Course Description

河南大學
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Enrolment Date: September 2020
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Course: College Physics I	Type: Compulsory
Credits: 3.0	Total Hours: 72
Score: 80	Academic Year: 2020-2021 1st Semester

Overview:

From Chapter 1 to Chapter 14, mainly concerned with basic math, motion, force, work and power, momentum, simple harmonic motion and simple harmonic wave.

Objectives:

General Physics is an important fundamental theory course for students in the major of Materials Science and Engineering & Polymer Materials Science and Engineering;

This course not only helps students obtain the necessary physical fundamental knowledge, but also generates important impacts on further study of new materials science theory, knowledge and technologies in the future;

On the other hand, through the study of this course, the students can obtain the methods to think and solve problems in the field of materials science and engineering.

Assessment:

Class Attendance and Participation（10%）

Homework（20%）

Final Test（70%）

Textbooks:

Physics for Scientists & Engineers with Modern Physics by Douglas C. Giancoli, 4th Edition

Course: Calculus of Engineering I	Type: Compulsory
Credits: 5.0	Total Hours: 108
Score: 80	Academic Year: 2020-2021 1st Semester

Overview:

From Chapter 1 to Chapter 8:

1.Functions: Introduction to functions, function properties, and various types of functions.

2.Limits: Understanding limits, calculating limits, and applying limits to study the behaviour of functions.

3.Derivatives: Definition of derivatives, rules of differentiation, and their applications to analyse the slopes and rates of change.

4.Applications of the Derivative: Practical applications of derivatives, including optimization, related rates, and curve sketching.

5.Integration: Introduction to integration, calculating definite and indefinite integrals, and applying integration to compute areas and volumes.

6.Application of Integration: Further applications of integration, including finding the area between curves, volumes of solids of revolution, and work problems.

7.Integration Techniques: Advanced methods of integration, such as integration by parts, trigonometric substitutions, and partial fraction decomposition.

8.Differential Equations: Basics of differential equations, including first-order differential equations and separable differential equations.

Objectives:

Calculus is an important branch of mathematics that primarily deals with concepts and methods related to limits, derivatives, integrals, and differential equations of functions. This course is commonly offered as a foundational subject in disciplines like mathematics and engineering at the undergraduate level. It helps students understand concepts of change and rates and applies them to solve practical problems, such as finding slopes of curves, computing areas and volumes, and analysing dynamics and circuits. Studying calculus provides students with a strong mathematical foundation and prepares them for further advanced academic and professional courses.

Assessment:

Class Attendance and Participation（10%）

Homework（30%）

Final Test（60%）

Textbooks:

Calculus for Scientists and Engineers: Early Transcendentals 1st Edition by William Briggs (Author), Lyle Cochran (Author), Bernard Gillett (Author)

Course: Introduction to Engineering I	**Type: Compulsory**
Credits: 3.0	**Total Hours: 72**
Score: 84	**Academic Year: 2020-2021 1st Semester**

Overview:

1.The course "Thinking Like an Engineer: An Active Learning Approach" based on the 3rd Edition by Elizabeth A. Stephan, David R. Bowman, William J. Park, Benjamin L. Sill, and Matthew W. Ohland is a foundational subject for undergraduate engineering students. This course focuses on developing the mindset and problem-solving skills essential for engineers. Through active learning techniques and real-world engineering challenges, students will learn how to think critically, analyse problems, and design innovative solutions. It serves as a comprehensive resource for shaping students' engineering mindset and preparing them for future engineering projects and careers.

2.The course "C++ Programming: Program Design Including Data Structures" based on the 007 Edition, Kindle Edition, authored by D. S. Malik, is an important subject for undergraduate computer science and engineering students. This course focuses on teaching C++ programming and data structure concepts. Topics covered include programming fundamentals, object-oriented programming, arrays, linked lists, stacks, queues, trees, and sorting algorithms. Through this course, students will acquire the knowledge and skills to design and implement efficient C++ programs with appropriate data structures. It serves as a fundamental resource for further studies in computer programming and software development.

Objectives:

Engineering Introduction is a course that focuses on the utilization of C++ programming language and Excel spreadsheets. The course provides an overview of engineering principles and practices, emphasizing the application of these tools in engineering projects. The objectives of this course include:

1.Understanding Engineering Concepts: The course aims to introduce students to fundamental engineering concepts across various disciplines, such as mechanical, electrical, civil, etc. Students will gain an understanding of the scope, applications, and key principles of different engineering fields.

2.Developing Programming Skills: Students will learn how to program in C++, a widely used programming language in the engineering field. They will acquire the knowledge and skills necessary to write efficient and effective code for engineering applications.

3.Utilizing Excel for Engineering Analysis: The course will teach students how to use Excel spreadsheets for data analysis, modelling, and problem-solving in engineering scenarios. They will learn how to organize and manipulate data, perform calculations, and create visual representations of engineering data using Excel.

4.Applying Programming and Excel in Engineering Projects: Students will have the opportunity to apply their programming and Excel skills in engineering projects. They will learn how to use C++ and Excel to design and analyse engineering systems, simulate real-world scenarios, and optimize engineering solutions. Overall, the course aims to provide students with a solid foundation in engineering principles while equipping them with practical programming and data analysis skills using C++ and Excel. By the end of the course, students should be able to apply these tools effectively in various engineering contexts.

Assessment:

Class Attendance and Participation（10%）

Homework（20%）

Mid-term Test（30%）

Final Test（40%）

Textbooks:

1.*Thinking Like an Engineer: An Active Learning Approach 3rd Edition* by Elizabeth A. Stephan (Author), David R. Bowman (Author), William J. Park (Author), Benjamin L. Sill (Author), Matthew W. Ohland (Author)

2.*C++ Programming: Program Design Including Data Structures 007 Edition, Kindle Edition* by D. S. Malik (Author)

Course: Introduction to Software Engineering	**Type: Optional**

Credits: 2.0	Total Hours: 36
Score: 80	Academic Year: 2020-2021 1st Semester

Overview:

This course focuses on the principles and practices of software engineering, with an emphasis on developing high-quality and reliable software products. Topics covered include software development life cycle, requirements engineering, software design, implementation, testing, and maintenance. Through this course, students will gain a comprehensive understanding of software engineering methodologies and techniques, enabling them to develop complex and efficient software products that meet user needs and industry standards. It serves as a foundational resource for further studies and practical applications in the field of software engineering, particularly in the development of innovative and reliable software solutions for various industries and domains.

Objectives:

Understanding Software Engineering: The course aims to introduce students to the field of software engineering and its importance in developing high-quality software systems. Students will gain an understanding of the software development life cycle, different software development methodologies, and the role of software engineering in solving real-world problems. Learning Software Development Processes: Students will learn about various software development processes, such as the waterfall model, agile methodologies (e.g., Scrum, Kanban), and iterative and incremental development. They will understand the different phases of software development, including requirements gathering, analysis, design, implementation, testing, and maintenance. Mastering Software Requirements Engineering: The course will cover the techniques and best practices for eliciting, documenting, and managing software requirements. Students will learn how to effectively communicate with stakeholders, analyse requirements, and ensure that software systems meet user needs. Exploring Software Design Principles: Students will learn about software design principles and patterns that facilitate the creation of modular, maintainable, and scalable software systems. They will understand the importance of abstraction, encapsulation, modularity, and separation of concerns in software design. Understanding Software Testing and Quality Assurance: The course will introduce students to software testing techniques, including unit testing, integration testing, system testing, and acceptance testing. They will learn how to write test cases, perform test execution, and identify and fix software defects. Additionally, students will understand the importance of quality assurance activities in ensuring software reliability and robustness. Learning Software Project Management: The course will cover the basics of software project management, including project planning, scheduling, resource allocation, and risk management. Students will learn how to effectively manage software projects, including managing project scope, budget, and team dynamics.

Overall, the course aims to provide students with a comprehensive understanding of software engineering principles, processes, and practices. By the end of the course, students should be able to apply these concepts to develop and manage software projects effectively.

Assessment:

Class Attendance and Participation（20%）

Homework（20%）

Final Test（60%）

Textbooks:

Engineering Software Products: An Introduction to Modern Software Engineering 1st Edition by Ian Sommerville (Author)

Course: Linear Algebra	Type: Compulsory
Credits: 3.0	Total Hours: 54
Score: 78	Academic Year: 2020-2021 1st Semester

Overview:

Linear algebra is an important branch of mathematics that studies the theory and methods of vector spaces and linear mappings. It has wide applications in various fields such as physics, engineering, computer science, and more. The fundamental concepts of linear algebra include vectors, matrices, linear equations, and linear transformations. Vectors are quantities with magnitude and direction, used to represent physical quantities or mathematical objects. Matrices are rectangular arrays of numbers used to represent linear transformations or systems of linear equations. Linear equations are a set of equations that can be solved by

expressing the solutions as linear combinations of vectors. Linear transformations are special mappings that preserve vector addition and scalar multiplication. The main topics of study in linear algebra include vector spaces, linear dependence and independence, basis and dimension, linear transformations, eigenvalues and eigenvectors, and more. A vector space is a set of vectors that satisfies certain rules of operations. Linear dependence and independence describe the relationships between vectors in a vector set. A basis is a set of linearly independent vectors that can be used to represent any vector in the vector space. Dimension refers to the number of vectors in the basis of a vector space. Linear transformations are operations that map vectors to other vectors while preserving vector addition and scalar multiplication. Eigenvalues and eigenvectors are important concepts in linear transformations, describing the effects of the transformation on certain vectors. Linear algebra has widespread applications in practical fields such as image processing, data analysis, machine learning, and more. It provides mathematical tools and methods to solve linear relationships and linear models in practical problems. Additionally, linear algebra is a foundational discipline in mathematics, laying the groundwork for more advanced mathematical analysis and abstract algebra.

Objectives:

The course covers fundamental concepts such as vectors, matrices, systems of linear equations, vector spaces, eigenvalues, and eigenvectors. Through studying this textbook, students acquire a solid understanding of the core theory and methods of linear algebra, and learn how to apply these concepts to solve various real-world problems, including solving systems of linear equations, linear transformations, least squares, engineering applications, and data processing. This course serves as a foundation for disciplines like mathematics, engineering, natural sciences, and computer science, providing students with a strong basis in linear algebra for advanced academic and professional courses.

Assessment:

Class Attendance and Participation（10%）

Homework（30%）

Final Test（60%）

Textbooks:

Elementary Linear Algebra 11th Edition by Howard Anton (Author)

Course: College Physics II	**Type: Compulsory**
Credits: 3.0	**Total Hours: 60**
Score: 80	**Academic Year: 2020-2021 2nd Semester**

Overview:

From Chapter 15 to Chapter 20, mainly concerned with wave motion and transverse waves, sound and longitudinal waves, the kinetic theory of gas, three thermodynamics laws, light reflection and refraction, lenses and optical instruments, interference, diffraction and polarization, the early quantum mechanics and develop skills and habits of solving problems in a well-reasoned and neat manner.

Objectives:

General Physics is an important fundamental theory course for students in the major of Materials Science and Engineering & Polymer Materials Science and Engineering;

This course not only helps students obtain the necessary physical fundamental knowledge, but also generates important impacts on further study of new materials science theory, knowledge and technologies in the future;

On the other hand, through the study of this course, the students can obtain the methods to think and solve problems in the field of materials science and engineering.

Assessment:

Class Attendance and Participation（10%）

Homework（20%）

Final Test（70%）

Textbooks:

Physics for Scientists & Engineers with Modern Physics by Douglas C. Giancoli, 4th Edition

Course: College Physics Experiment II	**Type: Compulsory**
Credits: 1.0	**Total Hours: 20**

Score: 89	Academic Year: 2020-2021 2nd Semester

Overview:

Students need to go to the physics laboratory to do different experiments every week, get relevant experimental data and complete relevant experimental reports. This course focuses on laboratory experiments that complement theoretical concepts covered in university physics courses. Topics covered include mechanics, electricity and magnetism, optics, and modern physics. Through this course, students will gain hands-on experience in conducting physics experiments, collecting and analysing data, and verifying physical principles and laws. It serves as a foundational resource for reinforcing theoretical knowledge and developing practical skills in experimental physics.

Objectives:

The course is designed to enhance students' understanding of the physical world and prepare them for further studies and research in physics and related disciplines.

Assessment:

Class Attendance and Participation（20%）

Experimental Report（40%）

Final Experimental Test（40%）

Textbooks:

University Physics Experiment, edited by Ding Fei and Liu Pingan, Henan University Press

Course: Dynamics	Type: Compulsory
Credits: 3.0	Total Hours: 54
Score: 74	Academic Year: 2020-2021 2nd Semester

Overview:

Dynamics is the study of the motion and force of objects in physics, involving the laws of motion of objects and the interaction of forces. It is the science of describing and explaining how objects change over time. The study of dynamics is based on Newton's laws of motion, the first of which describes the state of a body in constant motion or at rest in a straight line without the action of an external force. The second law describes the effect of force on the state of motion of the body, that is, the acceleration of the body is proportional to the force and inversely proportional to the mass of the body. The third law states that every force has an equal and opposite reaction. The main concepts of dynamics include particle, mass, force, acceleration, velocity, and displacement. A particle is an idealized object that has no size or shape, only mass and position. Mass is a property of an object that describes how well it responds to a force. Force is the cause of the interaction between objects and can change the state of motion of objects. Acceleration is the rate at which velocity changes over time. Velocity is the distance an object moves per unit of time. Displacement is the change of an object from one position to another. Dynamics has a wide range of applications, including mechanics, astrophysics, engineering and so on. It can be used to explain the motion of celestial bodies, the motion of mechanical systems, the behaviour of fluids, and so on. The theories and methods of dynamics also provide the basis for other branches of physics, such as quantum mechanics and relativity. In the study of dynamics, the motion of objects can be described and analysed by differential equations. Differential equations are mathematical equations that describe how the motion of an object changes over time. By solving the differential equation, the trajectory and the law of motion of the object can be obtained. In short, dynamics is the study of the motion and forces of objects, revealing laws in nature by describing and explaining how objects change over time. It is the foundation of physics and has a wide range of applications in many fields.

Objectives:

This course focuses on the study of dynamics, which deals with the motion of particles and rigid bodies under the influence of forces and moments. It covers topics such as kinematics, kinetics, work and energy, impulse and momentum, and mechanical vibrations. Through this course, students will gain a thorough understanding of the principles of dynamics and learn how to apply them to solve real-world engineering problems related to motion, forces, and mechanical systems. This course provides a strong foundation for further studies in engineering and related fields.

Assessment:

Class Attendance and Participation（20%）

Homework（20%）

Final Test（60%）
Textbooks: *Engineering Mechanics: Dynamics 13th ed. Edition* by R C Hibbeler (Author)

Course: Introduction to Engineering II	**Type: Compulsory**
Credits: 2.0	**Total Hours: 32**
Score: 81	**Academic Year: 2020-2021 2nd Semester**
Overview: 1.The course "Principles and Methods of Surveying" based on the book edited by Yan Haowen and Yang Weifang, and published by Science Press, is a crucial subject for undergraduate civil engineering and geomatics students. This course focuses on the principles, techniques, and practices of land surveying. Topics covered include measurements, leveling, angles, distance measurements, total stations, GPS, and data processing. Through this course, students will gain a comprehensive understanding of surveying principles and methodologies, enabling them to accurately measure and map the Earth's surface for various engineering and land development projects. It serves as a foundational resource for further studies and practical applications in the field of land surveying and geomatics. 2.The course "Mastering ArcGIS" based on the 8th Edition, Kindle Edition, authored by Maribeth Price, is an important subject for undergraduate geography, environmental science, and geomatics students. This course focuses on teaching Geographic Information System (GIS) concepts and ArcGIS software. Topics covered include spatial data management, map design, spatial analysis, geoprocessing, and web mapping. Through this course, students will acquire the knowledge and skills to effectively use ArcGIS software for spatial data analysis and visualization. It serves as a fundamental resource for further studies in GIS and spatial analysis applications in various fields.	
Objectives: Introduction to Engineering II is a course that provides an overview of various aspects of engineering, including measurement and ArcGIS. 1.Measurement is a fundamental aspect of engineering that involves the process of quantifying physical quantities. In this course, students learn about different measurement techniques and instruments used in engineering practice. They explore concepts such as accuracy, precision, and uncertainty in measurements. The course covers topics like dimensional analysis, units and conversions, error analysis, and statistical methods for data analysis. Students also gain hands-on experience with various measurement tools and techniques, including sensors, data acquisition systems, and calibration procedures. 2.ArcGIS (Geographic Information System) is a powerful software tool widely used in engineering and other fields to manage, analyse, and visualize spatial data. In this course, students learn the basics of ArcGIS and its applications in engineering projects. They explore concepts such as spatial data models, georeferencing, data editing, spatial analysis, and map production. Students also get hands-on experience with ArcGIS software, where they learn to create and manipulate maps, perform spatial analysis, and present their findings in a visually appealing manner. Overall, Introduction to Engineering II provides students with a broad understanding of measurement principles and techniques used in engineering, as well as an introduction to the applications of ArcGIS in engineering projects. This course equips students with essential skills and knowledge for data collection, analysis, and visualization, which are crucial in various engineering disciplines.	
Assessment: Class Attendance and Participation（10%） Homework（10%） Mid-term Test（30%） Final Test（50%）	
Textbooks: 1.*Principles and Methods of Surveying*, edited by Yan Haowen and Yang Weifang, Science Press 2.*Mastering ArcGIS 8th Edition, Kindle Edition* by Maribeth Price (Author)	

Course: Mechanics of Solids I	**Type: Compulsory**
Credits: 3.0	**Total Hours: 48**
Score: 74	**Academic Year: 2020-2021 2nd Semester**

Overview:
The book is divided into 11 chapters, in which the principles are first applied to simple, then to more complicated situations. In a general sense, each principle is applied first to a particle, then a rigid body subjected to a coplanar system of forces, and finally to three-dimensional force systems acting on a rigid body. Chapter 1 begins with an introduction to mechanics and a discussion of units. The vector properties of a concurrent force system are introduced in Chapter 2. This theory is then applied to the equilibrium of a particle in Chapter 3. Chapter 4 contains a general discussion of both concentrated and distributed force systems and the methods used to simplify them. The principles of rigid-body equilibrium are developed in Chapter 5 and then applied to specific problems involving the equilibrium of trusses, frames, and machines in Chapter 6, and to the analysis of internal forces in beams and cables in Chapter 7. Applications to problems involving frictional forces are discussed in Chapter 8, and topics related to the center of gravity and centroid are treated in Chapter 9. If time permits, sections involving more advanced topics, indicated by stars, may be covered. Most of these topics are included in Chapter 10 (area and mass moments of inertia) and Chapter 11 (virtual work and potential energy).

Objectives:
The course focuses on the static equilibrium of rigid bodies and introduces principles of statics and their practical applications in engineering. Topics covered include force systems, free-body diagrams, trusses, frames, friction, centroids, moments of inertia, and virtual work. Through this course, students gain a comprehensive understanding of static equilibrium concepts and develop problem-solving skills related to structures and machines. It lays a strong foundation for further studies in engineering and related disciplines.

Assessment:
Class Attendance and Participation（15%）
Homework（10%）
Mid-term Test（35%）
Final Test（40%）

Textbooks:
Engineering Mechanics: Statics (13th Edition) by Russell C. Hibbeler

Course: Calculus II	**Type: Compulsory**
Credits: 4.0	**Total Hours: 60**
Score: 70	**Academic Year: 2020-2021 2nd Semester**

Overview:
From Chapter 9 to Chapter 11:
9.Sequences and Infinite Series: Introduction to sequences, series, and their convergence properties.
10.Power Series: Understanding power series, finding their intervals of convergence, and representing functions as power series.
11.Parametric and Polar Curves: Studying parametric equations and polar coordinates to represent curves in the plane.

Objectives:
Calculus is an important branch of mathematics that primarily deals with concepts and methods related to limits, derivatives, integrals, and differential equations of functions. This course is commonly offered as a foundational subject in disciplines like mathematics and engineering at the undergraduate level. It helps students understand concepts of change and rates and applies them to solve practical problems, such as finding slopes of curves, computing areas and volumes, and analysing dynamics and circuits. Studying calculus provides students with a strong mathematical foundation and prepares them for further advanced academic and professional courses.

Assessment:
Class Attendance and Participation（10%）
Homework（30%）
Final Test（60%）

Textbooks:
Calculus for Scientists and Engineers: Early Transcendentals 1st Edition by William Briggs (Author), Lyle Cochran (Author), Bernard Gillett (Author)

Course: Calculus（Ⅲ）	Type: Compulsory
Credits: 3.0	Total Hours: 54
Score: 74	Academic Year: 2020-2021 2nd Semester
Overview: From Chapter 12 to Chapter 15: 12.Vectors and Vector-Valued Functions: Introduction to vectors, vector operations, and vector-valued functions. 13.Functions of Several Variables: Understanding functions of several variables, partial derivatives, and their applications. 14.Multiple Integration: Extending integration to multiple variables, including double and triple integrals, and their applications. 15.Vector Calculus: Introduction to vector calculus, covering topics like line integrals, surface integrals, and the theorems of Green, Stokes, and Gauss.	
Objectives: This course is commonly offered as a foundational subject in disciplines like mathematics and engineering at the undergraduate level. It helps students understand concepts of change and rates and applies them to solve practical problems, such as finding slopes of curves, computing areas and volumes, and analysing dynamics and circuits. Studying calculus provides students with a strong mathematical foundation and prepares them for further advanced academic and professional courses.	
Assessment: Class Attendance and Participation（10%） Homework（30%） Final Test（60%）	
Textbooks: *Calculus for Scientists and Engineers: Early Transcendentals 1st Edition* by William Briggs (Author), Lyle Cochran (Author), Bernard Gillett (Author)	

Course: Material Experiment	Type: Compulsory
Credits: 2.0	Total Hours: 20
Score: 95	Academic Year: 2021-2022 1st Semester
Overview: Material testing is an important undergraduate course that aims to teach students how to evaluate the performance and characteristics of materials through experimental testing. This course covers various testing methods, including tensile testing, compression testing, bending testing, hardness testing, and impact testing. Students will learn how to prepare test specimens, conduct experimental measurements, and analyse and interpret the test results.	
Objectives: Through this course, students will acquire practical skills in conducting experiments and processing data, gaining insights into the behaviour and responses of materials under different conditions. Material testing provides students with an opportunity to gain in-depth knowledge of material properties and establishes a solid foundation for research and practice in fields such as material science, materials engineering, and mechanical engineering.	
Assessment: Class Attendance and Participation（40%） Experimental Report（60%）	
Textbooks: No	

Course: Introduction to Ordinary Differential Equations	Type: Compulsory
Credits: 3.0	Total Hours: 54
Score: 89	Academic Year: 2021-2022 1st Semester
Overview:	

The first chapter starts with the simplest first-order linear differential equations and builds on this to lead to the more general equations. The concepts of initial values and existence and uniqueness of solutions are introduced early in this chapter. Ample examples, using simple integration, are provided to motivate and demonstrate these concepts. Almost all of the assertions are proved in elementary and simple terms.
The important concepts of the Cauchy problem and the existence and uniqueness of solutions are covered in detail and demonstrated by many examples. Proofs are given in an Appendix. There is also a rigorous treatment of some qualitative behaviour of solutions. This chapter is important from a pedagogical point of view because it introduces students to rigor and fosters an understanding of important concepts at an early stage.
In a chapter on nonlinear first-order equations, students will learn how to explicitly solve certain types of equations, such as separable, homogeneous, exact, Bernoulli and Clairaut equations. Further chapters are devoted to linear higher order equations and systems, with several applications to mechanics and electrical circuit theory. Also included is an elementary but rigorous introduction to the theory of oscillation.
A chapter on phase plane analysis deals with finding periodic solutions, solutions of simple boundary value problems, and homoclinic and heteroclinic trajectories. There is also a section on the Lotka–Volterra system in the area of population dynamics.
Subsequently, the book deals with the Sturm–Liouville eigenvalues, Laplace trans- form and finding series solutions, including fairly detailed treatment of Bessel functions, which are important in Engineering.
Although this book is mainly addressed to undergraduate students, consideration is given to some more advanced topics, such as stability theory and existence of solutions to boundary value problems, which might be useful for more motivated undergraduates or even beginning graduate students.
Each chapter ends with a set of exercises that are intended to test the student's understanding of the concepts covered. Solutions to selected exercises are included at the end of the book.

Objectives:
This course focuses on the study of ordinary differential equations and their solutions. Topics covered include first-order differential equations, higher-order linear differential equations, systems of differential equations, and special techniques for solving specific types of differential equations. Through this course, students will gain a comprehensive understanding of the theory and methods for solving ordinary differential equations and their applications in various fields of science and engineering. It serves as a fundamental basis for further studies in mathematics, physics, engineering, and other disciplines that involve modelling and analysing dynamic systems.

Assessment:
Class Attendance and Participation（10%）
Homework（30%）
Final Test（60%）

Textbooks:
A Textbook on Ordinary Differential Equations 2nd Edition by Shair Ahmad • Antonio Ambrosetti

Course: College Physics III	**Type: Compulsory**
Credits: 3.0	**Total Hours: 54**
Score: 78	**Academic Year: 2021-2022 1st Semester**

Overview:
From Chapter 21 to Chapter 31, primarily involves electric charge and electric field, Gauss's Law, electric potential, capacitance, dielectrics, electric energy storage, electric currents and resistance, DC circuits, magnetism, sources of magnetic field, electromagnetic induction and Faraday's Law, inductance, electromagnetic oscillations, and AC
circuits and Maxwell's equations and electromagnetic waves.

Objectives:
General Physics is an important fundamental theory course for students in the major of Materials Science and Engineering & Polymer Materials Science and Engineering;
This course not only helps students obtain the necessary physical fundamental knowledge, but also generates important impacts on further study of new materials science theory, knowledge and technologies in the future;

On the other hand, through the study of this course, the students can obtain the methods to think and solve problems in the field of materials science and engineering.
Assessment: Class Attendance and Participation（10%） Homework（10%） Presentation（10%） Final Test（70%）
Textbooks: *Physics for Scientists & Engineers with Modern Physics* by Douglas C. Giancoli, 4th Edition

Course: College Physics Experiment III	**Type: Compulsory**
Credits: 1.0	**Total Hours: 20**
Score: 96	**Academic Year: 2021-2022 1st Semester**
Overview: Students need to go to the physics laboratory to do different experiments every week, get relevant experimental data and complete relevant experimental reports. This course focuses on laboratory experiments that complement theoretical concepts covered in university physics courses. Topics covered include mechanics, electricity and magnetism, optics, and modern physics. Through this course, students will gain hands-on experience in conducting physics experiments, collecting and analysing data, and verifying physical principles and laws. It serves as a foundational resource for reinforcing theoretical knowledge and developing practical skills in experimental physics.	
Objectives: The course is designed to enhance students' understanding of the physical world and prepare them for further studies and research in physics and related disciplines.	
Assessment: Class Attendance and Participation（20%） Experimental Report（40%） Final Experimental Test（40%）	
Textbooks: *University Physics Experiment*, edited by Ding Fei and Liu Pingan, Henan University Press	

Course: Engineering Chemistry	**Type: Compulsory**
Credits: 2.0	**Total Hours: 36**
Score: 90	**Academic Year: 2021-2022 1st Semester**
Overview: From the laws of knowledge of matter, people are closely linked to the current rapid development of materials, life, information, energy, environment and other scientific and engineering examples, the composition, structure, changes of chemical particles and the relationship of light, electricity, magnetism, heat and other phenomena are discussed in depth. The textbook is divided into six chapters and 24 sections, with a broad structure framework, the content is concise, emphasize the foundations, highlight the focus, and connect the realities of the project. It can be used as a teaching material for non-chemical chemistry specialties in general higher schools.	
Objectives: This course focuses on the fundamental principles of chemistry and their applications in engineering fields. Topics covered include atomic structure, chemical bonding, thermodynamics, chemical reactions, chemical equilibrium, and chemical kinetics. Through this course, students will develop a strong foundation in chemistry concepts and their relevance to engineering practices. It equips students with the necessary knowledge to understand and solve engineering problems involving chemical processes, materials, and reactions. This course serves as a fundamental basis for advanced studies and practical applications in engineering disciplines, such as chemical engineering, materials engineering, and environmental engineering.	
Assessment: Class Attendance and Participation（10%）	

Homework（15%） Presentation（15%） Final Test（60%）
Textbooks: *Civil Engineering Materials (2nd Edition)*, edited by Bai Xianchen, China Architecture and Building Press

Course: Mechanics of Solids II	**Type: Compulsory**
Credits: 3.0	**Total Hours: 54**
Score: 87	**Academic Year: 2021-2022 1st Semester**
Overview: Mechanics of Solids II (Materials) is a classic engineering course encompassing the fundamental principles of solid and structural mechanics (including loading, deformation, stress, and strain). Students will learn about different loading situations applied to simple geometric structural elements such as beams and columns in addition to the transformation of the state-of- stress at a point. The types of loading include: (1) tension, (2) compression, (3) flexure, (4) shear, (5) torsion, (6) thermal, and (7) misfit. Students will be introduced to software to solve problems related to mechanics.	
Objectives: The emphasis of this course is the analysis of internal stresses and deformations resulting from the application of external loads. This course builds onto the fundamental topics covered in statics. Conceptual understanding of statics, problem set-up, using free-body diagrams, and mathematical problem-solving abilities are essential. Students who successfully complete this subject will be able to: 1.Apply the principles of rigid body mechanics (statics) to the analysis of deformable bodies. 2.Analyse indeterminate structures with axially loaded members. 3.Calculate axial, flexural, thermal, and torsional deformations in members. 4.Calculate stresses and strains in members due to internal forces and moments. 5.Generalize, extrapolate, and apply the fundamental principles of engineering mechanics to components and structures not specifically covered in this course. 6.Identify, formulate, and solve elementary and intermediate engineering mechanics problems. Understand and effectively communicate the fundamentals of engineering mechanics.	
Assessment: Class Attendance and Participation（15%） Homework（30%） Quizzes（5%） Final Test（50%）	
Textbooks: *Mechanics of Materials 2nd Edition* by Andrew Pytel (Author), Jaan Kiusalaas (Author)	

Course: Introduction to Environmental Engineering	**Type: Compulsory**
Credits: 3.0	**Total Hours: 54**
Score: 92	**Academic Year: 2021-2022 1st Semester**
Overview: Part one: general introduction to Environmental Engineering 1.What is Environment, E. science and E. engineering; 2.The content and objective of Environmental engineering; 3.The current environmental issues; 4.The general research method and hotspots of environmental engineering. Part two: Fundamentals 1.A review of and introduction to basic concepts: dimensions and units, density, concentration, flow rate, retention time, and approximations; 2.Mass balance: theme used throughout this course; 3.This part concludes with therecognition that some of the most fascinating reactions occur in ecosystems, and ecosystems are described using the mass balance approach and the reaction kinetics introduced earlier.	

Part three: Applications 1.Part Three applies the fundamental concepts covered in Part Two to the major areas of environmental engineering; 2.Begins with the quest for clean water. Followed by an introduction to water supply and treatment and then wastewater treatment; 3.Air pollution.
Objectives: •Preliminary understanding of environmental engineering; •Master the basic concepts in environmental engineering; •Be familiar with the basic processes in the environment and environmental treatment: •Master the thinking and methods contained in environmental engineering; •Find your own interests.
Assessment: Class Attendance and Participation（15%） Homework（15%） Group Presentation（30%） Final Test（40%）
Textbooks: *Introduction to Environmental Engineering - SI Version 3rd Edition* by P. Aarne Vesilind (Author), Susan M. Morgan (Author), Lauren G. Heine (Author)

Course: Mechanics Experiment	**Type: Compulsory**
Credits: 1.0	**Total Hours: 20**
Score: 94	**Academic Year: 2021-2022 1st Semester**
Overview: Mechanics experiments, also known as engineering mechanics experiments, are a fundamental component of undergraduate engineering courses. These experiments aim to provide students with hands-on experience in understanding and applying the principles of mechanics to real-world scenarios. Mechanics experiments cover various topics such as statics, dynamics, strength of materials, and fluid mechanics. In statics experiments, students study the equilibrium of rigid bodies and analyse forces and moments acting on structures. They conduct experiments to verify concepts like the triangle of forces and the principle of moments. Dynamics experiments involve the study of the motion of objects under the influence of forces. Students perform experiments to explore topics such as projectile motion, conservation of energy, and collision analysis. Strength of materials experiments focus on understanding the behaviour of materials under different loading conditions. Students conduct tests, such as tensile and compression tests, to determine material properties like strength, modulus, and elasticity. Fluid mechanics experiments involve the study of fluid behaviour and properties. Students perform experiments to investigate concepts such as fluid pressure, flow rates, and the behaviour of fluid flow in pipes and channels.	
Objectives: Mechanics experiments are essential for engineering students as they provide practical insights into theoretical concepts and help bridge the gap between theory and real-world applications. These experiments enhance students' problem-solving abilities, critical thinking skills, and understanding of engineering principles. Additionally, they prepare students for their future careers in various engineering disciplines.	
Assessment: Class Attendance and Participation（40%） Experimental Report（60%）	
Textbooks: No	

Course: Fluid Mechanics	**Type: Compulsory**
Credits: 3.0	**Total Hours: 54**

Score: 92	Academic Year: 2021-2022 1st Semester
Overview: Properties of fluids, gas systems, pressure distribution in static fluids, and hydrostatic forces on plane and curved surfaces. Kinematics and dynamics of fluid motion, dimensional analysis and similitude. Flow in closed conduits, drag and lift.	
Objectives: Students who successfully complete this course will be able to: 1.Understand the basic properties of fluids. 2.Calculate the pressure distribution in static fluids. 3.Calculate the hydrostatic forces on plane and curved surfaces. 4.Calculate the forces associated with fluid flow. 5.Understand the governing differential equations of fluid mechanics. 6.Apply the principles of dimensional analysis and similitude. 7.Calculate flows in single and multiple pipelines. 8.Understand pump performance. 9.Calculate the drag and lift forces associated with flow over common geometries.	
Assessment: Class Attendance and Participation（15%） Homework（10%） Mid-term Test（35%） Final Test（40%）	
Textbooks: *Fluid Mechanics for Engineers in SI Units* by David A.Chin	

Course: Civil Engineering Materials	Type: Compulsory
Credits: 2.0	Total Hours: 36
Score: 86	Academic Year: 2021-2022 1st Semester
Overview: The development of civil engineering materials is closely related to the progress of civil engineering technology, and they are interdependent and promote each other. As the material basis of civil engineering, material determines the structural form and construction method of civil engineering to a certain extent. The research and development and application of new civil engineering materials and the improvement and perfection of the performance of traditional civil engineering materials will directly promote the continuous change and innovation of engineering structural design methods and construction technologies, and novel structural forms and construction methods continue to put forward higher performance requirements for engineering materials. For example, a large number of applications and performance improvements of steel and cement have replaced traditional soil, wood and stone materials, making towering, large-span and large-volume civil engineering possible; The continuous emergence of high-performance, multi-functional, composite civil engineering materials has made modern prefabricated engineering construction technology dominant. At the same time, the sustainable development requirements of energy saving, ecological environmental protection, safety and efficiency of civil engineering have put forward many new propositions for the research and development and application of civil engineering materials.	
Objectives: Enable students to acquire basic knowledge, basic theories and basic skills about civil engineering materials, and master common civil engineering technical properties and selection principles of materials; familiar with the manufacturing process, composition structure and performance change principle of civil engineering materials as well as test and inspection methods; understand the development trend of wood engineering materials; build a knowledge system of wood engineering materials that is compatible with civil engineering disciplines; and lay a solid foundation for learning follow-up courses of the major.	
Assessment: Class Attendance and Participation（20%） Homework（10%） Quizzes（10%）	

Final Test（60%）
Textbooks: *Civil Engineering Materials (2nd Edition)*, edited by Bai Xianchen, China Architecture and Building Press

Course: The Electrician Principle	**Type: Compulsory**
Credits: 3.0	**Total Hours: 48**
Score: 88	**Academic Year: 2021-2022 2nd Semester**
Overview: This book covers circuit analysis, digital systems, electronics, and electromechanics at a level appropriate for either electrical-engineering students in an introductory course or nonmajors in a survey course. The only essential prerequisites are basic physics and single-variable calculus. Teaching a course using this book offers opportunities to develop theoretical and experimental skills and experiences in the following areas: •Basic circuit analysis and measurement • First- and second-order transients •Steady-state ac circuits •Resonance and frequency response •Digital logic circuits •Diode circuits •Electronic amplifiers •Field-effect and bipolar junction transistors • Operational amplifiers •Transformers •Ac machines	
Objectives: Through this course, students will develop the knowledge and skills to design, analyze, and troubleshoot electrical circuits and systems. It serves as a foundational resource for further studies and practical applications in the field of electrical engineering.	
Assessment: Class Attendance and Participation（20%） Homework（20%） Final Test（60%）	
Textbooks: *Electrical Engineering: Principles & Applications 7th Edition* by Allan Hambley (Author)	

Course: Traffic Engineering（I）	**Type: Compulsory**
Credits: 3.0	**Total Hours: 54**
Score: 90	**Academic Year: 2021-2022 2nd Semester**
Overview: This course provides a comprehensive overview of traffic engineering principles and practices. Topics covered include traffic flow theory, traffic control and management, traffic safety, transportation planning, and design of transportation facilities.	
Objectives: Through this course, students will develop an understanding of traffic engineering concepts and methodologies, enabling them to analyse and design transportation systems to ensure safe and efficient traffic flow. It serves as a foundational resource for further studies and practical applications in transportation engineering and related fields.	
Assessment: Class Attendance and Participation（15%） Homework（10%） Presentation（10%） Final Test（65%）	
Textbooks: *General Introduction to Traffic Engineering (Fifth Edition)*, edited by Xu Jiqian and Chen Xuewu, People's Communications Publishing House	

Course: Structural Analysis I	Type: Compulsory
Credits: 3.0	Total Hours: 54
Score: 90	Academic Year: 2021-2022 2nd Semester

Overview:
The course will cover shear forces and bending moments, geometric and energy methods of deformation analysis, influence lines, intermediate analysis including consistent deformations, slope-deflection and moment distribution.

Objectives:
To pass this course, students must:
(a)Grasp the basic concepts and fundamental knowledge,
(b)Participate in online class meeting,
(c)Do more problems available in the textbook.
(d)Ask questions if they don't know how to solve the problems.

Assessment:
Class Attendance and Participation（10%）
Homework（10%）
Quizzes（20%）
Mid-term Test（20%）
Final Test（40%）

Textbooks:
Structural Analysis 9th Edition by Russell Hibbeler (Author)

Course: Structural Experiment	Type: Compulsory
Credits: 1.0	Total Hours: 32
Score: 87	Academic Year: 2021-2022 2nd Semester

Overview:
This course focuses on the principles and practices of structural testing and experimental methods in civil engineering. Topics covered include the testing of structural components and materials, structural behaviour under different loads, and the analysis of test data.

Objectives:
Through this course, students will gain practical experience in conducting structural tests, analysing test results, and understanding the behaviour of various construction materials and components. It serves as a foundational resource for further studies and practical applications in the field of civil engineering, particularly in the design and assessment of safe and reliable structures based on experimental data and testing outcomes.

Assessment:
Class Attendance and Participation（20%）
Experiment（20%）
Final Test（60%）

Textbooks:
Civil Engineering Structural Testing and Testing (2nd Edition), edited by Liu Ming, Higher Education Press

Course: Thermodynamics I	Type: Compulsory
Credits: 3.0	Total Hours: 54
Score: 96	Academic Year: 2021-2022 2nd Semester

Overview:
Thermodynamics is an exciting and fascinating subject that deals with energy, and thermodynamics has long been an essential part of engineering curricula all over the world. It has a broad application area ranging from microscopic organisms to common household appliances, transportation vehicles, power generation systems, and even philosophy. This introductory book contains sufficient material for two sequential courses in thermodynamics. Students are assumed to have an adequate background in calculus and physics.

Objectives:
This book is intended for use as a textbook by undergraduate engineering students in their sophomore or junior year, and as a reference book for practicing engineers. The objectives of this text are
•To cover the basic principles of thermodynamics.
•To present a wealth of real-world engineering examples to give students a feel for how thermodynamics is applied in engineering practice.
•To develop an intuitive understanding of thermodynamics by emphasizing the physics and physical arguments that underpin the theory.
It is our hope that this book, through its careful explanations of concepts and its use of numerous practical examples and figures, helps students develop the necessary skills to bridge the gap between knowledge and the confidence to properly apply knowledge.

Assessment:
Class Attendance and Participation（20%）
Housework（20%）
Final Test（60%）

Textbooks:
Thermodynamics: An Engineering Approach 8th Edition by Yunus Cengel (Author), Michael Boles (Author)

Course: Cognitive Practice	**Type: Course Practice**
Credits: 1.0	**Total Hours: 0**
Score: 98	**Academic Year: 2021-2022 2nd Semester**

Overview:
Cognitive practice is a practical learning activity that allows students to understand the structural forms and design principles of different types of buildings through field investigation and study. The internship usually involves visiting different types of buildings, such as frame structures, shear wall structures, overhanging structures, etc. Students will understand the structural composition, mechanical characteristics and design principles of buildings through field observation and learning.

Objectives:
1.Understand the structural forms of different types of buildings: Students will learn about the structural forms of different types of buildings, such as frame structures, shear wall structures, overhanging structures, etc., through field trips and studies. They will look at the building's structural components, connections and load transfer paths, and understand the characteristics and applications of different structural forms.
2.Understand the mechanical properties of building structures: Students will learn the mechanical principles and properties of building structures. They will understand the bearing principle of structures, load transfer mechanisms and structural stability. Through field observation and learning, they will have a deeper understanding of the mechanical behaviour and properties of building structures.
3.Master the design principles of building structures: Students will learn the design principles and methods of building structures. They will understand the design requirements and specifications of different structural forms, and learn the basic principles and calculation methods of structural design. Through fieldwork and study, they will gain a more comprehensive understanding of the design process and methods of building structures.
4.Practical application ability: Through cognitive practice, students will be able to apply the knowledge of building structure to practical engineering projects. They will be able to assess the safety and feasibility of building structures through observation and analysis, and make corresponding recommendations and improvement measures.
In general, the cognition internship aims to let students understand the structural forms and design principles of different types of buildings through field visits and studies, cultivate their knowledge and understanding of architectural structures, and lay a solid foundation for their career development.

Assessment:
Internship Attendance（40%）
Internship Report（60%）

Textbooks:
No

Course: Application of Probability Theory and Mathematical Statistics	Type: Compulsory
Credits: 3.0	Total Hours: 54
Score: 94	Academic Year: 2021-2022 2nd Semester

Overview:

This textbook provides a carefully motivated, accessible, and interesting introduction to probability, statistics, and random processes for electrical and computer engineers. The complexity of the systems encountered in engineering practice calls for an understanding of probability concepts and a facility in the use of probability tools. The goal of the introductory course should therefore be to teach both the basic theoretical concepts and techniques for solving problems that arise in practice. The third edition of this book achieves this goal by retaining the proven features of previous editions:

•Relevance to engineering practice·
•Clear and accessible introduction to probability
•Computer exercises to develop intuition for randomness
•Large number and variety of problems
•Curriculum flexibility through rich choice of topics
•Careful development of random process concepts.

Objectives:

This course focuses on the study of probability theory, statistical methods, and random processes, with applications to electrical engineering problems. Topics covered include probability distributions, random variables, statistical estimation, hypothesis testing, and stochastic processes. Through this course, students will develop a strong foundation in probability and statistics concepts and learn how to apply them to analyse and solve real-world engineering problems, such as signal processing, communication systems, and control systems. It serves as a fundamental basis for advanced studies and practical applications in electrical engineering and related fields.

Assessment:

Class Attendance and Participation（10%）
Housework（30%）
Final Test（60%）

Textbooks:

Probability, Statistics, and Random Processes for Electrical Engineering 3rd Edition by Alberto Leon-Garcia (Author)

Course: Steel Structures	Type: Compulsory
Credits: 3.0	Total Hours: 54
Score: 76	Academic Year: 2022-2023 1st Semester

Overview:

This textbook focuses on the basic principles of steel structure, including the design of steel structure, connection and various basic components, the design and application of single-storey plant steel structure, plastic design of steel structure and seismic design methods. The book is accompanied by appropriate examples and exercises. In order to meet the requirements of different study hours and different readers, the book has compiled a part of more in-depth content for free reading.

Objectives:

This course focuses on the principles and practices of designing steel structures, covering various aspects of structural analysis, design methods, and construction considerations related to steel construction. Topics covered include material properties of steel, structural stability, load analysis, design of beams, columns, and connections, as well as considerations for steel construction in different applications. Through this course, students will develop a comprehensive understanding of steel structure design principles and methodologies, enabling them to create safe, efficient, and innovative steel structures. It serves as a foundational resource for further studies and practical applications in the field of structural engineering, particularly in the design and construction of steel buildings and bridges.

Assessment:

Class Attendance and Participation（10%）

Housework（20%） Final Test（70%）
Textbooks: *Principles of Steel Structure Design (2nd Edition)*, edited by Zhang Yaochun, Higher Education Press

Course: Concrete Structures	**Type: Compulsory**
Credits: 3.0	**Total Hours: 54**
Score: 92	**Academic Year: 2022-2023 1st Semester**
Overview: A study of mechanical properties of steel and concrete, and methods for the design of individual members subjected to basic loading types (bending, shearing, compression, tension and torsion). Civil Engineering majors must make at least a C- in this course before taking Building Concrete Structure course.	
Objectives: It is expected that the student understands the application of analysis and design principles related to RC. Also, students will have developed an awareness of the role of codes and standards. Upon successful completion of this course, students will able to: 1.Apply a working knowledge of concrete technology; 2.Analyse and design reinforced concrete structural elements; 3.Apply a working knowledge of allowable stress and ultimate strength design methodologies; 4.Apply a working knowledge of building code and standards as applied to reinforced concrete.	
Assessment: Class Attendance and Participation（10%） Housework（40%） Quizzes（10%） Final Test（40%）	
Textbooks: *Reinforced Concrete Design: to Eurocode 2, 7th Edition* by W.H. Mosley (Author), R. Hulse (Contributor), J. H Bungey (Contributor)	

Course: Building Construction	**Type: Compulsory**
Credits: 2.0	**Total Hours: 54**
Score: 84	**Academic Year: 2022-2023 1st Semester**
Overview: Building construction is a key professional course of civil engineering, which is practical, comprehensive and involves a wide range of knowledge. Its task is to study the local and overall laws of civil engineering construction. It is one of the main courses for students to apply what they learn and settle down after they enter the workplace. No matter what kind of career or position the students are engaged in in the field of civil construction after graduation, the professional knowledge of this course will benefit you for a lifetime.	
Objectives: This course focuses on the principles and practices of civil engineering construction, covering various aspects of construction processes and techniques used in civil engineering projects. Topics covered include construction planning, project management, construction methods for various types of structures, earthwork and foundation construction, concrete and steel construction, and construction safety and quality control. Through this course, students will gain a comprehensive understanding of construction principles, methodologies, and best practices, enabling them to effectively plan, manage, and execute civil engineering projects. It serves as a foundational resource for further studies and practical applications in the field of civil engineering, particularly in the domain of construction management and project execution.	
Assessment: Class Attendance and Participation（15%） Housework（15%） Final Test（70%）	
Textbooks: *Civil Engineering Construction (3rd Edition)*, edited by Ying Huiqing, Tongji University Press	

Course: Traffic Engineering（II）	Type: Compulsory
Credits: 3.0	Total Hours: 54
Score: 96	Academic Year: 2022-2023 1st Semester

Overview:

This course focuses on the principles and practices of traffic planning, which involves the systematic design and organization of transportation systems to efficiently manage traffic flow and promote safe and sustainable mobility. Topics covered include transportation demand analysis, land use and transportation integration, traffic impact assessment, transportation modelling, and the design of transportation networks and facilities.

Objectives:

Through this course, students will develop a comprehensive understanding of traffic planning concepts and methodologies, enabling them to address real-world transportation challenges and contribute to the development of efficient and liveable urban environments. It serves as a foundational resource for further studies and practical applications in the field of transportation engineering and urban planning.

Assessment:

Class Attendance and Participation（10%）
Housework（10%）
Presentation（15%）
Final Test（65%）

Textbooks:

Traffic Planning (2nd Edition), edited by Wang Wei and Chen Xuewu, People's Jiao Publishing House

Course: Structural Analysis II	Type: Compulsory
Credits: 3.0	Total Hours: 54
Score: 90	Academic Year: 2022-2023 1st Semester

Overview:

The course will cover the solving methods of indeterminate structures, such as Force Method, Displacement Method, Method of Successive Approximations, Matrix Displacement Method and Influence Lines for Indeterminate Structures. The basic concepts and methods to solve indeterminate structures are presented in this course. Upon successful completion of this course, students will be able to integrate basic prerequisite courses in mechanics into analysis of statically indeterminate structures and apply modern methods to analyse a structure.

Objectives:

To pass this course, students must:
(a)Grasp the basic concepts and fundamental knowledge,
(b)Participate in online class meeting,
(c)Do more problems available in the textbook.
(d)Ask questions if they don't know how to solve the problems.

Assessment:

Class Attendance and Participation（10%）
Homework（10%）
Quizzes（20%）
Mid-term Test（20%）
Final Test（40%）

Textbooks:

Structural Analysis 9th Edition by Russell Hibbeler (Author)

Course: Masonry Structure	Type: Compulsory
Credits: 2.0	Total Hours: 54
Score: 93	Academic Year: 2022-2023 1st Semester

Overview:

This course focuses on the study of masonry structures and their design, construction, and analysis. Topics covered include the properties of masonry materials, structural behaviour of masonry walls and columns, design principles, and seismic analysis of masonry structures.

Objectives:

Through this course, students will develop a comprehensive understanding of masonry construction techniques and gain the knowledge to design safe and efficient masonry structures. It serves as a foundational resource for further studies and practical applications in the field of civil engineering and architecture, particularly in the design and construction of masonry buildings.

Assessment:

Class Attendance and Participation（10%）

Homework（20%）

Final Test（70%）

Textbooks:

Masonry Structure (4th Edition), edited by Shi Chuxian, Liu Guiqiu, Huang Liang, China Building Industry Press

Course: Building Architecture	**Type: Compulsory**
Credits: 2.0	**Total Hours: 36**
Score: 98	**Academic Year: 2022-2023 2nd Semester**

Overview:

This course focuses on the principles and practices of housing design, covering various aspects of architectural planning, spatial organization, building materials, and construction techniques used in residential architecture. Topics covered include housing typologies, site planning, functional layouts, sustainable design, and architectural aesthetics.

Objectives:

Through this course, students will gain a comprehensive understanding of housing architecture principles and methodologies, enabling them to create functional, comfortable, and aesthetically pleasing residential spaces. It serves as a foundational resource for further studies and practical applications in the field of architecture, particularly in the design and construction of residential buildings and communities.

Assessment:

Class Attendance and Participation（10%）

Housework（10%）

Quizzes（10%）

Final Test（70%）

Textbooks:

Housing Architecture (2nd Edition), edited by Dong Hairong, Zhao Yongdong, etc., China Architecture and Building Press

Course: Seismic Design of Building Structures	**Type: Compulsory**
Credits: 2.0	**Total Hours: 36**
Score: 98	**Academic Year: 2022-2023 2nd Semester**

Overview:

This course focuses on the principles and practices of designing building structures to withstand seismic forces. Topics covered include seismic hazard analysis, seismic design codes and regulations, seismic analysis and design of various building components, retrofitting of existing structures, and the use of seismic-resistant materials.

Objectives:

Through this course, students will gain a comprehensive understanding of seismic design principles and methodologies, enabling them to design safe and resilient building structures in seismically active regions. It serves as a foundational resource for further studies and practical applications in the field of structural engineering, particularly in the seismic design of buildings to enhance their earthquake resistance and ensure the safety of occupants.

Assessment:

Class Attendance and Participation（10%） Housework（10%） Course Design（20%） Final Test（60%）
Textbooks: *Seismic Design of Building Structures,* edited by Zhou Ying, Lu Zheng, Dai Kaoshan, Jiang Jiafei, Shan Jiazeng, China Building Industry Press

Course: Foundations and Earth Retaining Systems	**Type: Compulsory**
Credits: 3.0	**Total Hours: 54**
Score: 94	**Academic Year: 2022-2023 2nd Semester**
Overview: Subservice exploration methods and program. Geotechnical analysis and design of shallow and deep foundations. Theories of lateral earth pressure. Design and analysis of earth filled retaining systems.	
Objectives: 1.Design a subsurface soil exploration program. 2.Analyse and design shallow foundations. 3.Analyse and design deep foundations. 4.Analyse lateral earth pressures. 5.Analyse and design earth-filled retaining systems.	
Assessment: Class Attendance and Participation（10%） Housework（10%） Quizzes（20%） Mid-term Test（20%） Final Test（40%）	
Textbooks: *Principles of Foundation Engineering 9th Edition* by Braja M. Das (Author), Nagaratnam Sivakugan (Author)	

Course: Construction Economy and Enterprise Management	**Type: Compulsory**
Credits: 2.0	**Total Hours: 36**
Score: 91	**Academic Year: 2022-2023 2nd Semester**
Overview: The construction industry plays a very influential role in the world today, providing relevant production facilities for other industrial sectors of the national economy and providing them for reproduction. The means of production, therefore, assume the first category of responsibilities in the national economy; At the same time, it also serves urban and rural construction and people's life, providing them with housing and other material and cultural facilities, and also bears the functions of the second department. It has contributed to the construction of the motherland, but also for the social economic development, environmental protection, residents live and work in peace and contentment, scientific and technological innovation, the promotion of higher education, social reform and development and community security and stability to provide a solid foundation. With the progress of The Times and modern science, the cross-integration of various subject areas has become more and more close. Building economic management came into being, it is natural science and social science mutual infiltration and combination of a fringe science. By studying the economic problems and management problems in production activities, we can obtain greater economic benefits through scientific management. In addition, to study how to improve economic benefits, it is necessary to study production, involving a large number of production technologies, which is	

inseparable, therefore, construction engineering economic management and enterprise management contains the nature of social science, but also contains the content of natural science.
Objectives: This course focuses on the principles and practices of construction project economics and enterprise management. Topics covered include project cost estimation, cost control, financial analysis, project scheduling, risk management, and construction enterprise organization and operation. Through this course, students will gain a comprehensive understanding of construction economics, project management, and enterprise management principles and methodologies, enabling them to effectively plan, manage, and execute construction projects and enhance the efficiency and profitability of construction enterprises. It serves as a foundational resource for further studies and practical applications in the field of construction engineering and management, particularly in the financial and managerial aspects of construction projects and businesses.
Assessment: Class Attendance and Participation（30%） Course Paper（70%）
Textbooks: *Construction Engineering Economics and Enterprise Management (2nd Edition)*, edited by Guan Ke, Wang Baoren, Cong Peijing, China Architecture and Building Press

Course: Bridge Engineering	**Type: Compulsory**
Credits: 4.0	**Total Hours: 72**
Score: 83	**Academic Year: 2022-2023 2nd Semester**
Overview: This course focuses on the principles and practices of designing and constructing bridges. Topics covered include bridge types and classifications, structural analysis and design of different bridge components, construction methods, and considerations for bridge materials and foundations.	
Objectives: Through this course, students will develop a comprehensive understanding of bridge engineering principles and methodologies, enabling them to design safe, efficient, and innovative bridges for various transportation and infrastructure projects. It serves as a foundational resource for further studies and practical applications in the field of civil engineering, particularly in the design and construction of bridges to ensure their structural integrity and functionality.	
Assessment: Class Attendance and Participation（10%） Housework（20%） Final Test（70%）	
Textbooks: *Bridge Engineering (5th Edition),* edited by Shao Xudong et al., People's Communications Publishing House Co., Ltd.	

Course: Geotechnical Engineering（Ⅰ）	**Type: Compulsory**
Credits: 3.0	**Total Hours: 54**
Score: 96	**Academic Year: 2022-2023 2nd Semester**
Overview: Geotechnical Engineering is the branch of Civil Engineering that deals with soil, rock, and underground water, and their relation to the design, construction, and operation of Engineering project. It is a specialized subject to study Geotechnical problems related to Civil Engineering, water conservancy and other projects. It is also an important basic technical course for Civil Engineering and water conservancy engineering specialties.	
Objectives: This course is an applied discipline which applies the basic principles of solid mechanics and fluid mechanics to soil, and constitutes an important branch of mechanics. After completing this course you should be able to:	

1.Grasp the meaning and conversion of soil physical indicators, soil seepage theory, soil consolidation theory and strength theory; 2.Soil seepage calculation and analysis, foundation stress calculation and settlement calculation, foundation bearing capacity calculation, earth pressure calculation and slope stability analysis will be carried out; 3.The basic principles and methods of soil mechanics can be freely used to solve the engineering problems of stability, deformation and seepage related to soil mass in practical engineering by mastering conventional geotechnical test skills and determining calculation parameters.
Assessment: Class Attendance and Participation（15%） Housework（10%） Mid-term Test（35%） Final Test（40%）
Textbooks: *Principles of Steel Structure Design (2nd Edition)*, edited by Zhang Yaochun, Higher Education Press

Course: Geotechnical Experiment	**Type: Compulsory**
Credits: 1.0	**Total Hours: 20**
Score: 94	**Academic Year: 2022-2023 2nd Semester**
Overview: This course focuses on the principles and practices of geotechnical testing and soil investigation. Topics covered include various geotechnical tests, such as soil classification tests, compaction tests, permeability tests, shear strength tests, and consolidation tests.	
Objectives: Through this course, students will gain a comprehensive understanding of geotechnical testing methods and techniques, enabling them to conduct proper soil investigations, analyse soil properties, and design safe and stable foundations and earthworks for engineering projects. It serves as a foundational resource for further studies and practical applications in the field of geotechnical engineering, particularly in the investigation and characterization of soil behaviour for civil engineering and construction projects.	
Assessment: Class Attendance and Participation（40%） Experimental Report（60%）	
Textbooks: *Geotechnical Test Guidebook (2nd Edition)*, edited by Zhang Chenrong, Cao Pei, Qian Jianguo, Yuan Juyun, People's Communications Publishing House	

Course: Measurement of Internship	**Type: Course Practice**
Credits: 1.0	**Total Hours: 20**
Score: 98	**Academic Year: 2023-2024 1st Semester**
Overview: Surveying practice is a practical learning activity that allows students to personally experience and apply surveying techniques through field measurement and data processing to deepen their understanding and application of civil engineering surveying. The internship will usually involve the use of various measuring instruments and tools, such as total station, level, rangefinder, etc., for line survey, topographic survey, building survey and other tasks.	
Objectives: 1.Be familiar with measuring instruments and tools: Students will learn to use a variety of measuring instruments and tools, such as total station, level, rangefinder, etc. They will understand the principles, operation methods and precautions of these instruments, and master the skills of proper use and maintenance of measuring instruments. 2.Master surveying techniques and methods: Students will learn various surveying techniques and methods, such as line surveying, topographic surveying, building surveying, etc. They will understand the basic principles and processes of measurement, learn to choose appropriate measurement methods, and be able to perform field measurement tasks.	

3.Data processing and analysis: Students will learn how to process and analyze measurement data. They will learn to use computer software for data processing, such as data import, correction, calculation and plotting. Through data processing and analysis, they will get accurate measurement results and be able to carry out corresponding engineering calculations and drawings.
4.Practical application ability: Through surveying practice, students will be able to apply the surveying techniques and methods learned to practical civil engineering projects. They will be able to carry out on-site measurement tasks, obtain accurate measurement data, and apply it to engineering design, construction monitoring and other aspects.
In general, the measurement internship aims to develop students' practical and application skills, so that they can become proficient in the use of measurement techniques and instruments, process and analyze measurement data, and apply it in civil engineering projects, and lay a solid foundation for their career development

Assessment:
Internship Attendance（40%）
Internship Report（60%）

Textbooks:
No

Course: High-rise Building Structure Design	**Type: Compulsory**
Credits: 2.0	**Total Hours: 36**
Score: Uncompleted	**Academic Year: 2023-2024 1st Semester**

Overview:
This textbook is mainly compiled according to the syllabus of the course "High-rise Building Structure" for Civil engineering undergraduates. The contents include the structural system and structure arrangement of high-rise buildings, the load action and structure calculation principles of high-rise buildings, the simplified calculation of torsion effect of high-rise buildings, the stress analysis and design of frame structures, the stress analysis and design of shear wall structures, and the stress analysis and design of high-rise buildings. Force analysis and design of frame-shear wall structure, analysis and design methods of simplified structure and steel and concrete composite structure, section design and construction requirements of structural components of high-rise buildings, and design points of high-rise building foundation.

Objectives:
The purpose of this textbook is to enable students to deeply understand the mechanical performance, deformation characteristics and design principles of high-rise building structures through the study of this course, and understand the layout characteristics and application scope of various structural systems in the composition area of high-rise building structures. Master the method of determining the calculation sketch of high-rise building structure; Master the calculation method of wind load and earthquake action; Master the practical method of proper force analysis and design of frame structure, shear wall structure and frame-shear wall structure; Master the seismic design concept of high-rise building structure, master the section design principle of frame and shear wall; Understand the internal force calculation method, internal force distribution characteristics and construction key points of cylinder structure; Learn about the design of steel and concrete composite structures and high-rise building foundations.

Assessment:
Class Attendance and Participation（30%）
Final Test（70%）

Textbooks:
High-rise Building Structure Design (3rd Edition), edited by Lu Xilin, Wuhan University of Technology Press

Course: Computer-aided Design	**Type: Compulsory**
Credits: 4.0	**Total Hours: 72**
Score: Uncompleted	**Academic Year: 2023-2024 1st Semester**

Overview:

Computer-aided Design plays an important role in the field of civil engineering. It utilizes computer technology and software tools to assist civil engineers in design, analysis and simulation. CAD can improve design efficiency, reduce errors, and provide more accurate design results.

Computer-aided design and civil engineering related directions mainly include the following aspects:

1.CAD software application: Learn to use professional CAD software, such as AutoCAD, Civil 3D, etc., for civil engineering design and drawing. Master the basic functions of the software, such as drawing, modeling, labeling, layer management, etc., and advanced functions, such as 3D modeling, terrain analysis, etc.

2.Civil engineering design: Learn how to use CAD software for civil engineering design, including road design, bridge design, hydraulic engineering design, etc. Understand the basic principles of design and specification requirements, and be able to apply them in CAD software.

3.Terrain modeling and analysis: Learn how to use CAD software for terrain modeling and analysis. Master the creation and processing technology of digital elevation model (DEM), understand the extraction and analysis methods of terrain features, such as profile analysis, contour generation, etc.

4.Engineering visualization: Learn how to use CAD software for engineering visualization and display design results in graphics, animation or virtual reality. Master rendering techniques, animation, and interactive simulation to provide more intuitive and vivid engineering presentations.

Objectives:

1.Master the basic operation and advanced functions of CAD software, and be able to skilfully use the software for civil engineering design and drawing.

2.Understand the basic principles and specification requirements of civil engineering design, and be able to apply them to CAD software for design.

3.Able to create and process digital elevation models, conduct terrain modelling and analysis, extract terrain features and generate related graphics.

4.Able to use CAD software for engineering visualization and display design results in graphics, animation or virtual reality to provide a more intuitive and vivid engineering display.

By studying CAD and civil engineering related directions, students will be equipped with the ability to design, analyse and visualize CAD software in the field of civil engineering, laying a solid foundation for their future career development.

Assessment:

Class Attendance and Participation（10%）

Housework（20%）

Final Test（70%）

Textbooks:

No