010733 2018-03-02

**The Clarkson Seminar**

The Clarkson Seminar welcomes first year students into a world of cultures, histories, and the global forces that will shape their personal and professional lives beyond Clarkson. Students will learn to define issues within a broad cultural context and gain experience evaluating and interpreting literary and nonliterary texts. Seminar classes will be a small and thematically structured, with an emphasis on discussion, critical reading and thinking, extensive writing, and collaborative work.

**Components:** Lecture**Attributes:** Offered Fall Term**Req. Designation:** Technology

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**Business - School of Business - Subject: University****UNIV 267(3) Course ID:011271 2022-02-10 Instructor Consent Required****Introduction to Canada**

This course will introduce students to Canada and the US-Canada relationship. In particular, the course will cover a broad swath of topics across academic disciplines including: geography, history, sociology, politics/government, economics, and the arts. Particular emphasis will be placed on comparing and contrasting Canada and the United States, but will also cover important current events and other issues unique to Canada, including the Quebec question and the future of Canada. The course will be a blend of classroom lectures/discussions and experiential trips to major Canadian cities/regions, including Ottawa, Montreal, Quebec, and Toronto.

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Cultures and Societies, University Course, Given When Needed**Req. Designation:** Technology

**Inst for a Sustainable Environ - Inst for a Sustainable Environ - Subject: University****UNIV 299(1)****Course ID:011930****2015-09-08****Global Service**

The focus of this course is a one-to-two week trip abroad for a service learning experience. Each section, centered on a unifying theme and geographic location, will include three components: experience, reflection and action. Through community connections and hands-on experience, students develop deeper global awareness and stronger critical thinking and problem solving skills. Students will return empowered to make positive change in their community and beyond. The travel group will spend quality time in a community, getting to know the people and their way of life. The course instructor works directly with the community to assure each group has a valuable, impactful visit. UNIV 299 is a repeatable course allowing a student to receive credit on completing two or more different Global Service experiences.

**Components:** Independent Study**Attributes:** Offered Spring Term**Req. Designation:** Technology

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**School of Arts and Sciences - Provost - Subject: University****UNIV 349(3)****Course ID:012035****2017-01-27****International Service Learning**

This course involves collaboration with non-governmental organization to develop appropriate technology and improve quality of life in a target community overseas. During a semester-long class that meets weekly, students develop an appreciation of the issues involved in international development and an understanding of the context of their project, while at the same time working in teams to solve technological problems according to the NGO's specifications and community's needs. Following the end of the semester, students will visit the community to present their solutions, provide necessary training, and assist in implementation of the technology. Through a combination of classroom and experiential learning in the community, students will gain global awareness, improve critical thinking and problem solving skills, and get to know a foreign place and people

**Components:** Lecture**Attributes:** Cultures and Societies, Offered Spring Term**Req. Designation:** Technology

**School of Arts and Sciences - Humanities & Social Sciences - Subject: University**

UNIV 359(1) Course ID:013012 2020-01-09

**Doctors Without Borders Global Experience**

This one-credit pass/fail course is designed for students chosen for the CU Doctors Without Borders out-of-country trip that occurs each summer. This course will provide an in-depth review of ethical volunteering practices, culture of the chosen country to prepare students for competency in language, values, beliefs/religions, clothing, and food. Preparation for medical volunteering will also be incorporated into this course through training on how to take vitals, as well as through the discussion of medical terminology and medical practices of the chosen country.

**Components:** Lecture**Attributes:** Given When Needed**Req. Designation:** Technology

**Business - School of Business - Subject: University****UNIV 399(3)****Course ID:011086****2022-02-10****Global Experience**

This course includes intensive study of issues in a country or region outside of the United States followed by a two- to three-week trip abroad to that location. Each section, centered on a unifying theme and geographic location, will include three components: structured classes, practitioner presentations, and visits to companies, governmental agencies, and important cultural sites. Students successfully completing this course will gain a better perspective on the economic, political, cultural issues as well as the business practices prevalent in another region of the world. Students should develop cultural awareness, an understanding of economic, cultural, and political differences between the US and other countries, and the role cultural, historical and political factors play in the conduct of business in a global economy. UNIV399 is a repeatable course allowing a student to receive credit on completing two or more different Global Study experiences. On approval from the Dean of the School of Business, this course can satisfy global business

**Components:** Lecture**Attributes:** Contemporary and Global Issues, Cultures and Societies, University Course, Offered

Spring Term

**Req. Designation:** Technology