University of Tennessee, Chattanooga 2025-2026 Undergraduate Catalog

Course Descriptions

Contract All Courses |

Courses certified as satisfying General Education Requirements are identified in the course title with a two letter category abbreviation. General Education categories are listed below.

Writing and Communication (WC) Humanities and Fine Arts (HF) Natural Science (LL, LC & LB, NL)

Behavioral and Social Science (SB) Quantitative Reasoning (QR) Individual and Global Citizenship (CZ)

Communication

COMM 3630 - Feature Writing

(3) Credit Hours

Nonfiction writing for newspapers, magazines and specialized publications. Spring semester. Laboratory 4 hours. Prerequisites: COMM 2300
or Department Head approval. Communication fee will be assessed.

COMM 3700 - Photojournalism

(3) Credit Hours

Introduction to photojournalism, with special attention paid to visual storytelling. On demand. Laboratory 4 hours. Prerequisites: COMM 2300
or Department Head approval. Communication fee will be assessed.

COMM 3999R - Group Studies

(1-9) Credit Hours

On demand. Prerequisites: Department Head approval. Department may have additional prerequisite requirements.

COMM 4000R - Special Topics

(3) Credit Hours

Specialized study of mass media designed to meet interests of students and faculty. On demand. Prerequisites: Department Head approval. Communication fee will be assessed.

COMM 4010R - Special Topics, Professional Elective

(3) Credit Hours

Specialized study of mass media designed to meet interests of students and faculty. Topic addresses professional skills related to mass media production. On demand. Prerequisites: Department Head approval. Communication fee will be assessed.

COMM 4020R - Special Topics, Professional Visual Skills

(3) Credit Hours

Specialized study of mass media designed to meet interests of students and faculty. Topic addresses a professional skills related to visual communication. On demand. Prerequisites: Department Head approval. Communication fee will be assessed.

COMM 4100 - Public Communication and Environmental Issues

(3) Credit Hours

Seminar concerning environmental policy, information, and education, environmental reporting, and environmental public relations. Also discusses risk communication and the multiracial environmental justice movement. On demand. Prerequisites: Completion of natural science/lab requirements, or Department Head approval. Junior or Senior standing or Department Head approval.

COMM 4200 - Senior Seminar

(3) Credit Hours

Current issues in mass media and completion of a research project. Every semester. Prerequisites: COMM 3200 or Department Head approval.

COMM 4210 - Media and Society

(3) Credit Hours

Examines media in relation to domestic diversity (race/ethnicity, sexuality, gender, socio-economic, etc.) and global cultures. Emphasis on using theory to analyze and interpret news, entertainment and strategic portrayals of diverse groups and on developing culturally sensitive media messages. Every semester.Lecture 3 hours. Prerequisites: COMM

3200
or Department Head approval.

COMM 4350 - Publication Design II

(3) Credit Hours

Advanced study in publication design with special attention to techniques of publication production. Spring semester. Laboratory 4 hours. Prerequisites: COMM 3350
or Department Head approval. Communication fee will be assessed.

COMM 4400 - Film Production

(3) Credit Hours

Working as a classroom studio to create a short film or pilot. Laboratory 4 hours. Prerequisites: COMM 3450
or Department Head approval. Communication fee will be assessed.

COMM 4450 - Video Post-Production

(3) Credit Hours

Advanced visual media production theory and techniques. Emphasis on writing effective scripts, project management, and legal and ethical issues.Spring semester. Laboratory 4 hours.Prerequisites: COMM 3450
or Department Head approval. Communication fee will be assessed.

COMM 4510 - Mass Communication Law and Ethics

(3) Credit Hours

United States legal system, elements of constitutional law, the law of mass communication. Personal and professional ethics as they apply to communications disciplines. Every semester. Lecture 3 hours.

COMM 4550 - Documentary Filmmaking

(3) Credit Hours

Documentary video production and post-production, including advanced shooting, lighting, audio, and nonlinear editing. Students produce and edit a short documentary conceptualized and researched in Documentary I.Laboratory 4 hours.Prerequisites: COMM 3450
or Department Head approval. Communication fee will be assessed.

COMM 4600 - Screenwriting II

(3) Credit Hours

Introduces students to the conventions and practices associated with writing serial narratives. Students will learn to conceptualize, plan, and execute scripts. Laboratory 4 hours. Prerequisites: COMM 3600
or Department Head approval. Communication fee will be assessed.

COMM 4700 - The Public Relations Campaign

(3) Credit Hours

Principles of campaign research, planning, implementation, and evaluation, and their application.Spring semester. Lecture 3 hours.Prerequisites: COMM 3300
and COMM 3330 or Department Head approval.

COMM 4750 - Photojournalism II

(3) Credit Hours

Introduction to advanced photojournalism, with special attention paid to visual storytelling.Laboratory 4 hours.Prerequisites: COMM 3700
or Department Head approval. Communication fee will be assessed.

COMM 4800 - Directed Project

(3) Credit Hours

Guided project designed to demonstrate proficiency at professional level in a specific area. Every semester. Senior standing and approval of the Department Head in the semester preceding enrollment.

COMM 4820 - Rising Rock

(3) Credit Hours

Advanced nonfiction storytelling, with special attention paid to producing stories about people in the context of everyday life in the Chattanooga area. Laboratory 4 hours.Prerequisites: COMM 1100
and COMM 3420
or COMM 3450
or COMM 3610
or COMM 3620
or COMM 3630
or COMM 3700
or COMM 4420 or COMM 4450
or COMM 4550
or COMM 4750
or Department Head approval. Communication fee will be assessed.

COMM 4850 - Individual Internship

(3) Credit Hours

Working experience in a professional situation. Every semester. Senior standing and approval of the Department Head in the semester preceding enrollment.

COMM 4995R - Departmental Thesis

(1-3) Credit Hours

A two-semester research or creative project resulting in a thesis under the supervision of a faculty member and with the approval of the Honors College. On demand. Prerequisites: Student must coordinate with Honors College to submit a Thesis Contract to get registered for this course. Restricted to Sophomore standing or higher.

COMM 4997R - Research

(1-9) Credit Hours

Enables students to conduct independent research. On demand. Prerequisites: Student must coordinate with a specific faculty member to complete the Research contract to get registered for the course. Restricted to Sophomore standing or higher.

COMM 4998R - Individual Studies

(1-9) Credit Hours

Enables students to study selected topics in depth. On demand. Prerequisites: Student must coordinate with a specific faculty member to complete the Individual Studies contract to get registered for the course. Restricted to Sophomore standing or higher.

COMM 4999R - Group Studies

(1-9) Credit Hours

Department may have additional prerequisite requirements. On demand.

Computer Engineering

CPEN 1999R - Special Projects

(1-9) Credit Hours

Individual or group projects. Maximum credit 4 hours. On demand. Prerequisites: Department Head approval. Differential course fee will be assessed.

CPEN 2999R - Group Studies

(1-9) Credit Hours

On demand. Prerequisites: Department Head approval. Department may have additional prerequisite requirements. Differential course fee will be assessed.

CPEN 3700 - Digital Logic and Introduction to Computer Hardware

(4) Credit Hours

Number representation and arithmetic; basic digital devices and their Boolean representations; introduction to logic circuit design and simplification using Boolean algebra and Karnaugh maps; combinational logic building blocks such as multiplexers, demultiplexers, encoders, decoders, comparators, adders, ALUs; analysis and design of sequential logic circuits; sequential logic building blocks such as storage registers, shift registers and counters. Lecture 3 hours and laboratory 2 hours. Prerequisites: CPSC 1100
with a minimum grade of C or Department Head approval. Laboratory/studio course fee will be assessed. Differential course fee will be assessed.

CPEN 3710 - Computer System Organization and Assembly Language Programming

(4) Credit Hours

Structure of digital computers; introduction to machine language, symbolic coding, and assembly language; register sets, instruction types, and addressing modes; assembler directives and macros; low-level input/output techniques; interrupts; procedure calls, returns, and stack operations; linking to high-level languages. Lecture 3 hours and laboratory 2 hours. Prerequisites: CPSC 1110
and CPSC 3700 or CPEN 3700
with minimum grades of C or Department Head approval. Laboratory/studio course fee will be assessed. Differential course fee will be assessed.

CPEN 3850 - Interdisciplinary Design Project I

(3) Credit Hours

First semester of the capstone interdisciplinary group design project in which students use their discipline-based knowledge in an interdisciplinary environment. Projects are expected to complete through preliminary design. The team design experience includes design methodology, concept generation, decision making, technical project management, quality and reliability engineering, concurrent engineering, teamwork, written and oral communication, and introduction to engineering ethics and professional responsibility. The projects incorporate technical activities applicable to the engineering disciplines of the College. Faculty from the disciplines support the course and students as technical advisors and aid in project selection. Fall and Spring semesters. Lecture 2 hours, project 2 hours. Pre or Corequisites: ENCE 3520
and ENEE 3720
with a minimum grade of C or Department Head approval. May be registered as ENCE 3850
, ENEE 3850
or ENME 3850
. Credit allowed in only one of the four courses. Differential course fee will be assessed.

CPEN 3999R - Group Studies

(1-9) Credit Hours

On demand. Prerequisites: Department Head approval. Department may have additional prerequisite requirements. Differential course fee will be assessed.

CPEN 4700 - Computer Architecture

(3) Credit Hours

An advanced course in computer architecture. Topics include classical uniprocessor architecture, computer arithmetic, instruction sets, control unit design including the basics of microprogramming, I/O operations, memory hierarchies, cache and virtual memory mechanisms, instruction and arithmetic pipelines, CISC, RISC, superscalar and super pipelined architectures, parallel architectures. Prerequisites: CPSC 2800
and CPEN 3700
with minimum grades of C or Department Head approval. Differential course fee will be assessed.

CPEN 4710 - Advanced Computer Systems

(3) Credit Hours

A study of representative computer systems including architectural features, hardware implementation, machine level programming, memory systems, I/O device interfacing, and system design. Prerequisites: CPEN 4700
with a minimum grade of C or Department Head approval. Differential course fee will be assessed.

CPEN 4850 - Interdisciplinary Design Project II

(3) Credit Hours

Second semester of the capstone interdisciplinary group design project in which students use their discipline-based knowledge in an interdisciplinary environment. Completion of the detailed and final design phases of the engineering project initiated in ENCE/ENEE/ENME/CPEN 3850 including building a model, testing, evaluation, and reporting the design result. Projects require students to illustrate their discipline knowledge in an interdisciplinary environment. Specific discipline aspects of the project are supported by representative faculty acting as technical advisors. Oral and written presentation of progress and results. Ethics and professional responsibility and the global and societal impact of engineering decisions are covered. Fall and Spring semesters. Lecture 1 hour, project 4 hours. Prerequisites: CPEN 3850
, ENCE 3850
, ENEE 3850
or ENME 3850
with a minimum grade of C; must have been taken in the immediately preceding semester or Department Head approval. May be registered as ENCE 4850
, ENEE 4850
or ENME 4850
. Credit allowed in only one of the four courses. Differential course fee will be assessed.

CPEN 4995R - Departmental Thesis

(1-3) Credit Hours

A two-semester research or creative project resulting in a thesis under the supervision of a faculty member and with the approval of the Honors College. On demand. Prerequisites: Student must coordinate with Honors College to submit a Thesis Contract to get registered for this course. Restricted to Sophomore standing or higher. Differential course fee will be assessed.

CPEN 4997R - Research

(1-9) Credit Hours

Enables students to conduct independent research. On demand. Prerequisites: Student must coordinate with a specific faculty member to complete the Research contract to get registered for the course. Restricted to Sophomore standing or higher. Differential course fee will be assessed.

CPEN 4998R - Individual Studies

(1-9) Credit Hours

Enables students to study selected topics in depth. On demand. Prerequisites: Student must coordinate with a specific faculty member to complete the Individual Studies contract to get registered for the course. Restricted to Sophomore standing or higher. Differential course fee will be assessed.

CPEN 4999R - Group Studies

(1-9) Credit Hours

Department may have additional prerequisite requirements. On demand. Differential course fee will be assessed.

Computer Science

CPSC 1000 - Introduction to Computing

(3) Credit Hours

Overview of the development of the electronic computer, its technology, capabilities, and limitations. Ethical and social issues are considered, as well as the role of computers in society. Introduction to the use of a range of useful microcomputer hardware and software. Extensive laboratory experience. Differential course fee will be assessed.

CPSC 1100 - Fundamentals of Computer Science

(4) Credit Hours

An introduction to computer science concepts and computer software development using a higher level language. Algorithms, flowcharting, programming, and documentation of numerical and non-numerical problems. Introduction to computer science terminology and concepts such as computer hardware and computer application areas.Lecture 2

hours, laboratory 3 hours.Prerequisites: MATH ACT 26 or above or MATH 1130
, MATH 1710
, MATH 1720
, MATH 1730
, MATH 1830
, 1910, 1920, MATH 1950
, or MATH 1960
with a minimum grade of C or Department Head approval. Laboratory/studio course fee will be assessed. Differential course fee will be assessed.

CPSC 1110 - Data Structures and Program Design

(4) Credit Hours

Continued development of programming style using abstract data structures and top-down design. Debugging and testing of large programs. Emphasis on algorithm development. List processing. Recursion. (Stacks, trees, searching and sorting.) Lecture 3 hours, laboratory 2 hours. Prerequisites: CPSC 1100
with a minimum grade of C or Department Head approval. Laboratory/studio course fee will be assessed. Differential course fee will be assessed.

CPSC 1999R - Special Projects

(1-9) Credit Hours

Individual or group projects. Maximum credit 4 hours. On demand. Prerequisites: Department Head approval. Differential course fee will be assessed.

CPSC 2100 - Software Design and Development

(3) Credit Hours

A study of the analysis, design and implementation phases of software systems development using a phased life cycle approach. Process, data and object oriented development models. Introduction to modeling tools and CASE software. Team approaches to software development. Project management concepts. Prerequisites: CPSC 1110
with a minimum grade of C or Department Head approval. Differential course fee will be assessed.

CPSC 2800 - Introduction to Operating Systems

(3) Credit Hours

Basic operating system principles, job control languages and operating system internals. The hardware/software interface; file systems; resource management; command languages; segmentation, paging and virtual memory; other virtual resources. Detailed examination of two or more current operating systems, such as Windows, UNIX or Novell NOS. Prerequisites: CPSC 1110
with a minimum grade of C or Department Head approval. Differential course fee will be assessed.

CPSC 2999R - Group Studies

(1-9) Credit Hours

On demand. Prerequisites: Department Head approval. Department may have additional prerequisite requirements. Differential course fee will be assessed.

CPSC 3120 - Python Programming

(3) Credit Hours

This course is an introduction to the Python programming language covering data types, control flow, object-oriented programming, and graphical user interface-driven applications. With its simple syntax, a powerful set of libraries, a rich programming environment, including and a robust debugger and profiler, students will experience programming in diverse areas such as text processing, graphics creation and image manipulation, HTML and web programming, and genomics. Prerequisites: CPSC 1110
with a grade of C or better.Only open to BAS IT Cybersecurity majors. Differential course fee will be assessed.

CPSC 3130 - .NET Development

(3) Credit Hours

This course will cover the practical aspects of multi-tier application development using the .NET framework. Students will be introduced to the basics of distributed application development, Web Service development and .NET remoting. Technologies covered will include, among others, the Common Language Runtime (CLR), .NET framework classes, C#, ASP.NET, and ADO.NET. Students will also be introduced to service oriented architecture, design, performance, security, content managements systems and deployment issues encountered in building multi-tier distributed applications. Prerequisites: CPSC 1110
with a grade of C or better. Only open to BAS IT Cybersecurity majors. Differential course fee will be assessed.

CPSC 3200 - Algorithm Analysis and Advanced Data Structures

(3) Credit Hours

A study of data structures and the algorithms used to process them. Algorithms for handling strings, stacks, lists, trees and graphs. Sorting and searching techniques. Recursive and non-recursive algorithms. Efficiency considerations. Prerequisites: CPSC 2100
and MATH 2030
or MATH 3000
or MATH 3030 with minimum grades of C or Department Head approval. Differential course fee will be assessed.

CPSC 3220 - File and Database Processing

(3) Credit Hours

Processing of sequential, direct, indexed and hashed files. File sorting and searching techniques. Database concepts using the relational model, relational algebra and relational calculus. Database design with E-R modeling techniques, SQL programming. Prerequisites: CPSC 2100
with a minimum grade of C or Department Head approval. Differential course fee will be assessed.

CPSC 3300 - Computer Server Administration

(3) Credit Hours

This is an introduction to the process of choosing, installing, configuring and maintaining a client and server systems. Both the server and or client may Microsoft, Linux or any other platform. Topics include user management, file systems, network domains and domain management, mailers, and printing. Students get practice in writing scripts for performing maintenance tasks. Also, students learn how these tasks fit into the more general system administration process. Prerequisites: CPSC 1110
with a grade of a C or better. Only open to BAS IT Cybersecurity majors. Differential course fee will be assessed.

CPSC 3310 - Network Administration

(1) Credit Hours

The course explores topics in computer network administration in theoretical and practical ways, including the study of different software platforms, control, shared resources and administration. Security, anti-virus procedures and methodologies. Ethical issues of working as a Network Administrator, network security issues in regards to common network operating systems (NOSs) used by network servers, directories, directories services, and their uses in a network environment, particularly X.500, LDAP and their derivatives will all be explored. Prerequisites: CPSC 1110
with a grade of a C or better. Only open to BAS IT Cybersecurity majors. Differential course fee will be assessed.

CPSC 3320 - Database Administration

(3) Credit Hours

The course will focus on a specific database architecture to explore database installation, creating a database, database instances, network environment, storage structures, user security, concurrency control mechanisms, database auditing and maintenance, performance management, backup and recovery concepts, moving data and, database restart. Prerequisites: CPSC 1110
with a grade of C or better. Only open to BAS IT Cybersecurity majors. Differential course fee will be assessed.

CPSC 3520 - Introduction to Video Game Development

(3) Credit Hours

An introduction to the modern video game software development process using an industry-standard game development tool suite. Practical application of software engineering, artificial intelligence, computer graphics and networking concepts. Related concepts such as object-oriented scripting and user interface design will also be discussed. Prerequisites: CPSC 2100
or Department Head approval. Differential course fee will be assessed.

CPSC 3600 - Principles of Information Security and Assurance

(3) Credit Hours

This course focuses on information security, integrity and privacy techniques. Topics include the nature and challenges

of computer security, the relationship between policy and security, the role and application of cryptography, the mechanisms used to implement policies, the methodologies and technologies for assurance and vulnerability analysis and intrusion detection. Prerequisites: CPSC 1100
with a minimum grade of C or Department Head approval. Differential course fee will be assessed.

CPSC 3610 - Ethical and Social Issues in Computing (HF)

(3) Credit Hours

This course examines the ethical and social issues arising from advances in computer technology and the responsibility that computer professionals and users have with regard to computer use by focusing on the intrinsic link between ethics and the law, how both try to define the validity of human actions, and on the moral and ethical dilemmas created by computer technology that challenge the traditional ethical and moral concepts. Prerequisites: ENGL 1020
and CPSC 1110
with minimum grades of C or Department Head approval. Differential course fee will be assessed.
General Education Category: Humanities and Fine Arts

CPSC 3810 - Introduction to Quantum Information Science and Technology

(3) Credit Hours

This course is the introduction part of a four-course QIST certificate program, which is aimed at training non-advanced-degree holding individuals or non-physicists in the art of QIST. A particular focus will be placed on quantum computation, both its hardware and software. At the end of this course, the student should understand the basic differences between quantum and classical information science and computation, have an understanding of the special rules that govern quantum information science. Finally, the student should be able to write in a quantum programming language to implement some prominent quantum algorithms. These sample algorithms will be from a selected suite chosen for its utility and pedagogy. May be registered as PHYS 3810 or CPSC 3810. Credit allowed in only one of the courses. Differential course fee will be assessed.

CPSC 3920R - Computer Science Internship

(1-3) Credit Hours

Work experience in Computer Science or Computer Engineering. Evaluations and reports required. The internship will require the signature of an advisor, Department Head, student, and local business representative. This course will be repeatable up to 3 credit hours. The number of credit hours will be determined by the number of hours worked. Every semester. Prerequisites: prior approval by a local business and advisor. Junior standing. Differential course fee will be assessed.

CPSC 3999R - Group Studies

(1-9) Credit Hours

On demand. Prerequisites: Department Head approval. Department may have additional prerequisite requirements. Differential course fee will be assessed.

CPSC 4100 - Survey of Programming Languages

(3) Credit Hours

The study of the structure, design, and implementation of computer programming languages, including procedural, object-oriented, logic programming, and functional languages. Topics include language syntax and semantics, procedure and data abstraction, binding times, exception processing, support for concurrency, and language programming paradigms. Prerequisites: CPSC 2800
and CPSC 3200
with minimum grades of C or Department Head approval. Differential course fee will be assessed.

CPSC 4120 - Secure Mobile App Development

(3) Credit Hours

The course will cover threats, attacks and defenses of mobile computing platforms spanning across secure coding, cryptography, physical security, secure communication, policy management, and mobile cloud where mobile devices outsource their computing tasks to the cloud. Mobile cloud can take advantage of the inherent benefits of cloud computing through its monitoring, security detection and malware prevention capabilities to protect its mobile customers. Prerequisites: CPSC 3140 and CPSC 3600
with a grade of C or better. Only open to BAS IT Cybersecurity majors. Differential course fee will be assessed.

CPSC 4130 - Introduction to Cloud Computing

(3) Credit Hours

Introduction to the current practices of cloud computing, focusing on cloud computing models, techniques, and architectures. Provides knowledge and hands-on experience in designing and implementing cloud-based software systems. Topics may include advanced web technologies, distributed computing models, virtualizations, parallelization, security/privacy, and other issues. Prerequisites: CPSC 2100
or Department Head approval. Differential course fee will be assessed.

CPSC 4150 - Secure Web Development

(3) Credit Hours

Building modern web applications requires integrating concepts from software engineering, systems programming, and computer security. This course will use concepts from these three areas to design, deploy, scale, attack, and defend modern web applications. Emphasis will be on concepts and techniques that enable web applications to maintain high performance in the face of numerous users and attackers, how to apply software engineering concepts to manage the complexity of client-side and server-side software and how to apply computer systems concepts to manage the scalability of the web application, and provide performance service to large numbers of simultaneous users. Prerequisites: CPSC 3140 and CPSC 3600
with a grade of C or better. Only open to BAS IT Cybersecurity majors. Differential course fee will be assessed.

CPSC 4180 - Programming Languages for Advanced Data Analytics

(3) Credit Hours

This course introduces students to the fundamental computing skills necessary for effective data analysis. Through this course students will learn a business/statistical programming language to read data, write functions, make informative graphics, and apply modern statistical methods to complex data sets. The course is designed to be of interest to students in a range of disciplines including health, insurance, education, sport and management.Prerequisites: CPSC 3200 with a minimum grade of C or Department Head approval. Differential course fee will be assessed.

CPSC 4200 - Automata, Complexity, and Computability

(3) Credit Hours

An introduction to the classical and contemporary theory of computation including automata, formal languages, Turing machines, recursive functions, computability and in computability, complexity, and the classes of P and NP. Prerequisites: CPSC 1110 and MATH 2030 or MATH 3030 with minimum grades of C or Department Head approval. Differential course fee will be assessed.

CPSC 4240 - Principles of Data Analytics

(3) Credit Hours

Introduces the tools and techniques of data analytics with application to business intelligence, the main tools of data analytics, both descriptive and predictive. Case studies will provide the links to intelligence that businesses can use in a range of disciplines including health, insurance, education, sport and management.Prerequisites: CPSC 3200 with a minimum grade of C or Department Head approval. Differential course fee will be assessed.

CPSC 4270 - Database and Security

(3) Credit Hours

Advanced concepts and methods in the definition and management of databases, transaction processing and programming in a database environment; topics in database security, database and data auditing, XML access control, trust management and privacy protection, integrity, recovery and concurrence, data warehousing and data mining. Spring semester. Prerequisites: CPSC 3220 or Department Head approval. Differential course fee will be assessed.

CPSC 4300 - Cloud Administration

(3) Credit Hours

The course begins with an introduction to the Amazon Web Services (AWS) or Azure platform and the user interface. The course will then cover key aspects of the platform such as policy creation, DLP, Threat Protection, securing Infrastructure as a Service (IaaS) and other key features. The course will provide examples and hands-on practice on how to enforce policy on any one or combination of granular factors such as service, category, user, group, device, content, data loss prevention (DLP) profile, and more. Prerequisites: CPSC 3600 with a grade of C or better. Only open to BAS IT Cybersecurity majors. Differential course fee will be assessed.

CPSC 4430 - Introduction to Machine Learning

(3) Credit Hours

Machine learning uses interdisciplinary techniques such as statistics, linear algebra, optimization, and computer science to create automated systems that can sift through large volumes of data at high speed to make predictions or decisions without human intervention. Machine learning as a field is now incredibly pervasive, with applications in business intelligence, homeland security, bio-informatics, and civil engineering, etc. This class will familiarize students with a broad cross-section of models and algorithms for machine learning, and prepare students for research or industry application of machine learning techniques. Prerequisites: CPSC 3200
and MATH 2200
and MATH 2100
or MATH 3100
or DATA 2140
, or Department Head approval. Differential course fee will be assessed.

CPSC 4440 - Introduction to Artificial Intelligence

(3) Credit Hours

Artificial intelligence; simulation of cognitive behavior and self-organizing systems; heuristic programming including the use of list processing languages; data representation; pattern matching structures; applications in symbolic mathematics; survey of examples from representative application areas. Prerequisites: CPSC 3200
with a minimum grade of C or Department Head approval. Differential course fee will be assessed.

CPSC 4530 - Data Visualization and Exploration

(3) Credit Hours

Data and image models, perception and attention, visualization software and tools, interactive visualization, Tufte's design principles, maps, graphs and networks, Hierarchies and trees, data density and small multiples, statistical graphs, text and documents, multivariate data and table, high-dimensional data.Lecture 3 hours and laboratory 2 hours.Prerequisites: CPSC 3200
with a minimum grade of C or Department Head approval. Laboratory/studio course fee will be assessed. Differential course fee will be assessed.

CPSC 4550 - Computer Networks

(3) Credit Hours

The theory, design, engineering, and installation of networks to connect digital computers. The course will prepare students to plan and implement a network. Also includes peer-to-peer networks, the client-server model, network operating systems, and an introduction to wide-area networks. The network and implementation tools may vary to meet current development trends. Prerequisites: CPSC 2800
with a minimum grade of C and an approved course in statistics or Department Head approval. Differential course fee will be assessed.

CPSC 4600 - Biometrics and Cryptography

(3) Credit Hours

This course covers the basic concepts of pattern recognition and biometrics, current major biometric technologies, and analyzes specific case studies from technical, privacy, and social impact viewpoints along with a critical study of the cryptographic protocols used in many security applications. Prerequisites: CPSC 1110
, CPSC 3600
and MATH 2030
or MATH 3030 with minimum grades of C or Department Head approval. Differential course fee will be assessed.

CPSC 4620 - Computer Network Security

(3) Credit Hours

This course will focus on the security issues and procedures in computer and mobile communication networks. Topics include risk assessment and security policies, network intrusion detection, forensics technologies, and current trends and research in security policies and technologies. Prerequisites: CPSC 4550
with minimum grade of C and an approved course in statistics or Department Head approval. Differential course fee will be assessed.

CPSC 4630 - Wireless Network Security

(3) Credit Hours

This course covers the basic concepts of wireless technologies, current major wireless technologies, and analyzes specific case studies from technical, privacy, and social impact viewpoints. Also covered is a critical study of the IEEE 802.11 cryptographic protocols used in many wireless security applications. Prerequisites: CPSC 1110
, CPSC 3600
and CPSC 4550
with minimum grades of C or Department Head approval. Differential course fee will be assessed.

CPSC 4660 - System Vulnerability Analysis and Auditing

(3) Credit Hours

The course covers the assessment of systems to discover resources that are susceptible to damage if intrusions and unauthorized access occur. The analysis of system vulnerability, identification of security deficiencies, security measurements, effectiveness and adequacy, and estimation of the vulnerability of system resources to potential disaster hazards of unknown origin are also covered. Prerequisites: CPSC 1110
, CPSC 3600
, and CPSC 4550
with minimum grades of C or Department Head approval. Differential course fee will be assessed.

CPSC 4680 - Computer Crime Investigation

(3) Credit Hours

A study on procedures for identification, preservation, and extraction of electronic evidence. Auditing and investigation of network and host system intrusions, analysis and documentation of information gathered, and preparation of expert testimonial evidence will be covered. Forensic tools and resources for system administrators and information system security officers will also be explored. Prerequisites: CPSC 2800
, CPSC 3600
and CPSC 3610
with minimum grades of C or Department Head approval. Differential course fee will be assessed.

CPSC 4730 - Quantum Computing Fundamentals

(3) Credit Hours

This course provides a comprehensive exploration of quantum computing, blending fundamental concepts with practical applications. The course begins with an introduction to quantum mechanics, followed by a focus on key topics like quantum algorithms, cryptography, information theory, hardware, and current research in the field. Hands-on Python exercises, using the Qiskit framework, complement theoretical learning, enabling students to simulate and implement various quantum computations. The course concludes with discussions on practical applications and future developments in quantum computing. Prerequisites: MATH 2200
or Department Head approval. Differential course fee will be assessed.

Effective Spring 2026.

CPSC 4820 - Enterprise Computing Systems

(3) Credit Hours

A study of mainframe computer systems, mainframe operating systems, and mainframe application program design and development.Prerequisites: CPSC 3200
with a minimum grade of C or Department Head approval. Differential course fee will be assessed.

CPSC 4900 - Software Engineering

(3) Credit Hours

Study of techniques used in the definition, specification, design, implementation and testing of large software systems. The course will include team efforts to identify and define the requirements of a large software product. The development of this product will continue in CPSC 4910
. Prerequisites: CPSC 3200
with a minimum grade of C plus 9 additional credit hours of CPSC and/or CPEN coursework at the 3000 or 4000 level or Department Head approval. Differential course fee will be assessed.

CPSC 4910 - Senior Capstone Project

(3) Credit Hours

Continuation of the group design effort started in CPSC 4900
. Implementation of a computer science project. Oral and written presentation of progress and final results

required. Prerequisites: CPSC 4900
with a minimum grade of C and senior standing in computer science or Department Head approval. Differential course fee will be assessed.

CPSC 4995R - Departmental Thesis

(1-3) Credit Hours

A two-semester research or creative project resulting in a thesis under the supervision of a faculty member and with the approval of the Honors College. On demand. Prerequisites: Student must coordinate with Honors College to submit a Thesis Contract to get registered for this course. Restricted to Sophomore standing or higher. Differential course fee will be assessed.

CPSC 4997R - Research

(1-9) Credit Hours

Enables students to conduct independent research. On demand. Prerequisites: Student must coordinate with a specific faculty member to complete the Research contract to get registered for the course. Restricted to Sophomore standing or higher. Differential course fee will be assessed.

CPSC 4998R - Individual Studies

(1-9) Credit Hours

Enables students to study selected topics in depth. On demand. Prerequisites: Student must coordinate with a specific faculty member to complete the Individual Studies contract to get registered for the course. Restricted to Sophomore standing or higher. Differential course fee will be assessed.

CPSC 4999R - Group Studies

(1-9) Credit Hours

Department may have additional prerequisite requirements. On demand. Differential course fee will be assessed.

Construction Management

ETCM 1001 - Introduction to Construction Management

(3) Credit Hours

This course offers an introduction to the field of construction management, covering various aspects such as industry divisions, stakeholders, organizational structures, project delivery methods, and contracting. Additionally, it provides an overview of management and trade roles, resource management, safety practices, environmental considerations, ethical principles, and an examination of codes, standards, and regulations within the industry. Fall or Spring semester. Differential course fee will be assessed.

ETCM 1100 - Blueprint Reading & Sketching

(3) Credit Hours

Provides instruction and practice in the use of working drawings and applications from the print to the work. Includes relationship of views and details, interpretation of dimensions, transposing scale, tolerance, electrical symbols, sections, materials list, architectural plans, room schedules and plot plans. This course introduces the basic principles of print reading. Topics include line types, orthographic projections, dimensioning methods, and notes. Upon completion, students should be able to interpret basic prints and visualize the features of a part or system. Class 2 hours. Lab 1 hour. Laboratory/studio course fee will be assessed. Differential course fee will be assessed.

ETCM 1740 - Surveying

(4) Credit Hours

Fundamental concepts and practices of surveying. Theory of measurements and field notes; methods of obtaining horizontal and vertical distances, angles and directions; use of levels, transits, theodolites, and total stations; construction surveying, curves and volumes. Lecture 2 hours and laboratory 2 hours. Pre or Corequisites: MATH 1720 or Department Head approval. Laboratory/studio course fee will be assessed. Differential course fee will be assessed.

ETCM 1999R - Special Projects

(1-9) Credit Hours

Individual or group projects. On demand. Prerequisites: Department Head approval. Differential course fee will be assessed.

ETCM 2010 - Industrial Safety and Risk Management

(3) Credit Hours

Introduction of occupational safety hazards associated with the manufacturing, service, and construction industries. Emphasis placed on recognition, evaluation and control of safety hazards, particularly as they relate to the Occupational Safety and Health Administration (OSHA) guidelines. Introduction to risk management strategies by identifying potential risks and assigning mitigation control measures.Lecture 3 hours.Differential course fee will be assessed.

ETCM 2020 - Estimating and Construction Documents I

(3) Credit Hours

Principles of estimating via quantity surveys of materials for construction projects through computer software programs, blueprints, and specifications. Current material, labor, and equipment costs will be evaluated and applied to material takeoffs to develop a construction estimate. Other topics include contractor's general and project specific overhead expenses, profit amounts, bid strategies and preparation, ethics, and the role of scheduling.Lecture 3 hours.Prerequisites: ETEM 1320
and ETCM 1100
or Department Head approval. Differential course fee will be assessed.

ETCM 2640 - Construction Office Practice

(3) Credit Hours

Examination of the importance of construction documents and best practices integral to various aspects of the construction process. Provides fundamental knowledge for the documentation, administration, and successful delivery of construction projects. Serves as a useful study aid for those wishing to obtain the Construction Documents Technologist (CDT) certificate.Lecture 3 hours. Pre or Corequisites: ETCM 1100
or IARC 1100
or Department Head approval. Differential course fee will be assessed.

ETCM 2999R - Group Studies

(1-9) Credit Hours

On demand. Pre or Corequisites: Department Head approval. Department may have additional prerequisite requirements. Differential course fee will be assessed.

ETCM 3090 - Architectural CAD

(3) Credit Hours

Introduction to principles of graphic tools and CAD systems in architecture and construction fields. Application of CAD in creation of floor plans, foundation plans, roof design, section details, and elevation drawings. Prerequisites: ETCM 1100
or IARC 1100
with a grade of C or better or Department Head approval. Laboratory/studio course fee will be assessed. Differential course fee will be assessed.

ETCM 3150 - Building Information Modeling (BIM)

(3) Credit Hours

Introduction of the fundamental knowledge in Building Information Modeling (BIM). The course includes two sides: basic BIM theory and the application of existing BIM tools. These two types of contents will be alternately offered

through regular lecture contents and lab practice. The typical BIM tool, ArchiCAD, will be introduced and used as a preliminary into one aspect of BIM design.Lecture 1 hour, laboratory 2 hours.Prerequisites: ETCM 3090 or Department Head approval. Differential course fee will be assessed.

ETCM 3240 - Construction Structures

(3) Credit Hours

Principles of structural components and their behavior related to building structures. Types of building structures include concrete foundations, structural steel, pre-engineered metal buildings, and precast concrete structures. Includes purpose, structural elements, stress patterns, shear, and soil bearing mechanisms. Study includes reinforced concrete, formwork, wood framed and steel buildings. Prerequisites: ETCM 2020 or Department Head approval. Differential course fee will be assessed.

ETCM 3340 - Building Science Applications

(3) Credit Hours

Principles of form, shape, function, purpose and systems behavior related to building science. Includes floor systems, wall systems, force systems, frame analysis, gravity load tracing, moisture resistance, wind resistance, and seismic resistance for concrete, wood, and steel buildings. Prerequisites: ETCM 2020 or Department Head approval. Differential course fee will be assessed.

ETCM 3440 - Mechanical and Electrical Systems in Buildings

(3) Credit Hours

Overview of the plumbing and mechanical and electrical systems of buildings. Basic design, sustainability concepts, systems, installation and testing are covered. Study includes history, service of system functions, project planning, and plan document review. Prerequisites: ETCM 2020 or Department Head approval. Differential course fee will be assessed.

ETCM 3999R - Group Studies

(1-9) Credit Hours

On demand. Pre or Corequisites: Department Head approval. Department may have additional prerequisite requirements. Differential course fee will be assessed.

ETCM 4010 - Construction Scheduling

(3) Credit Hours

Development of the project schedule and its relationship to the estimate and contractual scheduling requirements examined. The application of the Critical Path Method (CPM) and Program Evaluation Review Technique (PERT) to construction planning, scheduled vs. actual job expenditures, cost forecasting, should be reinforced.Lecture 3 hours.Prerequisites: ETEM 3550

or Department Head approval. Differential course fee will be assessed.

ETCM 4020 - Estimating and Construction Documents II

(3) Credit Hours

Advanced estimating techniques using quantity surveys of materials for construction projects which incorporate unit pricing, labor units, crew sizes, material costs, integration of subcontractor pricing and proposals, weather conditions and site restraints with scheduling systems. Other topics include discussions regarding trends related to Building Information Models (BIM) and site work.Lecture 3 hours.Prerequisites: ETCM 2020
and ETCM 2640
and ETCM 3090
or Department Head approval. Differential course fee will be assessed.

ETCM 4050 - Strategic Management for Construction Business

(3) Credit Hours

This course covers essential construction management issues as related to the management and organizational practices as well as legal and ethical topics found in industry. Construction law and risk management is discussed through the exploration of contracts, insurance requirements, labor laws, lien claims, and dispute resolution methods. management topics include company organizational structures, policies and procedures, accounting and budgeting practices, procurement procedures, operational and business ethics within construction arenas. lecture 3 hours. Prerequisites: ETCM 2640
, or Department Head approval. Differential course fee will be assessed.