Module Handbook

for Mechanical Engineering

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1. Introduction to the Mechanical Engineering

Module name	Introduction to Mechanical Engineering
Module level	Undergraduate
Code	3080201233
Courses	specialized education
Semester	Fall Semester Semester
Contact person	Hu Hai
Lecturer	Chang Degong and Xiu Xia
Language	Chinese
Relation to curriculum	compulsory, 1 st semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, live teaching, 2 study hours/ week
Work load	● Total study hours: 28 study hours= Lecture 16 study hours+ Self-study 12 study hours, completed in 16 weeks ● Lecture: 1 hour per week, including lecture, discussion and questions. ● Self-study: approximately 1 semester hour per week, including pre-class pre-study, post-class practice, and review and preparation for exams.
Credit points	1

ETCS			
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Advanced Mathematics		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1	Identify the general principles and methods of the mechanical engineering profession, and analyze the history, status and development trends of the field of mechanical engineering, especially those related to smart manufacturing, in conjunction with literature research, in order to establish the correct analytical questions in the field of mechanical engineering.	R2

Learning outcomes and their corresponding PLOs		Questions, problem solving methods.	
	CLO-2	Cultivate students' scientific and technological literacy, professional ethics, conscientious compliance with laws and norms related to science and technology; develop a rigorous and serious scientific attitude, patience and meticulous work style, teamwork and innovation.	R6
	CLO-3	Understand and analyze engineering management principles and methods and be able to apply them to mechanical engineering projects.	R10
	CLO-4	Awareness of self-directed and lifelong learning, and the ability to continue to learn and adapt to developments.	R11
Content	Introduction to Mechanical Engineering is an introductory course for mechanical engineering majors, and it is a compulsory course for freshmen, and it is one of the important means to let students understand the mechanical engineering majors. It guides the freshmen to establish a preliminary concept of mechanical engineering, to understand, know and love their major, to know the scope of their future		

	career, and guides them to adapt to the university life, to follow the rules of learning, to master the learning method, and to lay the ideological foundation for actively mastering the knowledge and cultivating the ability of independent learning in the future. Knowledge Module 1: Disciplines and Specializations in Mechanical Engineering (Weighting Factor 2/16, Level: Memorization - Understanding) Knowledge Module 2: Mechanical and Engineering (Weighting Factor 2/16, Level: Comprehension) Knowledge Module 3: A Brief History of Mechanical Engineering (Weighting Factor 2/16, Level: Comprehension+ Analysis) Knowledge Module 4: Mechanical Engineering Disciplines (Weighting Factor 2/16, Level: Understanding) Knowledge module 5: Mechanical specialization (Weighting Factor 2/16, level: understanding) Knowledge Module 6: Mechanical Engineering Specialization (Weighting Factor 2/16, Level: Comprehension)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and non-written exam (50%), of which the process assessment includes: 50% of usual performance + 50% of usual assignments, and the final examination is in the form of a short paper.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
	[1] Liu Yongxian et al. Introduction to Mechanical Engineering [M],

Reading list	Beijing: Mechanical Industry Press, 2010. [2] Zhang Chunlin et al. Introduction to Mechanical Engineering [M], Beijing: Beijing Institute of Technology Press, 2011. [3] Wang Xiaojun et al. Introduction to Mechanical Engineering [M], Beijing: National Defense Industry Press, 2011. [4] Zhang Xianmin et al. Introduction to Mechanical Engineering [M], Wuhan: Huazhong University of Science and Technology Press, 2011. [5] Zhou Ji. Intelligent manufacturing-the main attack direction of "Made in China 2025"[J]. China Mechanical Engineering, 2015,26(17):2273-2284. [6] Li Lianshui, Shi Fai, Liu Jun. 40 years of China's manufacturing industry: Intellectualization process and outlook[J]. China Soft Science,2019(01):1-9+30.
	[7] He Liujiang. Design and realization of virtual interaction system for CNC machine tools based on digital twin [D]. Master's thesis of Mechanical Engineering, University of Electronic Science and Technology , 2019.
revision time	July 2024

2. Descriptive Geometry and Mechanical Drawing

Module name	Descriptive Geometry and Mechanical Drawing
Module level	Undergraduate
Code	3080201242
Courses	specialized education
Semester **school term**	Fall Semester Semester
Contact person	Liu Liwei
Lecturer	Tan Yunan, Song Yi
Language	Chinese
Relation to **curriculum**	compulsory , 1st semester
Type of teaching, contact hours	Lecture, Demonstration, Group Discussion, Project Learning, 2 study hours/week
	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24

Work load	study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 1.5 hours per week, including pre-study, post-study exercises, review and preparation.		
Credit points ETCS	2		
Requirements according to the examination regulations	A student must have registered for the course.		
Recommended prerequisites	Advanced Mathematics I		
Learning outcomes and their corresponding PLOs	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
		They should be able to integrate knowledge of mathematics and the natural sciences, as well as elements of pictorial	

	CLO-1 Learning Outcome-1	geometry, to operate drawing tools and instruments correctly, to memorize common methods of geometric drawing, and to use projective methods to represent spatial geometries and to solve spatial geometric problems.	R1
	CLO-2 Learning Outcome-2	Be able to draw and dimension assemblies and read parts drawings and assemblies. Drawing. To realize the spirit of meticulousness and the meaning of rules in drawing. Knowledge.	R2
		To be able to draw simple sectional views (mainly in a single plane of section), to memorize common simplified and other prescribed drawing methods; to memorize the basic theoretical knowledge of standard and	

	CLO-3 Learning Outcome-3	commonly used parts, to memorize threads, bolts, screws, nuts, washers and their connection drawing and marking or labeling methods, to demonstrate the prescribed drawing of a straight-toothed cylindrical gear and its mesh, and to show the prescribed drawing of keys, pins and Spring Semesters (compression Spring Semesters). Demonstration of the drawing of keys, pins and Spring Semesters (compression Spring Semesters). Strict application of drawing standards and knowledge of the system of technical standards during the drawing process.	R6
	CLO-4 Learning Outcome-4	The ability to design technically feasible, economically sound, safe and environmentally friendly drawings for industrial production, taking into account design	R10

		costs.	
Content	This course is a basic course for mechanical engineering and vehicle engineering majors. Through the study of this course, students are required to learn how to use projection transformation and other methods to solve some spatial geometric problems, to master the formation and drawing of axonometric projection from the practical needs of the profession, to learn how to read, draw, and dimension combinations; to learn the representation of machine parts used in actual production and the drawing of mechanical drawings, so as to lay a solid foundation for their future work in the engineering field. Base. Knowledge Module 1: Basic Knowledge and Skills in Cartography (Weighting Factor 1/32, Level: Memorization + Understanding) Knowledge Module 2: Basics of Projection (Weighting Factor 2/32, Level: Memorization + Understanding) Knowledge Module 3: Projections of Points, Lines and Planes (Weighting Factor 3/32, Level: Memorization + Understanding + Application) Knowledge Module 4: Relative Positions of Lines and Planes (Weighting Factor 4/32, Level: Memorization + Understanding + Application) Knowledge Module 5: Projection in three dimensions (Weighting Factor 3/32, level: memorization + understanding + application) Knowledge Module 6: Axonometric Projections (Weighting Factor 3/32, Level: Memorization + Understanding + Application) Knowledge Module 7: Common expressions for machine		

	parts (Weighting Factor 4/32, Level: Memorization + Understanding + Application) Knowledge Module 8: Standard and Common Parts (Weighting Factor 4/32, Level: Memorization + Understanding + Application) Knowledge Module 9: Parts Drawings (Weighting Factor 4/32, Level: Memorize + Understand + Apply + Analyze) Knowledge Module 10: Assembly Drawings (Weighting Factor 4/32, Level: Memorize + Understand + Apply + Analyze)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and final examination (50%), of which the process assessment includes: regular assignments (50%), classroom quizzes (50%), and a final closed-book examination of 100 points minutes.
Media employed	Computers, online websites, whiteboards, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Fan Si-chong. Descriptive Geometry and Mechanical Drawing (Second Edition) [M] Beijing: Mechanical Industry Press , 2023 [2] Zheng Remins, Liu Yongtian. Descriptive Geometry and Mechanical Drawing [M] Inner Mongolia: Inner Mongolia Science and Technology Press, 2002. [3] He Bin. Mechanical Drawing (Fifth Edition) [M] Beijing: Higher Education Press, 2005. [4] Pu L. Strategies for the integration of CAD technology and mechanical drawing technology[J]. Mechanical Management Development,2022,37(10):282- 283+286.

	[5] Xiao Lei. Analysis of Mechanical CAD and Mechanical Drawing and Measuring Technology[J]. High Technology and Industrialization,2024,30(07):60- 62. [6] Dang Jincai, The teaching application and innovation of CAD technology in mechanical drawing course[J]. Paper Equipment and Materials,2024,53(02):194-196. [7] Lu Yibo. Analysis of digital mapping technology in coal mine geological survey[J]. Mining Equipment,2024,(02):77-79.
revision time	July 2024

3. Electrotechnics

Module name	Electrotenics
Module level	Undergraduate
Code	3080201239
Courses	specialized education
Semester school term	Spring Semester
Contact person	Li Anning
Lecturer	Li Anning, Li Aiqin, Ge Jiali
Language	Chinese
Relation to curriculum	compulsory , 2nd semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, case study method, field teaching, hands-on method, 2 study hours/week
	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24

Work load	study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately (1-2) hours per week, including pre-study, post-study exercises, review and preparation.		
Credit points ETCS	2		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Introduction to the Mechanical Engineering Profession, Descriptive Geometry and Mechanical Drawing		
Learning outcomes and their corresponding PLOs	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	To understand a series of technological breakthroughs achieved by the application of electromagnetic phenomena in engineering and technology and the	

		contributions made by relevant scientists, to appreciate the importance of scientific literacy and scientific spirit, and to cultivate the spirit of linking theory with practice and the courage to explore.	R1 R2
	CLO-2 Learning Outcome-2	To be able to describe and explain the basic concepts and laws of electric circuits, to learn how to analyze electric circuits, and to be able to use electricity correctly and safely; to remember the working principles and control techniques of motors and electrical appliances that are closely related to industrial and agricultural production and daily life.	R3 R4
	CLO-2 Learning Outcome-3	To be able to describe and explain electromagnetic phenomena and apply them to common thinking in engineering and technology, and to develop students' ability to simplify complex	R7, R9, R10

		problems, reason by analogy, analyze and synthesize engineering problem-solving skills. Power.	
Content	Electrotechnics is a basic course for mechanical engineering majors, including basic knowledge of circuits, circuit analysis, single-phase AC circuits, three-phase AC circuits, transformers, etc. The course is very basic, logical and applied. The course has strong basicity, logic and applicability. A hybrid online-offline teaching method is utilized. Students will be able to describe and explain the basics of electric circuits, the basic methods of AC and DC circuit analysis, the basic relationship between electromagnetism, and a certain degree of experimental ability through the study of this course; to cultivate students' rigorous scientific attitude, to develop a habit of lifelong learning, and to form a certain degree of professionalism. Subsequent courses include mechanical engineering test technology, numerical control technology and PLC. The subsequent courses will use the circuit analysis methods and motor and relay control knowledge in this course. Knowledge Module 1: Basic Concepts and Fundamental Laws of Electric Circuits (Weighting Factor 6/32, Level: Memorization+ Understanding+ Application) Knowledge Module 2: Methods of Analyzing Circuits (Weighting Factor 6/32, Level: Understanding+ Application+ Analysis) Knowledge Module 3: Sinusoidal AC Circuits (Weighting Factor 6/32, Level: Understanding+ Application+ Analysis) Knowledge Module 4: Three-Phase Circuits (Weighting Factor 6/32, Level: Understanding+ Application+ Analysis) Knowledge Module 5: Magnetic Circuits and Core Coil Circuits (Weighting Factor		

	2/32, Level: Understanding-Application) Knowledge Module 6: AC Motors (Weighting Factor 4/32, Level: Understanding+ Application)
	Knowledge Module 7: Relay Contactor Control Systems (Weighting Factor 2/32, Level: Comprehension-Analysis)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and final examination (50%), of which the process assessment includes: usual performance (30%)+ usual homework (30%)+ on-line experiments (40%), and the final closed-book examination of 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Electrotechnics (Eighth Edition), Book 1, Qin Zenghuang, Higher Education Press, April 2008. [2] Principles of Electric Circuits (2nd Edition), Zhou Shouchang, Higher Education Press, June 2009. [3] Principles of Electric Circuits (Third Edition), Chengzhi Fan, Dun Sun, Mei Tong, Mechanical Industry Press, November 2010. [4] Circuits (Fifth Edition),Qiu Guanyuan,Higher Education Press,June 2015. [5] YANG Shude, WU Guifeng, ZHANG Jiyong, JIANG Wei, Analysis and countermeasures of problems in teaching three-phase circuits[,. Journal of Electrical and Electronic Teaching,2020,42(3):89-91, 120.

	[6] Tian Q., Li C. Shuai. Simulation of three-phase AC load star connection circuit based on Multisim Shan,. Journal of Shijiazhuang Institute of Vocational Technology,2021,33(2):68-71.
revision time	July 2024

4. Theoretical Mechanics

Module name	Theoretical Mechanics
Module level	Undergraduate
Code	3080201205
Courses	specialized education
Semester	Fall Semester
Contact person	Wang Limin
Lecturer	He Linan, Wang Hongxia
Language	Chinese
Relation to curriculum	compulsory ,3 th semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, project learning method, case study method, on-site teaching, practical method, 3 hours/week
Work load	. Total study hours: 84 study hours= Lecture 48 study hours+ Self-study 36 study hours, completed in 16 weeks . Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: approximately 2.3 hours per week, including pre-course study, post-course exercises, review and preparation for examinations.

Credit points **ETCS**	3		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Descriptive Geometry and Mechanical Drawing		
	Electrotechnics		
Learning	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1	To be able to list the mathematics, natural science, engineering fundamentals and professional knowledge required in the field of mechanical engineering, especially in the field related to intelligent manufacturing; to apply the learned knowledge system to solve general engineering problems in the field of mechanical	R1

outcomes and their corresponding PLOs		engineering.	
	CLO-2	To be able to use scientific principles and methods to analyze general engineering problems in the field of mechanical engineering, including designing experiments, analyzing and interpreting data, and synthesizing information to reach reasonable and valid conclusions.	R4
	CLO-3	To develop humanities and social sciences literacy and a sense of social responsibility, and to fulfill the corresponding responsibilities in relation to the ethics and norms of the engineering profession in the practice of mechanical engineering.	R7
	This course has been offered since the establishment of Mechanical Engineering, which is the science of studying the general law of mechanical movement of objects, and is a professional basic course with strong theory for mechanical majors. Theoretical mechanics can not only be directly used in production practice and the study of natural laws, it is also the theoretical basis of subsequent mechanics courses, and has a wide range of applications in many fields of engineering and technology.		

Content	With the development of modern science and technology, the research content of mechanics has penetrated into other disciplines, and the establishment of new disciplines must be based on solid knowledge of theoretical mechanics. This course is based on quality education, adopts reasonable teaching methods and means to construct mechanical models, cultivates students' mechanical thinking mode and methods, enables students to master the basic laws and research methods of mass, mass system and rigid body mechanical motion (including balance), initially learns to use these theories and methods to analyze and solve practical engineering problems, and lays the foundation of mechanical analysis for the structural design of later mechanical engineering majors. Knowledge Module 1: Introduction (Weighting Factor 2/48, level: memorization+ understanding) Knowledge Module 2: The Axioms of Static Mechanics and the Analysis of Forces on Objects (Weighting Factor 4/48, Level: Recall-Analysis) Knowledge Module 3: Planar Force Systems (Weighting Factor 6/48, Level: Memorization - Analytical) Knowledge Module 4: Space Force Systems (Weighting Factor 2/48, Level: Understanding+ Applications) Knowledge Module 5: Friction (Weighting Factor 4/48, level: memorization-analysis) Knowledge Module 6: Kinematics of Points (Weighting Factor 2/48, Level: Memorization - Application) Knowledge Module 7: Simple Motion of Rigid Bodies (Weighting Factor 2/48, Level: Understanding+ Application) Knowledge Module 8: Synthetic Motion of Points (Weighting Factor 4/48, Level:

	Memorization - Application) Knowledge Module 9: Plane Motion of Rigid Bodies (Weighting Factor 6/48, Level: Memory - Analytical) Knowledge Module 10: Fundamental Equations of Plasma Dynamics (Weighting Factor 4/48, Level: Understanding - Analyzing) Knowledge Module 11: Moment Theorem, Moment Moment Theorem (Weighting Factor 6/48, Level: Memorization - Analytical) Knowledge Module 12: Kinetic Energy Theorem, D'Alembert's Principle, Imaginary Displacement Principle (Weighting Factor 6/48. (Level: understanding - analysis)
Study and examination requirements and forms of examination	The course assessment consists of a process assessment (50%) and a final examination (50%), of which the process assessment consists of: 50% of the stage test + 50% of the usual assignments, and a final closed-book examination of 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Theoretical Mechanics (3rd Edition), Wang Qi and Xie Chuanfeng, Higher Education Press, 2021. [2] Theoretical Mechanics (3rd Edition), Jianping Chen, Qinshan Fan, Higher Education Press,2018. [3] Theoretical Mechanics (3rd Edition), Teaching and Research

	Department of Theoretical Mechanics, Northwestern Polytechnical
	University, Zhi Xizhe, Gao Xingshan, Zhu Xiping, Liu Yongshou, Higher Education Press,2021. [4] Theoretical Mechanics Course (First Edition), Zhou Yanbai, Higher Education Press,2018. [5] Theoretical Mechanics (I) (8th Edition), Department of Theoretical Mechanics, Harbin Institute of Technology, Higher Education Press, 2016. [6] MULIN DONG, ZHAO XINLEI, XU PENG, et al. Force control based assisted two-wheel trailer load[J]. Journal of Military Engineering,2023,44(S2):61-70. [7] JIA Zhi-Hsu, ZHANG Lei, SUN Ming, et al. Design and grasping research of three-finger robot gripper[J]. Combined machine tools and automated processing technology,2024, (09):35-40+45.
revision time	July 2024

5. Interchangeability and Technical Measurements

Module name	**Interchangeability and Technical Measurement**
Module level	Undergraduate
Code	3080201202
Courses	specialized education
Semester school term	Fall Semester
Contact person	Zhao Chengyuan
Lecturer	Xiu Xia, Xu Yunyan
Language	Chinese
Relation to curriculum	Compulsory, 3 th semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, project-based learning method, case study method, on-site teaching, hands-on method, 2 study hours/week

Work load	Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks Lectures: 2 study hours per week, including lectures, discussions and questions. Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review and preparation for exams.		
Credit points ETCS	2		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Introduction to Mechanical Engineering, Descriptive Geometry and Mechanical Drawing, Electrotechnics.		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**

Learning outcomes and their corresponding PLOs	CLO-1 Learning Outcome-1	To be able to memorize the basic knowledge of precision design of typical parts and transmission components; to be able to summarize the basic concepts of linear dimensions, angular dimensions, shape and positional accuracy of basic geometrical quantities and the basic contents of the relevant national standards, the relationship between geometrical tolerances and dimensional tolerances.	R2
	CLO-2 Learning Outcome-2	Be able to remember the basic concepts of precision design of machinery, basic steps, basic principles and general methods of precision design; be able to summarize the working principle, adjustment and use of common measuring instruments.	R3
	CLO-3 Learning Outcome-3	To cultivate self-learning ability, engineering design ability, pioneering and innovative consciousness and good overall quality; to develop a serious and responsible working attitude and a rigorous and meticulous working style.	R6

	CLO-4 Learning Outcome-4	Cultivate the spirit of rigorous scientific research and the sentiment of great national craftsmen; gradually develop the emotion of love for the work of the specialty and the ability of self-learning.	R11
Content	Interchangeability and technical measurement is a basic course for mechanical engineering majors and near mechanical majors, which is mainly divided into two major parts, namely "tolerance and coordination" and "technical measurement", with the main contents of interchangeability and standardization, and the control and evaluation of cylinder combined with dimensional accuracy, Measurement technology basics, geometric tolerance and inspection The course will cover measurement, control and evaluation of surface profile characteristics, geometrical accuracy design of typical components, evaluation of transmission errors of cylindrical gears and accuracy design of gears, accuracy design of mechanical systems and accuracy design of machinery with analysis of examples. Tolerance fits and technical measurements are organically combined, and from the point of view of interchangeability development, tolerance fits are rationally determined and appropriate technical measurements are used. Knowledge Module 1: Introduction (Weighting Factor 1/32, level: memorization+ understanding) Knowledge Module 2: Tolerancing and fitting of smooth cylindrical unions (Weighting Factor 2/32, Level: Understanding+ Application) Knowledge Module 3: Fundamentals of Measurement Technology (Weighting Factor 4/32, Level: Understanding+ Application)		

	Knowledge Module 4: Shape and Position Tolerance and Inspection (Weighting Factor 8/32, Level: Understanding+ Application+ Analysis)
	Knowledge Module 5: Surface Roughness (Weighting Factor 6/32, Level: Understanding + Application) Knowledge Module 6: Detection of Smooth Working Dimensions (Weighting Factor 4/32, Level: Understanding+ Application+ Analysis) Knowledge Module 7: Interchangeability of Commonly Used Bonds (Weighting Factor 4/32, Level: Understanding+ Application+ Analysis) Knowledge Module 8 Interchangeability of Involute Cylindrical Gear Transmissions (Weighting Factor 3/32, Level: Comprehension+ Evaluation)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 40% + post-course homework 40% + experiment 20%, and final closed-book examination of 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
	[1] Interchangeability and Measurement Technology (Fourth Edition), Mao Pinghuai, Machinery Industry Press, 2022. [2] Interchangeability and Measurement Technology, Tie Zhang, Min Li, Tsinghua University Press, 2010. [3] Fundamentals of Interchangeability and Measurement Technology, Zhou

Reading list	Zhaoyuan, Mechanical Industry Press, 2019. [4] Fundamentals of Interchangeability and Measurement Technology, Wang Boping, Mechanical Industry Press, 2019 [5] Zhihuishu Online Learning Platform: https://coursehome.zhihuishu.com/courseHome/1000078027#teachTeam [6] Chaoxing Learning Platform: http://t.g2s.cn/bG2VaPMM , http://t.g2s.cn/lyWwG66A [7] Chen Fude, Lv Jing, Research on Blended Teaching Reform of Online and Offline Teaching under the Background of New Engineering--Taking "Interchangeability and Technical Measurement" Course as an Example[J]. Modern Information Technology, 2022 ,6 (23) :179-182. [8] YUAN Linjiang, ZHENG Jie, REN Yun, Research on the reform of experimental teaching of interchangeability and measurement technology[J]. Experimental Science and Technology, 2020 ,18 (06) :113-117.
revision time	July 2024

6. Fundamentals of Engineering Materials and Mechanical Engineering

Module name	Fundamentals of Engineering Materials and Mechanical Manufacturing
Module level	Undergraduate
Code	3080201203
Courses	specialized education
Semester **school term**	Fall Semester
Contact person	Feng Yunhao
Lecturer	Xu Ying, He Rong
Language	Chinese
Relation to **curriculum**	compulsory , 3 th semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, on-site teaching, project learning method, case study method, laboratory, practical method, 2 study hours/week

Work load	. Total study hours: 84 study hours= Lecture 48 study hours+ Self-study 36 study hours, completed in 16 weeks . Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: approximately 2.5 study hours per week, including pre-course study, post-course practice, and review for exams.		
Credit points ETCS	3		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Introduction to Mechanical Engineering, Descriptive Geometry and Mechanical Drawing, Electrotechnics.		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**

Learning outcomes and their corresponding PLOs	CLO-1 Learning Outcome -1	To be able to memorize the mathematical, natural science, engineering fundamentals and professional knowledge required in the field of mechanical engineering, especially in the field of intelligent manufacturing; to apply the acquired body of knowledge to solve general engineering problems in the field of mechanical engineering.	**R1**
	CLO-2 Learning Outcome -2	Be able to apply the basic principles and methods of mathematics, natural sciences and mechanical engineering to model and analyze problems in the mechanical field, and analyze the design, manufacturing, development, and applied research of products and equipment in the field of mechanical engineering, especially in the field related to intelligent manufacturing, through literature research.	**R2**

		The program is designed to provide a comprehensive overview of general engineering issues in the areas of research, management, etc., and to draw valid conclusions.	
	CLO-3 Learning Outcome -3	Ability to analyze general mechanical engineering problems and demonstrate mechanical systems to meet specific needs. systems, components, or manufacturing processes, and can demonstrate innovation in the process. The organization has the ability to recognize and seek out basic innovative ideas, and to propose effective solutions.	**R3**
	CLO-4 Learning Outcome -4	Ability to extrapolate general engineering problems in the field of mechanical engineering, including designing experiments, analyzing and	**R4**

		interpreting data, and synthesizing information to obtain reasonable and valid conclusions, using scientific methods based on scientific principles. Theory.	
Content	This course is a compulsory basic course for mechanical engineering and mechanical majors. The main contents of the course include a brief introduction to engineering materials and manufacturing technology, engineering material properties and application basics, heat treatment of steel, metal materials, casting and forming technology, plastic forming technology, welding and forming technology, basics of cutting and processing, metal cutting processing methods and equipment, analysis of typical surface machining methods, basic knowledge of machining processes, and special machining. Basic knowledge of machining process, special machining. Through the study of this course, it helps students to master the classification and properties of engineering materials and the manufacturing technology of parts in the processing process. It lays the foundation for the subsequent courses and further improvement of analyzing and solving engineering problems. Knowledge Module 1: A Brief Introduction to Engineering Materials and Manufacturing Technology (Weighting Factor 2/48, Level: Memorization+ Understanding) Knowledge Module 2: Fundamentals of Engineering Materials Properties and Applications (Weighting 4/48, Level: Memorization+ Understanding+ Applications)		

	Knowledge Module 3: Heat Treatment of Steel (Weighting Factor 2/48, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Metallic Materials (Weighting Factor 1/48, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Casting Molding Technology (Weighting Factor 6/48, Level: Memorization+ Understanding+ Application) Knowledge Module 6: Plastic Forming of Materials (Weighting Factor 8/48, Level: Understanding - Evaluation) Knowledge Module 7: Welding and Forming Technology (Weighting Factor 2/48, Level: Understanding - Creative) Knowledge Module 8: Fundamentals of Cutting (Weighting Factor 2/48, Level: Memorize - Analyze) Knowledge Module 9: Metal Cutting Methods and Equipment (Weighting Factor 1/48, Level: Comprehension - Evaluation) Knowledge Module 10: Analysis of Typical Surface Finishing Methods (Weighting Factor 2/48, Level: Memory - - Evaluation) Knowledge Module 11: Fundamentals of Machining Processes (Weighting Factor 1/48, Level: Memorization - - Evaluation) Knowledge Module 12: Specialty Processing (Weighting Factor 1/48, Level: Memory - Evaluation)

Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 30% + post-course homework 30% + individual demonstration 30% + experiment 10%, and final closed-book examination of 100 minutes.
Media employed	Computers, MOOC online site, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Fundamentals of Engineering Materials and Mechanical Manufacturing, Qi Lehua, Higher Education Press, 2018. [2] Fundamentals of Engineering Materials and Mechanical Manufacturing, Su Zilin, Peking University Press, 2009. [3] Fundamentals of Engineering Materials and Mechanical Manufacturing, Luo Li et al, Huazhong University of Science and Technology Press, 2012. [4] Fundamentals of Engineering Materials and Mechanical Manufacturing, Tao Yiyi, Chemical Industry Press, 2012.
	[5] Fundamentals of Engineering Materials and Mechanical Manufacturing, Ming Zhe, Yu Donglin, Zhao Liping, Tsinghua University Press, 2012. [6] Engineering Materials, Zheng Mingxin, Zhu Zhangshu, Yao Kefu, Tsinghua University Press, 2011. [7] Yang Xueyin. The application of blended teaching in Foundamentals of Engineering Materials and Mechanical Manufacturing[J]. Agricultural Machinery Use and Maintenance,2019,(04):73-74. [8] Gao Yufang,Li Wei. Teaching reform and practice of engineering

	materials and mechanical manufacturing foundation course[J] . Journal of Higher Education Science,2018,38(10):72-75.
revision time	July 2024

7. Training in Materials Mechanics

Module name	Training in Materials Mechanic
Module level	Undergraduate
Code	3080201206
Courses	specialized education
Semester school term	Fall Semester
Contact person	Wang Limin
Lecturer	Hu Hai Wang Hongxia
Language	Chinese
Relation to curriculum	compulsory, 4 th semester
Type of Teaching, Contact hours	Lecture, simulation, practice, on-site teaching, project-based learning method, case study method, hands-on method, 3 study hours/week

<table>
<tr><td>Work load</td><td colspan="3">. Total study hours: 84 study hours= Lecture 48 study hours+ Self-study 36 study hours, completed in 16 weeks
. Lectures: 3 hours per week, including lectures, discussions and questions.
. Self-study: approximately 2.3 study hours per week, including pre-course study, post-course practice, and review for exams.</td></tr>
<tr><td>Credit points ETCS</td><td colspan="3">3</td></tr>
<tr><td>Requirements according to the examination Regulations</td><td colspan="3">A student must have registered for the course.</td></tr>
<tr><td>Recommended prerequisites</td><td colspan="3">Advanced Mathematics, University Physics, Theoretical Mechanics</td></tr>
<tr><td rowspan="2">Learning outcomes and their corresponding PLOs</td><td>Course Learning Outcome (CLO)</td><td>Description</td><td>Supported Programme Learning Objective (PLOs)</td></tr>
<tr><td>CLO-1 Learning</td><td>To be able to calculate the strength and stiffness of bars through the study of Materials Mechanics. To be able to use basic knowledge of tensile,</td><td></td></tr>
</table>

	Outcome-1	compressive, torsional and flexural loading to calculate deformations or displacements of simple structures.	R1
	CLO-2 Learning Outcome-2	The ability to recognize the compressive instability of slender bars and to simplify it into a mechanical model. The critical pressure or proximity stress is calculated or verified by using the following models.	R2
	CLO-3 Learning Outcome-3	To be able to select and use modern engineering and information technology tools to retrieve solutions to complex engineering problems, evaluate their limitations, and rationalize and improve them.	R6

Content	Materials Mechanics is a basic course in mechanical engineering, mainly about the tensile, torsion, bending and its combination of force forms and strength theory. The task of the course is to enable students to master the deformation of stressed components and internal stress analysis and calculation methods, and provide calculation methods for economic and rational design. Through the study of this course, students learn to have a clear basic concept of strength, stiffness and stability of members, and acquire the necessary basic knowledge and calculation ability. Knowledge Module 1: Introduction (Weighting Factor 2/48, Level: Memorization+ Understanding) Knowledge Module 2: Stretching Compression and Shearing (Weighting Factor 5/48, Level: Understanding - Analyzing) Knowledge Module 3: Reversals (Weighting Factor 4/48, level: comprehension-analysis) Knowledge Module 4: Bending Internal Forces (Weighting Factor 5/48, Level: Memorization - Analysis) Knowledge Module 5: Bending Stress (Weighting Factor 6/48, Level: Understanding - Analyzing) Knowledge Module 6: Bending Deformation (Weighting Factor 6/48, Level: Memorization - Analytical) Knowledge Module 7: Stress-Strain Analysis and Strength Theory (Weighting Factor

	6/48, Level: Memorization - Evaluation) Knowledge Module 8: Combinatorial Transformations (Weighting Factor 6/48, Level: Understanding - Evaluation) Knowledge Module 9: Pressure Bar Stabilization (Weighting Factor 8/48, Level: Understanding-Application)
Study and examination requirements and forms of examination	The course assessment includes process assessment (60%) and final examination (40%), of which the process assessment includes: unit test 40% + post-course work 30% + personal presentation 30%, and the final closed-book examination 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
	[1] Materials Mechanics (Sixth Edition), Liu Hongwen, Higher Education Press, 2017. [2] Tutorial on Materials Mechanics,Yuan Xuezhong, China Electric Power Press,2019. [3] Materials Mechanics,Wang Xiangdong, China Water Conservancy and Hydropower Press,2014. [4] Q.C. Ji, K.P. Yu, C.G. Wang. A method for analyzing the stiffness of composite materials based on Tsai's modulus. Force and Practice, 2024,

Reading list	46(5) : 1066-1071 [5] Ji Qingxiang, Yu Kaiping, Wang Changguo. Analysis on stiffness of composite materials based on Tsai's modulus. Mechanics in Engineering, 2024, 46(5): 1066-1071 [6] Bingheng Lu, R&D and demonstration of high performance polymer and metal powder materials for 3D printing. Shanxi Province, Shanxi Research Institute of Chemical Industry (Co., Ltd.), 2023-08-22. [7] Jin Mingxu, Zhao Chunguang, Chang Chengcheng, et al. Experimental study on Spring Semester force attenuation factor of regulator for high-speed locomotive braking system[J]. Railway Rolling Stock,2023,43(06):136-140.
revision time	July 2024

8. Hydraulic and Pneumatic Transmission

Module name	Hydraulic and Pneumatic Transmission
Module level	Undergraduate
Code	3080201209
Courses	specialized education
Semester school term	Fall Semester
Contact person	Song Yi
Lecturer	Wang Haitao, He Linan
Language	Chinese, English
Relation to curriculum	compulsory C o m p u l s o r y , 5th semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, field teaching, project-based learning method, laboratory, hands-on method, 2 study hours/week

Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review for exams.		
Credit points ETCS	2		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Descriptive Geometry and Mechanical Drawing, Interchangeability and Technical Measurement, Principles of Machinery.		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**

Learning outcomes and their corresponding PLOs	CLO-1 Learning Outcome -1	Describe the basic theories of hydraulic and pneumatic transmissions and summarize the application of hydrostatic and dynamic pressure theories in hydraulic and pneumatic transmission technology; review the basic knowledge of hydraulic transmissions. Remember the structural features, operating principles, performance and applications of basic hydraulic components. The following is an overview of the principles of operation, system components and performance characteristics of hydraulic servo systems. Summarize the operating principles, system components and performance characteristics of hydraulic servo systems.	**R1**

	CLO-2 Learning Outcome -2	Possess basic theoretical analysis of hydraulic and pneumatic engineering problems; possess basic skills in drafting, calculating, testing, literature searching and process operation necessary for the specialty. The ability to read and analyze hydraulic systems of general machinery and equipment, and the basic ability to debug and repair according to equipment specifications.	**R2**
	CLO-3 Learning Outcome -3	To be able to analyze and demonstrate basic circuits according to the working principles and characteristics of hydraulic and pneumatic components, to understand and analyze the working principles of complex circuits with specific functions by using the characteristics of basic circuits, and to be able to design complex circuits to	**R3**

		achieve certain functional tasks in an innovative way.	
	CLO-4 Learning Outcome -4	Identify terminology used in hydraulic and pneumatic transmissions, use common names and sketches of power, actuator, and control components, analyze and reason about engineering problems, and communicate professionally using engineering terminology.	**R9**
	Hydraulic and Pneumatic Transmission" is a mechanical engineering students must study a professional foundation course, is a pressurized fluid (pressure oil or compressed air) as an energy medium, to achieve a variety of mechanical transmission and automatic control of the course. The main content of the basic knowledge of hydraulic and pneumatic transmission, hydraulic and pneumatic transmission of the basic components, hydraulic and pneumatic transmission of the basic circuit and so on. Through the study of this course, students can master the basic knowledge and basic theory of hydraulic and pneumatic transmission technology, have a systematic understanding of the hydraulic and pneumatic transmission technology used in production, lay a foundation for the use and maintenance of engineering equipment, electromechanical equipment and intelligent control systems, and cultivate the ability of students to solve the related transmission problems in		

Content	production. Knowledge Module 1: Hydraulic Transmission Basics (Weighting Factor 2/32, Level: Memorization+ Understanding) Knowledge Module 2: Hydraulic Power Elements (Weighting Factor 2/32, Level: Memorization+ Understanding+ Application) Knowledge Module 3: Hydraulic Actuators (Weighting Factor 4/32, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Hydraulic Auxiliary Components (Weighting Factor 1/32, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Hydraulic Control Elements (Weighting Factor 6/32, Level: Memorization+ Understanding+ Application) Knowledge Module 6: Basic Hydraulic Circuits (Weighting Factor 6/32, Level: Understanding - Evaluation) Knowledge Module 7: Typical Hydraulic Transmission Systems (Weighting Factor 4/32, Level: Understanding - Creative) Knowledge Module 8: Hydraulic Servo and Electrohydraulic Proportional Control Technology (Weighting Factor 2/32, Level: Memorization - Analytical) Knowledge Module 9: Design and Calculation of Hydraulic Systems (Weighting Factor 1/32, Level: Comprehension - Evaluation) Knowledge Module 10: Fundamentals of Pneumatic Transmissions and Pneumatic Circuits (Weighting Factor 4/32, Level: Memorization - - Evaluation)
Study and	

examination requirements and forms of examination	The course assessment consists of process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 30% + post-course homework 30% + individual demonstration 30% + experiment 10%, and final closed-book examination of 100 minutes.
Media employed	Computers, MOOC online site, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Hydraulic and Pneumatic Transmission, edited by Zuo Jianmin, Machinery Industry Press, 2019, 5th ed. [2] Hydraulic and Pneumatic Transmission, edited by Xu Fuling, Machinery Industry Press, 2018, 4th ed. [3] Hydraulic and Pneumatic Transmission Technology, edited by Chen Lifang Meng Hui, Machinery Industry Press, 2023, 2nd ed. [4] Hydraulic Transmission Systems, edited by Wang Jie, Su Donghai, and Guan Zhongfan, Mechanical Industry Press, 2024, 5th ed. [5] Shin S.Y.. Exploration of hydraulic and pneumatic transmission technology and application[J]. Modern Manufacturing Technology and Equipment,2024,(S2):23-25. [6] Chen Zhongrun, Li Mingxiang. Application of information technology in teaching hydraulic and pneumatic transmission technology []. Electronic Technology, 2022(2):152-153. [7] ZHENG Yukun, SUN Ruyue, LI Fengming, et al. Research and application of centralized drive control system for hydraulic robot arm[J]. Journal of Jilin University (Engineering Edition),2024,54(11):3358-3371.
revision time	July 2024

9. Mechanical Principles

Module name	Mechanical Principles
Module level	Undergraduate
Code	3080201207
Courses	specialized education
Semester **school term**	Spring Semester
Contact person	He Linan
Lecturer	Chang Degong, Guo Haibing, Liu Liwei
Language	Chinese
Relation to **curriculum**	Compulsory, 4 th semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, field teaching, project learning method, hands-on method, 4 hours/week
	. Total study hours: 112 study hours= Lecture 64 study hours+ Self-study 48

Work load	study hours, completed in 16 weeks . Lectures: 4 hours per week, including lectures, discussions and questions. . Self-study: approximately 3 study hours per week, including pre-class pre-study, post-class practice, and review and preparation for exams.		
Credit points ETCS	4		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Advanced Mathematics, Descriptive Geometry and Mechanical Drawing, Theoretical Mechanics.		
Learning outcomes and their corresponding PLOs	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	Be able to memorize the principles of common mechanisms, kinematics and dynamics of mechanisms, understand the basics of mechanical principles, and	R1

	analyze the principles of mechanical related structures. The program is based on the following principles	
CLO-2 Learning Outcome-2	To be able to memorize the basic principles and methods of structural analysis of machinery, to be able to analyze and study common engineering problems through books, literature and journals, and to be able to apply them to specific mechanical engineering projects.	R4
CLO-3 Learning Outcome-3	Analyze the theoretical knowledge of mechanical principles, combined with mechanics, materials science and other related knowledge, to carry out project design and optimization analysis, from the economy, reliability and other aspects of a comprehensive examination.	R10

		Consider and propose optimal project solutions.	
	CLO-4 Learning Outcome-4	To stimulate students' curiosity in catching up with the frontiers of science and technology through the introduction of cutting-edge technology. The program is designed to provide a strong sense of ownership and lifelong learning, with the ability to continue to learn and adapt to developments.	R11
	Principles of Machinery is a core course for mechanical engineering majors. The main content of the course includes three parts: the first part is the structure and kinematics of mechanism, mainly studying the possibility and certainty of the motion of the mechanism, as well as the displacement, velocity and acceleration characteristics of the mechanism; the second part is the commonly used mechanical mechanism, mainly introducing the characteristics and design methods of the common mechanical mechanism such as planar linkage mechanism, gear mechanism, cam mechanism, etc.; the third part is the dynamics of mechanism and machine, mainly studying the relationship between force and motion during the motion of the mechanism, the balance of inertia,		

Content	mechanical efficiency and speed fluctuation regulation, etc.. The third part is Mechanism and Machine Dynamics, which mainly studies the relationship between force and motion in the process of mechanism motion, the balance of inertia force, mechanical efficiency and speed fluctuation regulation. Through the study of this course, students can master the basic theories and concepts of machinery and cultivate their ability to analyze and design mechanisms. In the overall situation of cultivating mechanical senior engineering talents, it not only serves as a precursor for students to study related technical and professional courses, but also plays an important role in their future mechanical design and research work. Knowledge module 1: Introduction (Weighting Factor 2/64, level: understanding) Knowledge Module 2: Structural Analysis of Institutions (Weighting Factor 6/64, Level: Memory-Analysis)
	Knowledge Module 3: Motion Analysis of Planar Mechanisms (Weighting Factor 6/64, Level: Comprehension-Analysis) Knowledge Module 4: Static Analysis of Planar Mechanisms (Weighting Factor 4/64, Level: Understanding+ Application) Knowledge Module 5: Linkage Mechanisms and Their Design (Weighting Factor 8/64, Level: Memorization-Analysis) Knowledge Module 6: Cam Mechanisms and Their Design (Weighting Factor 4/64, Level: Comprehension - Evaluation) Knowledge Module 7: Gear Mechanisms and Their Design (Weighting Factor 8/64, Level: Memorization-Analysis) Knowledge Module 8: Gear Systems and Their Design (Weighting Factor 6/64, Level: Memorization - Evaluation) Knowledge module 9: Other commonly used institutions (Weighting Factor

	4/64, level: understanding-evaluation) Knowledge Module 10: Balance of Machinery (Weighting Factor 6/64, Level: Understanding + Application) Knowledge Module 11: Operation of machinery and regulation of its speed fluctuations (Weighting Factor 4/64, Level: Memorization+ Understanding) Knowledge Module 12: Schematic Design of Mechanical Systems (Weighting Factor 6/64, Level: Understanding-Creating)
Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 40% + post-course homework 30% + classroom participation 30%, and the final closed -book examination of 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Liu Guobing. Research on anti-skid technology of automobile tires based on mechanical principle[J]. China Tire Resource Utilization, 2024,(09):28-30 [2] He Hongxing. Upgrading of electrical control principle of agricultural machinery[J] . New Farmer,2024,(09):87- 89. [3] Yao Haiyan, WANG Tong, ZHANG Yunfeng, et al. Structure, principle and application of hydraulic clutch/brake for mechanical presses[J]. Forging Equipment and Manufacturing Technology,2024,59(01):14-17. [4] Mechanical Innovative Design, Qiu Lifang Tang Jinyuan Gao Zhi, edited by Qiu Lifang Tang Jinyuan Gao Zhi, Higher Education Press, 2020. [5] Principles of Mechinery, edited by Sun Huan Ge Wenjie, Higher Education

	Press, 2021.05, 9th ed. [6] Niu Xiang. Research on optimization of packaging machinery system based on mechanical engineering principle[J] . Shanghai Packaging,2023,(10):4-6. [7] Mechanical Innovative Design, Qiu Lifang Tang Jinyuan Gao Zhi, edited by Qiu Lifang, Higher Education Press, 2020.
revision time	July 2024

10. Mechanical Design

Module name	Mechanical Design
Module level	Undergraduate
Code	3080201208
Courses	specialized education
Semester **school term**	Fall Semester
Contact person	Zhang Kaida
Lecturer	Fan Zhimin
Language	Chinese
Relation to **curriculum**	Compulsory / Semester 5
Type of **Teaching,** **Contact hours**	Lecture, demonstration, simulation, practice, on-site teaching, project-based learning method, hands-on method, 4 hours/week
	Total study hours: 112 study hours= Lecture 64 study hours+ Self-study 48 study hours, completed in 16 weeks . Lectures: 4 hours per week, including lectures, discussions and

Work load	questions. . Self-study: approximately 3 study hours per week, including pre-class pre-study, post-class practice, and review and preparation for exams.		
Credit points ETCS	4		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Theoretical Mechanics, Materials Mechanics, Principles of Machinery		
Learning outcomes and their corresponding PLOs	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	To be able to memorize the mathematical and engineering fundamentals and specialized knowledge required in the field of mechanical engineering. Apply the acquired body of knowledge to solve general engineering problems in the field of	R2

		mechanical engineering.	
	CLO-2 Learning Outcome-2	Be able to recognize machines and their common mechanical parts; understand the structural characteristics of common parts. The students should have the basic methods and skills of mechanical design; they should be able to refer to standards, manuals and related technical data; and they should summarize the general knowledge of selecting, installing, using and maintaining mechanical equipment.	R3
	CLO-3 Learning Outcome-3	Cultivate students' scientific and technological literacy, professional ethics, and conscientious compliance with laws and norms related to science and technology; develop a rigorous and serious scientific attitude, patience and meticulous work ethic. We have a team spirit of cooperation and a creative spirit of enterprise.	R7
	CLO-4 Learning Outcome-4	Understand and analyze engineering management principles and methods The methodology of the program	

		is based on the following principles and can be applied in mechanical engineering projects.	R10
Content	This course is a compulsory core course for mechanical engineering majors according to their core competence. Through the study of this course, students can master the basic knowledge, basic theories, basic methods and basic training of designing skills of mechanical design, and can master the whole designing and calculating process through the designing of common mechanical parts and mechanical structures, which can lay a foundation for students to further study other specialized courses and to engage in mechanical designing work in the future. It is the foundation for learning mechanical engineering and engaging in mechanical engineering design. In the arrangement of teaching plan, it plays the role of transition from basic theoretical courses to engineering specialized courses, and occupies an important place in the process of cultivating talents of mechanical majors. Bit. Knowledge Module 1: General Mechanical Design (Weighting Factor 2/64, Level: Memorization+ Understanding) Knowledge Module 2: Strength of Mechanical Components (Weighting Factor 2/64, Level: Understanding+ Application+ Analysis) Knowledge Module 3: Threaded Couplings and Screw Transmissions (Weighting Factor 10/64, Level: Understanding+ Application+ Analysis) Knowledge Module 4: Keys, Splines, Keyless Couplings and Pin Couplings (Weighting Factor 2/64, Level: Understanding+ Application+ Analysis) Knowledge Module 5: Belt Drives (Weighting Factor 8/64, Level: Understanding+ Application+ Analysis) Knowledge Module 6: Chain Drive (Weighting Factor 4/64, Level:		

	Understanding+ Application+ Analysis) Knowledge Module 7: Gearing (Weighting Factor 16/64, Level: Understanding+ Application+ Analysis) Knowledge Module 8: Axes (Weighting Factor 4/64, level: understanding+ application+ analysis) Knowledge Module 9: Rolling Bearings (Weighting Factor 6/64, Level: Understanding+ Application+ Analysis) Knowledge Module 10: Plain Bearings (Weighting Factor 6/64, Level: Understanding+ Application+ Analysis) Knowledge Module 11: Couplings and Clutches (Weighting Factor 4/64, Level: Understanding+ Application+ Analysis)
Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 40% + post-course homework 30% + classroom participation 30%, and the final closed -book examination of 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform

Reading list	[1] Mechanical Design (10th Edition), Pu Lianggui, Higher Education Press, 2019 [2] Design of Machines, edited by Muth et al. and translated by Kong Jianyi, Mechanical Industry Press, 2012. [3] Mechanical Design (Third Edition), Wu Changlin, Huazhong University of Science and Technology Press, 2011. [4] Mechanical Design, Cheng Zhihong, Southeast University Press, 2006 [5] Mechanical Design (Second Edition), Wang Wei, Huazhong University of Science and Technology Press, 2011 [6] Weng Xingyu. A review of modern mechanical design theories and methods[J]. Southern Agricultural Machinery,2024,55(S1):109-111+120. [7] Zhao Lei. Application of computer-aided design mechanical drawing in mechanical design[J]. Internal Combustion Engine Engineering,2024,45(06):9.
revision time	July 2024

11. Mechanical Engineering Test Technology

Module name	Mechanical Engineering Test Technology
Module level	Undergraduate
Code	3080201216
Courses	specialized education
Semester **school term**	Fall Semester
Contact person	Hu Hai
Lecturer	Sun Hui and Li Anning
Language	Chinese
Relation to **curriculum**	compulsory, 5th semester
Type of **Teaching,** **Contact hours**	Lecture, demonstration, simulation, practice, field instruction, laboratory, project-based learning method, hands-on method, 2 study hours/week
	. Total study hours: 84 study hours= Lecture 48 study hours+ Self-study 36 study

Work load	hours, completed in 16 weeks . Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: approximately 2.5 study hours per week, including pre-course study, post-course practice, and review for exams.		
Credit points ETCS	3		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Theoretical Mechanics, Electrotechnics, Principles of Machinery.		
Learning outcomes and their corresponding PLOs	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	To be able to describe the general principles and methods of mechanical engineering testing technology, and to compare the engineering testing methods in the field of	R1

	mechanical engineering testing technology, especially in the field related to smart manufacturing, with literature research. case to infer the correct and usable engineering model.	
CLO-2 Learning Outcome-2	Be able to identify commonly used sensors, test instruments and devices; review the basic concepts of mechanical engineering test technology; remember the principles and methods of signal acquisition, conversion, and experimental data analysis and processing. Comparison of the basic characteristics of different test systems The program is characterized by the ability to design test protocols and to conduct scientific experiments independently.	R3
CLO-3 Learning Outcome-3	Cultivate students' scientific and technological literacy, professional ethics, conscientious compliance with laws and norms related to	R7

		science and technology; develop a rigorous and serious scientific attitude, a patient and meticulous work style, a sense of teamwork, and a spirit of innovation.	
	CLO-4 Learning Outcome-4	Apply engineering management principles and methods to analyze the rationality, reliability and economy of projects, compare different options and solve project problems. Topic.	R10
Content	The course is a programme core course and compulsory course based on the core competence of mechanical engineering. The main contents include signal description and analysis, basic characteristics of test systems, principles and applications of common sensors, signal transformation and processing, random signal analysis, mechanical displacement measurement, vibration measurement, strain, force and torque measurement, temperature, pressure and flow measurement. The course will help students to develop a concept of testing techniques for mechanical systems. The course focuses on non-electrical measurement techniques in the field of mechanical engineering, with an emphasis on the testing of dynamic signals. Attention is paid to broadening the basic knowledge, strengthening the engineering background, and cultivating the students' innovative ability and engineering practice ability, reflecting the new development and knowledge in the field of testing technology.		

	Knowledge Module 1: Introduction (Weighting Factor 2/48, Level: Memorization+ Understanding) Knowledge Module 2: Signal Description and its Analysis (Weighting Factor 4/48, Level: Memorization+ Understanding+ Application) Knowledge Module 3: Basic Characteristics of Test Systems (Weighting Factor 4/48, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Principles and Applications of Commonly Used Sensors (Weighting Factor 6/48, Level: Memorization+ Understanding+ Applications) Knowledge Module 5: Transformation and Processing of Signals (Weighting Factor 6/48, Level: Memorization+ Understanding+ Application)
	Knowledge Module 6: Stochastic Signal Analysis (Weighting Factor 2/48, Level: Understanding+ Application+ Analysis) Knowledge Module 7: Mechanical Displacement Measurement (Weighting Factor 8/48, Level: Understanding+ Application+ Analysis) Knowledge Module 8: Measurement of Vibration (Weighting Factor 4/48, Level: Understanding+ Application+ Analysis) Knowledge Module 9: Measurement of Strain, Force and Torque (Weighting Factor 4/48, Level: Understanding+ Application+ Analysis) Knowledge Module 10: Temperature Measurement (Weighting Factor 4/48, Level: Understanding+ Application+ Analysis) Knowledge Module 11: Measurement of Pressure and Flow (Weighting Factor 4/48, Level: Understanding+ Application+ Analysis)

Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 30% + post-course homework 30% + individual demonstration 30% + experiment 10%, and final closed-book examination of 100 minutes.
Media employed	Computers, MOOC online site, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Mechanical Engineering Testing Technology, edited by Liu Peiji and Wang Anmin, Mechanical Industry Press, 2020, 1st ed. [2] Signal and Test Technology, edited by Fan Shangchun, Beijing University of Aeronautics and Astronautics Press, 2011, 2nd ed. [3] Fundamentals of Mechanical Engineering Testing Technology, edited by Huang Changyi et al, Mechanical Industry Press, 2020. [4] Testing Technology, edited by Shi Wenkang et al, Shanghai Jiao Tong University Press, 2021. [5] Mechanical Engineering Testing Technology, edited by Zheng Shufang et al., Science Press, 1999. [6] CHEN Chen, YIN Baoji, TANG Dan, XIA Jing . Reform of experimental teaching in mechanical engineering testing technology course [J]. Modernization of Education, 2019(71):84-85.

	[7] ZHOU Fenglin, YU Jianghong, LIAO Ocean, et al. Research on promoting the teaching of Mechanical Engineering Testing Technology through scientific research experiments in the context of new engineering disciplines[J]. Mechanical and electrical product development and innovation,2019,32 (03):96-97.
revision time	July 2024

12. Intelligent Manufacturing Equipment Technology

Module name	Intelligent Manufacturing Equipment Technology
Module level	Undergraduate
Code	3080201212
Courses	specialized education
Semester **school term**	Fall Semester
Contact person	Sun Guiping
Lecturer	Sun Guiping, Qi Yunshu, Zhang Kaida
Language	Chinese
Relation to **curriculum**	Compulsory, 5th Semester
Type of **Teaching,** **Contact hours**	Lecture, demonstration, simulation, practice, live teaching, project-based learning method, 3 hours/week

Work load	. Total study hours: 84 study hours= Lecture 48 study hours+ Self-study 36 study hours, completed in 16 weeks . Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: approximately 2.3 study hours per week, including pre-course study, post-course practice, and review for exams.		
Credit points ETCS	3		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Foundamentals of Engineering Materials and Mechanical Manufacturing, Principles of Machinery		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**

Learning outcomes and their corresponding PLOs	CLO-1 Learning Outcome-1	Be able to apply the general principles and methods of smart manufacturing process route selection and design, combined with literature research, to deduce or design a reasonable smart manufacturing system. The system is designed to solve complex engineering problems in the manufacturing process and to create correct and usable engineering models.	R2
	CLO-2 Learning Outcome-2	Describe the smart manufacturing process, design the testing, diagnostic and control systems for the manufacturing process to meet specific needs, and construct the corresponding database and knowledge base.	R3
	CLO-3 Learning Outcome-3	To be able to apply intelligent manufacturing equipment technology to optimize manufacturing systems such as intelligent manufacturing equipment, and to use	R4

	scientific methods to study complex engineering problems.	
CLO-4 Learning Outcome-4	They are able to use knowledge of intelligent manufacturing systems and intelligent manufacturing equipment to select equipment components for a specific manufacturing unit.	R4
This course is the foundation of advanced manufacturing technology, driven by the changing market demand, prompting the manufacturing industry from mass production to small batch, customized production direction change and a large number of intelligent equipment to meet the requirements of the market rapid response; intelligent manufacturing as a high degree of fusion of information technology and industrialization will be the product of long-term development. With the continuous development and improvement of artificial intelligence technology, intelligent manufacturing is defined as the future direction of China's manufacturing. Through the study of this course The study will enable students to master the basic theory and basic knowledge of intelligent manufacturing, and initially have the ability to sub In order to adapt to the requirements of China's future development of resource conservation and production intensification, it is necessary to		

Content	pay attention to cultivating students' correct design thinking, rigorous working style and teamwork spirit, and laying the necessary foundation for studying relevant programme courses and participating in technological innovation and product transformation. Knowledge Module 1: Introduction (Weighting Factor 4/48, Level: Memorization+ Comprehension) Knowledge Module 2: Intelligent Knowledge Domains (Weighting 8/48, Level: Memorization+ Understanding+ Application) Knowledge Module 3: Intelligent Design (Weighting 12/48, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Process Intelligent Planning and Intelligent Databases (Weighting Factor 8/48, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Intelligent Inspection, Diagnosis and Control of Manufacturing Processes (Weighting Factor 6/48, Level: Memory)
	+(Understanding+ applications) Knowledge Module 6: Intelligent Manufacturing Systems (Weighting Factor 6/48 , Level: Memorization+ Understanding+ Application) Knowledge Module 7: Smart Manufacturing Equipment (Weighting Factor 4/48, Level: Memorization+ Understanding+ Application)
Study and examination requirements and forms of examination	The course assessment consists of a process assessment (50%) and a final examination (50%), of which the process assessment consists of: 50% of the usual performance + 50% of the usual assignments, and a final closed-book examination of 100 minutes.

Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Intelligent Manufacturing Equipment and Systems, Wang Liping, Tsinghua University Press, 2020. [2] Intelligent Manufacturing, Liu Min, Tsinghua University Press, 2023. [3] Intelligent Manufacturing Fundamentals and Applications, Wang Fang, Machinery Industry Press.2018 [4] China University MOOC website: https://www.icourse163. org [5] Zhihuishu Online Learning Platform: https://www.zhihuishu.com [6] Yuketang: https://www.yuketang.cn [7] Qun Wu,Qian Chen. Research on the Formation Logic and Leap Path of New Quality Productivity Based on Intelligent Manufacturing [J]. Contemporary Finance and Economics,2024,(09):3-12. [8] QI Tianhong, HUANG Haifeng, CAO Le, et al. Research on the conceptual model and key technology of digital twin for intelligent manufacturing[J]. Information Technology and Standardization, 2024,(11):45-50+60.
revision time	July 2024

13. Mechanical Manufacturing Processes

Module name	Mechanical Manufacturing Processes
Module level	Undergraduate
Code	3080201210
Courses	specialized education
Semester **school term**	Spring Semester
Contact person	Sun Huili
Lecturer	Sun Huili, Zhao Qingzhi, Liu Liwei
Language	Chinese
Relation to **curriculum**	compulsory, 6 th semester
Type of **Teaching,** **Contact hours**	Lecture, demonstration, simulation, practice, on-site teaching, project-based learning method, case study method, hands-on method, 3 study hours/week
	. Total study hours: 84 study hours= Lecture 48 study hours+ Self-study 36 study hours, completed in 16 weeks

Work load	. Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: approximately (2-3) hours per week, including pre-study, post-study exercises, review and preparation.		
Credit points ETCS	3		
Requirements according to	A student must have registered for the course.		
the examination Regulations			
Recommended prerequisites	Mechanical Design; Intelligent Manufacturing Equipment Technology		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
		Familiarize yourself with the basic theory of mechanical engineering processes, defining their core concepts and explaining process characteristics; applying processing method selection techniques and	

Learning outcomes and their corresponding PLOs	CLO-1 Learning Outcome-1	implementing process routing. Solve process procedure development problems. The problem is to calculate the dimensional chain parameters and analyze the dimensional chain errors; to control the machining accuracy fluctuations and optimize the surface quality indexes; Design of machine tool fixture structures, application of computer-aided technology ; hands-on CAD software operation, demonstration of process simulation flow Program.	R1
	CLO-2 Learning Outcome-2	To be able to apply process procedures for the machining of parts and the assembly of machines; to be able to analyze the machining accuracy and surface quality of mechanical products and to take appropriate improvement measures;	R3

	CLO-3 Learning Outcome-3	To use various process parameters and diagrams in machining process manuals, and to search for information on modern manufacturing process methods, advanced manufacturing models and other cutting-edge technologies.	R5
	CLO-4 Learning Outcome-4	Judge the development and application trends of Advanced Manufacturing Technology, and memorize the basic principles and application methods of new technologies, so as to be well prepared for future career development. Preparedness.	R6
	This course is a core course for mechanical engineering majors. Through the study of this course, students can understand the basic knowledge and basic theories of machining system, master the formulation methods and steps of machining and assembly process procedures, master the design of machine tools and fixtures, the accuracy and control of machining, the surface quality of machining and its control, and understand the development of the theory and technology of mechanical manufacturing process, especially the development trend of advanced manufacturing technology and intelligent manufacturing technology. At the same time, through the study of this course, students will develop the ability to analyze and solve practical problems in		

Content	mechanical design and manufacturing, and establish the ideal faith of studying for the construction and development of the socialist motherland. Knowledge module 1: Introduction (Weighting Factor 2/48, level: memorization-understanding) Knowledge Module 2: Machining Process Protocol Design (Weighting Factor 12/48, Level: Memorization+ Understanding+ Application) Knowledge Module 3: Machine Tool Fixture Design (Weighting Factor 10/48, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Machining Accuracy and its Control (Weighting Factor 10/48, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Machined Surface Quality and its Control (Weighting Factor 4/48, Level: Memorization+ Understanding-Application) Knowledge Module 6: Machine Assembly Process Design (Weighting Factor 6/48, Level: Memorization+ Understanding+ Application) Knowledge Module 7: Developments in Mechanical Manufacturing Process Theory and Technology (Weighting Factor 4/48, Level: Recall)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and non-written exam (50%), of which the process assessment includes: unit test 40% + post-course work 30% + laboratory 30%, and the non-written exam is 100 points. Bell.

Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Mechanical Manufacturing Processing, Xiankui Wang, Mechanical Industry Press, Aug 2019 . [2] Mechanical Manufacturing Technology (5th Edition), Wang Qiping, Harbin Institute of Technology Publishing House, August 2005. [3] Mechanical Manufacturing Process, Xu Jiayuan, Machinery Industry Press, 2006. [4] China University MOOC website: https://www.icourse163.org . [5] Zhihuishu Online Learning Platform: https://www.zhihuishu.com . [6] Zhang Xianming, Jingjin. Exploration of project-based teaching practice in mechanical manufacturing process course[J]. Vocational Education,2023, (03):89-92. [7] Xiao Miaoxin. Thinking and practice of teaching mechanical manufacturing technology under the concept of curriculum politics[J]. Equipment manufacturing technology,2020, (09):131-132+141.
revision time	July 2024

14. Mechatronics System Design

Module name	Mechatronics System Design
Module level	Undergraduate
Code	3080201217
Courses	specialized education
Semester **school term**	Fall Semester
Contact person	Hu Hai
Lecturer	Jiang Peigang
Language	Chinese
Relation to **curriculum**	compulsory, 7 th semester
Type of **Teaching,** **Contact hours**	Lecture, demonstration, simulation, practice, on-site teaching, case study method, hands-on method, 2 study hours / week

Work load	. Total study hours: 84 study hours= Lecture 48 study hours+ Self-study 36 study hours, completed in 16 weeks . Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: approximately 2 study hours per week, including pre-course study, post-course practice, and review for exams.		
Credit points ETCS	3		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Principles of Machinery, Mechanical Design, Principles of Automatic Control, Test Techniques in Mechanical Engineering.		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1	To be able to understand the general principles and methods of mechatronics design, and to select or	R2

Learning outcomes and their corresponding PLOs		design mechatronics products by combining with literature research, and to establish correct and usable engineering models.	
	CLO-2	Remember the basic concepts of mechatronic system design, commonly used sensors, transmission mechanisms, power drives, and types and characteristics of computer control systems; analyze the roles and interrelationships of structural elements in the system; and have the ability to design a system. Ability to design and develop typical mechatronic products.	R3
	CLO-3	Cultivate students' scientific and technological literacy, professional ethics, conscientious compliance with laws and norms related to science and technology; develop a rigorous and serious scientific attitude, patience and meticulous work style, teamwork and	R6

		innovation.	
	CLO-4	Understand the principles and methods of project management and be able to apply them in mechanical engineering projects.	R10
Content	Mechatronics system design is a core and compulsory course based on the core competencies of the mechanical engineering program. The main contents include general scheme design, mechanical system design, computer system design, servo drive system design and so on. Through the course, students can establish the integrated design idea of electromechanical products, organically combine electronic technology, sensing technology, automatic control technology, computer technology and mechanical technology, and understand the interface relationship between each technology. The program is designed to equip students with the initial ability to solve general engineering problems in the design, manufacture, development, applied research and management of mechatronics equipment in the production process. Knowledge module 1: Introduction (Weighting Factor 2/48, level: memorization-understanding) Knowledge Module 2: Overall Scheme Design of Mechatronics Systems (Weighting Factor 4/48, Level: Comprehension+ Application) Knowledge Module 3: Mechanical Systems Design (Weighting 14/48, Level: Understanding+ Application+ Analysis+ Evaluation+ Creation) Knowledge Module 4: Computer Systems Design (Weighting Factor 4/48, Level: Comprehension+ Applications)		

	Knowledge Module 5: Servo Drive System Design (Weighting Factor 16/48, Level: Understanding+ Application+ Analysis+ Evaluation+ Creation) Knowledge Module 6: Examples of CNC Machine Design (Weighting Factor 4/48, Level: Comprehension+ Application) Knowledge Module 7: Examples of Robotics Applications (Weighting Factor 2/48, Level: Understanding+ applications) Knowledge Module 8: Mechatronic Systems in Office and Home Appliance Automation (Weighting Factor 2/48, Level: Comprehension)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 40% + post-course work 30% + personal presentation 30%, and the final closed-book examination of 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
	. Chen ZJ , Lin LH . Analysis of the application of mechatronics technology in intelligent manufacturing[J]. Agricultural Machinery Use and Maintenance , 2022(4):71-73. . Wang Lingzhu. Practical research based on mechatronics CNC technology in machinery manufacturing[J]. Technology Innovation and Productivity , 2022(1):119-121. . Liang Guangrui et al. Introduction to Mechatronics Technology [M] , Beijing : Mechanical Industry Press, 2019.

Reading list	. Zhang Huixian et al. Mechatronics system design [M], Beijing: China Railway Press, 2022. . Chen Jinyang et al. Driving, Programming Control and Debugging of Mechatronics Systems[M] , Beijing: Chemical Industry Press , 2021. . Gao Anbang et al. Mechatronics system design and example analysis [M] , Beijing : Chemical Industry Publishing House , 2018. . Ji Shixuan. Research and Implementation of Key Technology of Mechatronics Virtual Commissioning System[D] , Master's thesis of Mechanical Engineering, South China University of Technology, 2021.
revision time	July 2024

15. Professional English for Mechanical Engineering

Module name	Professional English for Mechanical Engineering
Module level	Undergraduate
Code	3080201213
Courses	specialized education
Semester school term	Spring Semester
Contact person	Song Yi
Lecturer	Xu Ying, He Linan
Language	Chinese, English
Relation to curriculum	restricted elective, 5 th semester
Type of teaching, contact hours	Lecture, simulation, practice, live teaching, 2 study hours/week

Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review for exams.		
Credit points ETCS	2		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	College English, Mechanical Design, Materials Mechanics, Theoretical Mechanics.		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
		Memorize the basic vocabulary and expressions in the field of mechanical engineering, and be able to	

Learning outcomes and their corresponding PLOs	CLO-1 Learning Outcome-1	read and translate technical documents, mechanical engineering drawings, product specifications, etc. in English Material.	**R1**
	CLO-2 Learning Outcome-2	Improve students' listening, speaking, reading, and writing skills to be able to conduct basic mechanical engineering communication and technical discussions in English, and to be able to independently translate articles and analyze professional issues.	**R2**
	CLO-2 Learning Outcome-2	Improve students' listening, speaking, reading, and writing skills to be able to conduct basic mechanical engineering communication and technical discussions in English, and to be able to independently translate articles and analyze professional issues.	**R2**
	CLO-3 Learning Outcome-3	Students will practice their basic English language skills, improve their ability to understand and analyze English sentences, and be	**R9**

		able to review English literature and write English reports and other documents.	
	CLO-4 Learning Outcome-4	Master at least one foreign language, have a broad international perspective, keep abreast of the times, learn advanced design concepts and their achievements at home and abroad with an open mind, and be able to communicate and exchange ideas in a cross-cultural context.	**R9**
	This course is an elective course for mechanical engineering majors. It is a comprehensive technical foundation course involving specialized knowledge in mechanical engineering and general basic English. As a language tool, it is of great significance to read domestic and foreign documents about machinery, electronics and electricity, computers, control and so on, and to learn from them or recognize the development of domestic and foreign advanced technology, and it is also an indispensable means to correctly write the research report about the specialty in order to carry on the international communication. Through the study of this course, students will learn the characteristics of professional English, the methods or techniques of reading, written translation and writing. The program is designed to provide a foundation for future study and work by helping students to acquire an initial grasp of		

Content	common vocabulary and specialized knowledge. Knowledge Module 1: Introduction (Weighting Factor 1/32, Level: Memorization+ Understanding+ Application) Knowledge Module 2: Heat Treatment of Steel (Weighting Factor 3/32, Level: Memorization+ Understanding+ Application) Knowledge Module 3: Welding (Weighting Factor 2/32, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Cutting Angles (Weighting Factor 4/32, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Lathes (Weighting Factor 2/32, level: memorization+ understanding+ application) Knowledge Module 6: Balancing (Weighting Factor 4/32, Level: Memorization+ Understanding+ Application) Knowledge Module 7: Gears (Weighting Factor 4/32, Level: Memory - Evaluation) Knowledge Module 8: Lubrication of Bearings (Weighting Factor 4/32, Level: Memorization+ Understanding+ Application) Knowledge Module 9: Rationale for CAD/CAM (Weighting Factor 2/32, Level: Memorization+ Understanding+ Application) Knowledge Module 10: Tolerances, Limits and Fits (Weighting Factor 2/32, Level: Memorization+ Understanding+ Application) Knowledge Module 11: Properties of Materials (Weighting 2/32, Level: Memorization+ Understanding+ Should

	(used) Knowledge Module 12: Computer-Aided Design and Manufacturing Squirt Shape Enters New Phase of Development (Weighting Factor 2/32 , Level: Memorization - Evaluation)
Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and non-written exam (50%), of which the process assessment includes: unit test 40% + post-course homework 30% + personal presentation 30%, and the non-written exam is in the form of a course paper.
Media employed	Computers, MOOC online site, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Professional English for Mechanical Engineering, Shi Ping, Electronic Industry Press, 2019 [2] Professional English for Mechanical Engineering, Guilian Wang, Mechanical Industry Press, 2019 [3] Professional English for Mechanical Engineering-Communication and Communication, Conlan, Mechanical Industry Press, 2012. [4] Professional English for Mechanical Engineering, Song Shengli, Electronic Industry Press, 2010. [5] Xu Han. Research on Translation Strategy and Operation of Mechanical Professional English [J]. Food and Machinery,2023,39(03):243-244. [6] Shi Beibei. Characteristics of Mechanical Engineering English and Vocabulary Identification of Engineering Materials[J]. Nonferrous Metal Engineering,2022,12(06):160. [7] Zhou Xiaojun. Research on the Characteristics and Translation Points of Mechanical Casting English[J]. Special Casting and

	Nonferrous Alloy,2022,42(02):278-279.
revision time	July 2024

16. Metal Cutting Machine Tools

Module name	Metal Cutting Machine Tools
Module level	Undergraduate
Code	3080201223
Courses	specialized education
Semester **school term**	Fall Semester
Contact person	Liu Liwei
Lecturer	Xu Ying, Tan Yunan
Language	Chinese
Relation to **curriculum**	restricted elective, 5th semester
Type of teaching, contact hours	Lecture, Demonstration, Group Discussion, Project Learning, 2 study hours/week

Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review and preparation for exams.		
Credit points ETCS	2		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Principles of Machinery, Fundamentals of Engineering Materials and Mechanical Manufacturing		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning	Ability to apply mathematics, natural sciences, and basic principles of mechanical engineering to identify and	**R2**

Learning outcomes and their corresponding PLOs	Outcome-1	determine complex problems in mechanical engineering and related fields.	
	CLO-2 Learning Outcome-2	To be able to compare the reliability, maintainability, security, safety, flexibility and other factors in the design and manufacture of machinery, and to apply relevant design knowledge to design solutions to complex professional problems.	**R3**
		Programs.	
	CLO-3 Learning Outcome-3	To be able to use various search tools, professional software and other modern information technology for literature search and information query in this specialty.	**R5**
	CLO-3 Learning Outcomes-4	To be able to identify and ask questions on their own initiative, to develop a sense of and demand for lifelong learning, to develop independent learning	

		methods, and to have the means to expand their knowledge and abilities.	**R11**
Content	This course is a professional elective course for mechanical engineering majors. Through the study of this course, students will understand the working principle, types, technical performance, transmission, structure and adjustment of Metal Cutting Machine Toolstools and other aspects of basic knowledge. Through this course, students will learn the basic knowledge about the working principle, types, technical performance, transmission, structure and adjustment of Metal Cutting Machine Toolstools. They will also master the types, technical performance, structure and use of machine tools, and be able to choose and debug the machine tools skillfully. At the same time, through the study of this course, cultivate the ability to analyze and solve the common problems in the use of machine tools, and set up for the socialist motherland construction development and study of strong ideal faith. Knowledge Module 1: Motion Analysis of Machine Tools (Weighting Factor 6/32, Level: Memorization + Understanding) Knowledge Module 2: Lathe (Weighting Factor 8/32, level: memorization + understanding + application) Knowledge Module 3: Gear Processing Machines (Weighting Factor 6/32, Level: Memorization + Understanding + Application) Knowledge Module 4: CNC Machine Tools (Weighting Factor 6/32,		

	Level: Memorization + Understanding + Application) Knowledge module 5: Various other machine tools (Weighting Factor 6/32, level: memorization + understanding + application + analysis)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and final examination (50%), of which the process assessment includes: usual assignments (40%), subject tests (60%), and a final closed-book examination of 100 points minutes.
Media employed	Computers, online websites, whiteboards, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Metal Cutting Machine ToolsTools (3rd Edition) [M] , Qingyu Li , Machinery Industry Press , 2018 [2] Introduction to Metal Cutting Machine ToolsTools [M] , Jia Asia , Machinery Industry Press, 2011 [3] Metal Cutting Machine ToolsTools [M] , Dai Shu , Machinery Industry Press, 2012 [4] Zhou JC. A data model hybrid-driven method for machine tool wear prediction[D]. Shenyang University of Technology,2024. [5] WANG Menglei, NIU Xinghua, ZHU Jiaotong, et al. Comprehensive error compensation study of geometry and cutting force of three-axis CNC machine tools based on ball-end milling[J]. Manufacturing Technology and

	Machine Tools,2024,(07):71-79. [6] Cui C, Wang W H, Geng J Q, et al. Optimal design of machine tool milling quality robustness based on approximation model[J]. Journal of Hunan University (Natural Science Edition),2023,50(12):194-202. [7] ZHAO Jianying,REN Zhefeng. Research on CNC machine tool machining process based on brake drum metal cutting[J]. World Nonferrous Metals,2023,(09):193-195.
revision time	July 2024

17. CNC Technology and PLCs

Module name	CNC Technology and PLCs
Module level	Undergraduate
Code	3080201245
Courses	specialized education
Semester **school term**	Spring Semester
Contact person	Zhao Qingzhi
Lecturer	Zhao Qingzhi, Feng Lili, He Linan
Language	Chinese
Relation to **curriculum**	optional, 6 th semester
Type of teaching, **contact hours**	Lecture, demonstration, simulation, practice, live teaching, 2 study hours/week

Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review for exams.		
Credit points ETCS	2		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Principles of Machinery, Mechanical Design		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**

Learning outcomes and their corresponding PLOs	CLO-1 Learning Outcome-1	Ability to select and use the appropriate CNC machine for machine parts. The company's products are based on a wide range of technologies, such as: machine tools, rational machining processes, modern engineering platforms and specialized software tools for automated programming and simulation.	R3
	CLO-2 Learning Outcome-2	To be able to design and create mechanical equipment and electromechanical products using relevant software and equipment. To be able to write machining programs and CNC machine parts to solve complex engineering problems in the mechanical manufacturing process and to establish a correct and practical CNC machining process system.	R4
	CLO-3 Learning Outcome-3	To be able to use the basic methods of literature search, data search and modern information technology to obtain relevant information in order to deal with related research, statistics, analysis, new technology and new materials.	R5

	CLO-4 Learning Outcome-4	The ability to memorize and apply the scientific method and the nature of science, and the ability to apply cutting-edge scientific theories to design practice in order to solve problems related to design and engineering practice.	R11
Content	CNC Technology and PLC is a professional direction course for mechanical engineering majors. The contents of this course mainly include the general introduction of CNC technology, basic structure of CNC machine tools, CNC machining technology, CNC machine tool programming, CNC machine tool drive servo system, sensors and detection technology, PLC basic applications. Through the study of this course, students should learn the basic principles of CNC technology, the mechanical structure of CNC machine tools, the principles and applications of CNC machine tool power servo system control, the composition, principles and design applications of feed servo system, the application of sensor control and detection principles, the application of the basic application of PLC, as a basis, to be able to correctly select the CNC machine tools based on the batch size of the machining parts and the complexity of the workpieces, and to select or design the CNC machine tools that can meet the machining accuracy and productivity in technologically feasible, reliable and efficient way. Selection or design of technically feasible to meet the machining accuracy and productivity, Economic and reasonable, safe and environmentally friendly process routes; at the same time mastering the promotion and application of CNC technology research, so as to be able to cope with the technological upgrading of the manufacturing industry for the upgrading of ordinary machine tools.		

	Knowledge Module 1: Overview of CNC Technology (Weighting Factor 2/32, Level: Memorization, Understanding) Knowledge Module 2: Mechanical Structure of CNC Machine Tools (Weighting Factor 4/32, Level: Memorization, Understanding) Knowledge Module 3: CNC Machining Technology (Weighting Factor 4/32, Level: Understanding, Evaluation) Knowledge Module 4: CNC Machine Programming (Weighting Factor 6/32, Level: Understanding, Application) Knowledge Module 5: Drive Systems and Inspection Technology for CNC Machine Tools (Weighting Factor 6/32, Level: R)
	(Solution, application) Knowledge Module 6: CNC Power Servo System Design (Weighting Factor 6/32, Level: Comprehension - Evaluation) Knowledge Module 7: PLC Fundamentals and Applications (Weighting Factor 4/32, Level: Comprehension, Evaluation)
Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and non-written exam(50%), of which the process assessment includes: unit test 40% + post-course homework 30% + personal presentation 30%, and the non-written exam is 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
	[1] CNC Technology, Gong Zhonghua, edited by Gong Zhonghua, Mechanical Industry Press, 2nd edition, October 2010. [2] Principles and Applications of Programmable Controllers, edited by

Reading list	Shuzhen Gong and Shihshu Xu, People's Posts and Telecommunications , 3rd edition, April 2013. [3] Liao effect. Digital control of machine tools [M]. Wuhan: Huazhong University of Science and Technology Press, January 2001. [4] Wang Runxiao. Principles and Systems of Machine Tool Numerical Control [M]. Northwestern Polytechnical University Press, September 2004. [5] Wang Ailing. Modern CNC Principles and Control Systems [M]. Beijing: National Defense Industry Press, January 2005. [6] SHI Qinghua, NAN Pengtao, ZHU Shengshuo, et al. Polynomial fitting and real-time compensation of linear axis positioning error on CNC machine tools[J/OL]. Machine Tools and Hydraulics,1-6[2024-12-25] [7] HUANG Hongban, CHEN Dezhi, HUANG Zhenjin. Research on the method of machining double-line trapezoidal threads using CNC lathe [J]. Southern Agricultural Machinery,2024,55(23):161-164.
revision time	July 2024

18. Fundamentals of Mechanical Engineering Control

Module name	Fundamentals of Mechanical Engineering Control
Module level	Undergraduate
Code	3080201246
Courses	specialized education
Semester **school term**	Spring Semester
Contact person	Lili Feng
Lecturer	Jin Yaohua, Ren Xiaohong
Language	Chinese
Relation to **curriculum**	restricted elective, 6th semester
Type of **Teaching,** **Contact hours**	Lecture, demonstration, simulation, practice, live teaching, 2 study hours/week

Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review for exams.		
Credit points ETCS	2		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Electrotechnics, Theoretical Mechanics, Mechanical Engineering Test Techniques		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**

Learning outcomes and their corresponding PLOs	Learning outcomes - 1	Identify the components of an automated control system and their interrelationships; describe methods of describing and mathematically modeling systems using transfer functions, block diagrams, and signal flow diagrams; and understand methods of analyzing a control system (time-domain and frequency-domain analysis).	R1
	Learning outcomes - 2	To be able to summarize the basic methods of literature search, data query and the use of modern information technology to obtain relevant information in order to cope with relevant research, statistics, analysis, new technology, new materials and other issues. The ability to apply cutting-edge theories to design practice. The program is designed to solve problems related to design and engineering	R2

		practice.	
	Learning outcomes - 3	The ability to analyze the analysis and design of automatic control systems; to develop the ability to analyze the performance of automatic control systems using control theory; to calibrate systems and to propose ways and means to improve system performance.	R4
	This course is a specialized course for mechanical engineering majors, and it is necessary to use the knowledge of higher mathematics, Electrotechnics, mechanical engineering testing technology. In the teaching process, it is necessary to strengthen the theoretical knowledge and deepen the students' understanding of basic concepts, basic knowledge and basic methods, and also to closely combine with the actual situation of mechanical engineering, in order to communicate and strengthen the connection between the theoretical foundation and professional knowledge, and deepen the students' perceptual understanding. The course mainly introduces the mathematical model of linear system, the basic method of analyzing the performance of automatic control system, etc. Students are required to understand the		

Content	basic theory and basic method of feedback control system, master the basic problems of automatic control system and be able to analyze and design the automatic control system according to the requirements of the actual production, which will lay a foundation for the subsequent study of the programme courses and the work of the mechanical industry. Knowledge Module 1: Introduction (Weighting Factor 2/32, Level: Memorization+ Understanding) Knowledge Module 2: Mathematical Modeling of Control Systems (Weighting Factor 6/32, Level: Understanding - Application - Analysis) Knowledge Module 3: Time Domain Analysis of Control Systems (Weighting Factor 6/32, Level: Understanding - Application - Analysis) Knowledge Module 4: Frequency Characteristics of Control Systems (Weighting Factor 6/32, Level: Understanding-Application-Analysis) Knowledge Module 5: Stability of Control Systems (Weighting Factor 4/32, Level: Understanding-Application-Analysis-Evaluation)
	Knowledge Module 6: Error Analysis of Control Systems (Weighting Factor 4/32, Level: Understanding-Analysis) Knowledge Module 7: Integration and Correction of Control Systems (Weighting Factor 4/32, Level: Understanding-Application-Analysis-Evaluation-Creativity)
Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 40% + post-course homework 30% + classroom participation 30%, and the final closed-book examination of 100 minutes.

Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Fundamentals of Mechanical Engineering Control (6th Edition), Xiong Liangcai et al, Huazhong University of Science and Technology Publishing House, 2011. [2] Fundamentals of Mechanical Engineering Control (4th Edition), Shuzi Yang, Huazhong University of Science and Technology Press, 2018 [3] Fundamentals of Mechanical Engineering Control (2nd Edition), Xuan Zhaoyan, Electronic Industry Press, 2016 [4] Fundamentals of Mechanical Engineering Control (2nd Edition), Dong Yuhong et al, Mechanical Industry Press, 2013. [5] Principles of Automatic Control (6th Edition), Hu Shousong, Science Press, 2013. [6] Fundamentals of Mechanical Engineering Control (2nd Edition), Zhu Shouxin et al, Tsinghua University Press, 2015. [7] LUO Binhong, CHEN Zhuo, XIANG Jun, et al. Research on automatic control technology of first-stage venting connector of launch vehicle[J]. Computerized Measurement and Control,2024,32(06):166-172.
revision time	July 2024

19. Advanced Manufacturing Technology

Module name	Advanced Manufacturing Technology
Module level	Undergraduate
Code	3080201247
Courses	specialized education
Semester	Fall Semester
Contact person	Chen Xinchen
Lecturer	Liu Juan, Feng Yunhao
Language	Chinese
Relation to curriculum	restricted elective, 5 th semester
Type of teaching, contact hours	Lecture, demonstration, practice, project-based learning method, 2 study hours/week
Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review for exams.
Credit points ETCS	2

Requirements according to the examination regulations	A student must have registered for the course.		
Recommended prerequisites	Fundamentals of Engineering Materials and Mechanical Manufacturing, Principles of Machinery, Mechanical Design		
Learning outcomes and their corresponding PLOs	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1	Remember the basic principles, methods and applications of Advanced Manufacturing Technology, and be able to analyze and compare the advantages and disadvantages of modern manufacturing processes and propose reasonable improvement plans.	R1
	CLO-2	To train students to apply modern manufacturing automation technology, intelligent manufacturing technology and flexible manufacturing technology to design solutions and practice technology application and innovation in projects to enhance the efficiency and	R3

		intelligence of manufacturing systems.	
	CLO-3	Students will develop a sense of creativity and critical thinking through the review of Advanced Manufacturing Technology, develop the ability to solve complex engineering problems, and develop an understanding of the responsibilities involved.	R6
	CLO-4	Students are trained to be team players, to collaborate on real-world problems in an interdisciplinary environment, and to be able to work with people from different backgrounds on manufacturing technology projects.	R8
Content	This course is an important course for mechanical related majors, aiming at guiding students to understand and master the basic concepts, development history and future trends of advanced manufacturing technology. Through systematic explanation of modern design technology, advanced manufacturing process, manufacturing automation, intelligent production management technology and advanced manufacturing mode, this course helps students to comprehensively understand the connotation and application of advanced manufacturing technology. The teaching objective of this course is to cultivate students with strong engineering practice ability and innovative thinking, and to be able to apply modern manufacturing technology to solve practical engineering problems. Through reviewing the development history of advanced manufacturing technology, students will have a better understanding of the future development direction of the manufacturing industry, and at the same time have a certain degree of foresight to adapt to the changes in industry demand.		

	The expected results of the course are to cultivate mechanical engineering talents with high theoretical level and practical ability, and to promote the overall ability of students in the fields of design, process, automation and production management. Knowledge Module 1: Overview of Advanced Manufacturing Technology (Weighting Factor 2/32, Level: Comprehension) Knowledge Module 2: Special Processing Technologies (Weighting Factor 6/32, Level: Understanding, Application, Analysis) Knowledge Module 3: Manufacturing Automation Technology (Weighting Factor 6/32, Level: Application, Analysis, Evaluation) Knowledge Module 4: Advanced Manufacturing Process Technology (Weighting Factor 4/32, Level: Application, Analysis, Evaluation)
	(price) Knowledge Module 5: Computer-Aided Process Protocol Design (Weighting Factor 4/32, Level: Application, Analysis, Evaluation, Creation) Knowledge Module 6: CNC Technology (Weighting Factor 6/32, Level: Understanding, Application, Analysis) Knowledge Module 7: Advanced Manufacturing Model (Weighting Factor 4/32, Level: Understanding, Evaluation)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 40% + post-course work 30% + personal presentation 30%, and the final closed-book examination of 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning

	Platform
Reading list	. DING Wenfeng,WAN Nian,ZHAO Biao,et al. Research status and trend of aerospace advanced manufacturing theory and technology[J/OL]. Journal of Aeronautics and Astronautics, 1-37[2025-03-17]. http://kns.cnki.net/kcms/detail/11.1929.v.20241118.1404.012.html. . Wang Hongyan. Research on the Trend of Integration and Development of Industrial Internet and Advanced Manufacturing Industry[J]. Modern Management Science,2024,(02):173-181. . Huang Qunhui, He Jun. "The Third Industrial Revolution and China's Economic Development Strategy Adjustment: The Perspective of Techno-Economic Paradigm Shift[J]. China Industrial Economy, 2013,(01):5-18. . Li JH. Development Reality and Future Path Thinking of China's Advanced Manufacturing Industry[J]. Humanities Journal, 2020,(01):22-32. . Wang Lei,Lu Bingheng. Research on the development of additive manufacturing technology and industry in China[J]. China Engineering Science,2022,24(04):202-211. . Liu ZF. Green Manufacturing Theory Methods and Applications [M] Beijing: Tsinghua University Press, 2021 . Zhou Jun. Advanced Manufacturing Technology [M] Beijing:

	Tsinghua University Press , 2022
revision time	July 2024

20. Principles of Automatic Control

Module name	Principles of Automatic Control
Module level	Undergraduate
Code	3080201224
Courses	specialized education
Semester	Fall Semester
Contact person	Jin Yaohua
Lecturer	Jin Yaohua, Feng Lili
Language	Chinese
Relation to curriculum	restricted elective, 5 th semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, fieldwork, project-based learning, 2 study hours/week
Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review for exams.

Credit points ETCS	2		
Requirements according to the examination regulations	A student must have registered for the course.		
Recommended prerequisites	Linear Algebra, Advanced Mathematics, College Physics, Principles of Machinery		
		descriptive	
	CLO-1 Learning Outcome-1	By listing the development of control theory, basic concepts, and mathematical models, you will be able to memorize the basics of control theory and review the common generalizations of control systems. The concepts, inferences, and mathematical models of control systems are used to analyze engineering problems.	R1
	CLO-2 Learning	By summarizing the time domain analysis, root trajectory analysis, and frequency characteristic analysis of control theory, students will be able to analyze the performance of control	

	Outcome-2	systems and obtain effective conclusions by applying the analytical methods and literature research, and develop their problem analysis ability.	R4
Learning outcomes and their corresponding PLOs	CLO-3 Learning Outcome-3	To be able to use modern simulation (analog) tools for simulation modeling of automatic control systems, to be able to solve verification test problems and comprehensive design problems of automatic control systems according to the specific indicators and requirements of the system, and to provide initial training in the analysis and design skills of complex engineering problems.	R5
	CLO-4 Learning Outcome-4	By describing the knowledge of calibration in control theory, they will be able to apply the basic ideas of calibration and propose solutions for calibration of control systems through literature research. List relevant applications of control theory. It is also a good way to develop students' ability to apply engineering and innovation in the field.	R3

Content	This course is a compulsory core course for mechanical engineering majors, and plays the role of theoretical cornerstone in the mechanical engineering curriculum. The content of the course includes the classification and basic working principle of automatic control system, the performance indexes of control system: stability, transient response, steady state accuracy; the methods of establishing mathematical model of the system - transfer function and differential equations, as well as the relationship between each model.
	The course will help students to understand the composition, characteristics and terminology of automatic control systems and master the basic analysis and design methods of classical control theory; cultivate students' ability to analyze and solve problems independently by linking theory with practice; and prepare students for further theoretical courses and specialized courses. Through the study of this course, it helps students to understand the composition, characteristics and terminology of automatic control systems, master the basic analysis and design methods of classical control theory, cultivate the ability of students to connect theory with practice, analyze and solve problems independently, and lay a solid theoretical foundation for further theoretical and professional studies and innovative research as well as professional studies. Knowledge Module 1: General Concepts of Automatic Control Systems (Weighting Factor 4/32, Level: Memorization+ Understanding) Knowledge Module 2: Mathematical Modeling of Control Systems (Weighting Factor 6/32, Level: Understanding - Application - Analysis) Knowledge Module 3: Time Domain Analysis of Control Systems (Weighting Factor 8/32, Level: Understanding-Application-Analysis) Knowledge Module 4: Root Trajectory Methods for Linear Systems (Weighting Factor 4/32, Level: Understanding-Application-Analysis)

	Knowledge Module 5: Frequency Domain Analysis of Linear Systems (Weighting Factor 6/32, Level: Understanding-Application-Analysis-Evaluation) Knowledge Module 6: Calibration of Linear Systems (Weighting Factor 4/32, Level: Understanding-Analysis)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and non-written exam (50%), of which the process assessment includes: unit test 40% + post-course homework 30% + online experiments 30%, and the non-written exam is 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Li F ,Yang W , Zhou Y .Research and Exploration on the Integration of Political Thinking Elements into the Teaching of Principles ofAutomatic Control Course under the Background of Informatization[J]. Computer Informatization and Mechanical System, 2024, 7(5):64-69. [2]Li Z . Exploration of goal achievement and curriculum assessment reform -— "Automatic Control Theory" as an example[J].Computer Informatization and Mechanical System,2024,7(1):19-22. [3]Linqin C ,Shizhou C ,Wenyuan Y , et al. Correction to: Modeling and

	simulation of virtual learning environment for automatic control principle[J].Multimedia Tools and Applications,2023,82(23):36649- 36649. [4]Ding S ,Yu M,Zhou Z.Principle Analysis and Fault Handling of MCC400A Electric Wheel Automatic Lubrication Control System[J].Journal of Engineering System,2023,1(1). [5] Zhenchao Z .The Teaching Design and Practice of Integrating Ideological and Political Elements for Principle of Automatic Control Course[J].Advances in Educational Technology and Psychology, 2022, 6(8). [6]Liu L ,Zhang Y ,Guo R , et al. Innovative Exploration and Practice of the Automatic Control Principle Course in University Artificial Intelligence Major[J].Journal of Educational Research and Policies,2022,4(1). [7]Wang B .The Application of Principle of Automatic Control in the site Management of Electric Power Construction Enterprise[J]. Electronic Research and Application, 2020, 4(3).
revision time	July 2024

21. Intelligent Manufacturing Principles and Controls

Module name	Intelligent Manufacturing Principles and Controls
Module level	Undergraduate
Code	3080201211
Courses	specialized education
Semester	Spring Semester
Contact person	Sun Guiping
Lecturer	Sun Guiping, Qi Yunshu, Zhang Kaida
Language	Chinese
Relation to curriculum	restricted elective, 6 th semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, fieldwork, project-based learning, 2 study hours/week
Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review and preparation for exams.

Credit points **ETCS**	2		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Advanced Mathematics, Intelligent Manufacturing Equipment Technology		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	To be able to memorize the general principles and methods of selecting and designing process routes for intelligent design systems, and to infer or design reasonable intelligent manufacturing routes by combining with literature research, so as to solve complex engineering problems of manufacturing processes and establish	R2

Learning outcomes and their corresponding PLOs		correct and usable engineering models.	
	CLO-2 Learning Outcome-2	Apply fuzzy control and neural network control to the control system of an intelligent manufacturing system to design the database and knowledge base of the system and to draw process schematics.	R3
	CLO-3 Learning Outcome-3	To be able to study the control requirements and technical equipment conditions of intelligent manufacturing systems, and to list or design technically feasible, economically reasonable, safe and environmentally friendly process routes that can meet the needs of industrial production, so as to cope with the ever-changing technological upgrading of the industry and changes in policies and markets.	R4

Content	This course is a professional orientation course for mechanical engineering majors. The course summarizes the research results of intelligent manufacturing and control, and explains the basic concepts, working principles, design methods and practical applications of intelligent manufacturing and control. This course takes Advanced Mathematics and Fundamentals of Mechanical Engineering Control as the introductory courses. Through the study of this course, students can understand the frontiers, latest achievements and development trends of intelligent manufacturing technology and electromechanical control technology, broaden their horizons, expand their knowledge, and lay a solid foundation for future innovative and entrepreneurial study and work. Knowledge Module 1: Introduction (Weighting Factor 2/32, Level: Memorization+ Understanding) Knowledge Module 2: Intelligent Design (Weighting Factor 4/32, Level: Memorization+ Understanding+ Application) Knowledge Module 3: Intelligent Manufacturing Systems (Weighting Factor 4/32, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Intelligent Manufacturing Equipment (Weighting Factor 6/32, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Fuzzy Control (Weighting Factor 8/32, Level: Memorization+ Understanding+ Application) Knowledge Module 6: Neural Network Control (Weighting Factor 8/32, Level: Memorization+ Understanding+ Application)
Study and examination requirements	The course assessment includes process assessment (50%) and non-written exam (50%), of which the process assessment includes: unit test 40% + post-course work 30% + individual presentation 30%, and non-written exam 100

and forms of examination	minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Fundamentals of Intelligent Manufacturing Technology, Ge Yingfei, Mechanical Industry Press, 2019. [2] Intelligent Manufacturing, Min Liu, Tsinghua Publishing House, 2023. [3] Intelligent Control, Liu Jinkun, Tsinghua University Press, 2023. [4] Fundamentals of Intelligent Manufacturing Technology, Deng Zhaohui, Huazhong University of Science and Technology Press, 2017 . [5] China University MOOC website: https://www.icourse163. org [6] Leading the Construction of Modernized Industrial System with Intelligent Manufacturing as the Support of New Quality Productivity [J], Wang Wenze, Contemporary Economic Research, 2024-02-15. [7] How Smart Manufacturing Improves Enterprise Capacity Utilization-Based on the Perspective of Production and Marketing Integration[J],Huang Zhuo; Tao Yunqing; Liu Zhaoda; Ye Yongwei, 2024-05-05
revision time	July 2024

22. Microcomputer Principles and Applications

Module name	Microcomputer Principles and Applications
Module level	Undergraduate
Code	3080201221
Courses	specialized education
Semester	Spring Semester
Contact person	Zhu Xiaoxiao
Lecturer	Zhu Xiaoxiao, Jin Yaohua
Language	Chinese
Relation to curriculum	restricted elective, 6 th semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, field instruction, laboratory, project-based learning approach, 2 study hours/week
Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review and preparation for exams.
Credit points ETCS	2

Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Descriptive Geometry and Mechanical Drawing, Principles of Machinery, Electrotechnics.		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	Through the study of microcomputer principles, students will be able to memorize the basic components and working principles of microcomputers, explain the basic methods of program design and concepts related to microcomputer interface technology.	R1
		To be able to articulate the internal architecture and operational principles of microcomputer systems, as well as off-chip resource expansion	

Learning outcomes and their corresponding PLOs	CLO-2 Learning Outcome-2	methodologies, enabling students to: Correctly conduct hardware system design according to technical requirements; Effectively enhance their analytical and problem-solving capabilities.	R2
	CLO-3 Learning Outcome-3	Systematic and in-depth integration of software and hardware through the writing of code in a software system that can be adapted to the actual task. Students will be able to design appropriate circuits and develop software programs to meet their requirements, and have the ability to design microcomputer application systems, thus laying a solid foundation for their further study of systems. Through the teaching segments of computer system composition, instruction system and program design, the relationship between the whole and its parts is	R6

		emphasized, so as to further enhance students' collective awareness and make them fully understand that there must be coordination and unity among people, between individuals and the collective, and between individuals and the society in order to achieve harmony and harmony with the society.	
		inclusive development	
	CLO-4 Learning Outcome-4	To be able to communicate effectively and complement each other's strengths in the process of designing and debugging microcomputer hardware objects, to give full play to the strengths of each member, to complete microcomputer works in unity and cooperation, and to exercise students' hands-on skills. It also aims to develop the students' ability to apply microcomputer knowledge to solve practical engineering	R8

		problems and to improve their overall quality.	
Content	This course is a limited course for mechanical engineering majors, and occupies an important position in cultivating students' creative thinking and comprehensive design ability in the flexible use of computers. This course covers the 8086 instruction system and assembly language programming, main memory and interfaces with the CPU, input and output, interrupts, and commonly used microcomputer interface circuits and digital-to-analog (D/A) and analog-to-digital (A/D) interfaces. The main task of this course is to understand and master the working principle of microcomputer and the related knowledge of programming and design, and to comprehensively apply the learned microelectronics technology, digital electronics technology, microcomputer interfaces and applications and other related knowledge, so as to lay a solid foundation for the study of Mechanical Engineering, and to support the attainment of the corresponding index points of the cultivation objectives of Mechanical Engineering. Knowledge Module 1: Computer Basics (Weighting Factor 2/32, Level: Comprehension) Knowledge Module 2: 8086 Microprocessor (Weighting Factor 4/32, Level: Memory-Application) Knowledge Module 3: Assembly Language Programming (Weighting Factor 8/32, Level: Comprehension - Evaluation) Knowledge module 4: Memory (Weighting Factor 4/32, level: memorization-application) Knowledge Module 5: Input/Output Interfaces for Microcomputers (Weighting Factor 2/32, Level: Understanding, Application)		

	Knowledge Module 6: Interruption Techniques (Weighting Factor 4/32, Level: Understanding - Evaluation) Knowledge Module 7: Programmable Interface Circuits (Weighting Factor 6/32, Level: Understanding, Application) Knowledge Module 8: AD and DA Conversion (Weighting Factor 2/32, Level: Understanding-Evaluation)
Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 30% + post-course homework 30% + individual demonstration 30% + experiment 10%, and final closed-book examination of 100 minutes.
Media employed	Computers, MOOC online site, Hengxing Capability Platform, Chaoxing Learning Platform
	. ZHANG Weitao,QUAN Yinghui,YUAN Xiaoguang,et al. Experimental design of stepper motor control based on reconfigurable microprocessor[J] . Journal of Electrical and Electronic Teaching,2024,46(06):195-199. . Zhang Weitao,Ren Aifeng,Sun Xiaochao. Design and application of an assembler for a model microprocessor [J]. Educational Teaching Forum,2024, (29):29-32. . Zhang, Bi-Yang. Design and Study of Integer Computing Unit Microarchitecture Compatible with E300 Core [D].2023. . Zhou Heqin, et al. Microcomputer Principles and Interface

Reading list	Technology (6th Edition)M]. Hefei: University of Science and Technology of China Press, 2019. 2. References . Yan R ,Zhou Y ,Xiang H .Research on the Reform of Microcomputer Principle Course for the Major of Biomedical Engineering[J]. Methodology, 2024, 7(3). . Zhou Peiling, et al (eds.), Microcomputer Principles and Interface Technology, Publishing House of Electronics Industry, 2015. [7] Randal E. Bryant, et. al. (eds.), Computer Systems: a Programmer's Perspective (3rd Edition), Machinery Industry Press, 2017. 3.
revision time	July 2024

23. Electromechanical Transmission and Controls

Module name	Electromechanical Transmission and Controls
Module level	Undergraduate
Code	3080201250
Courses	specialized education
Semester	Spring Semester
Contact person	Sun Hui
Lecturer	Li Anning, Feng Lili
Language	Chinese
Relation to curriculum	restricted elective, 6th semester
Type of Teaching, Contact hours	Lecture, simulation, practice, field instruction, project-based learning approach, 2 study hours/week
Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review and preparation for exams.

Credit points ETCS	2
Requirements according to	A student must have registered for the course

the examination Regulations			
Recommended prerequisites	Advanced Mathematics II, Electrotechnics.		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning outcomes - 1	To be able to memorize the fundamentals of dynamics of electromechanical drive systems, the working principles and characteristics of DC and AC motors, the theoretical knowledge of control motors and relay-contact controls, the fundamentals of power electronics, DC and AC speed control systems, and control systems of stepping motors, and to use the acquired knowledge system to solve general engineering problems in the field of mechanical engineering.	R1

Learning outcomes and their corresponding PLOs	CLO-2 Learning outcomes - 2	To be able to analyze electromechanical drives and control systems using a systematic view and to apply measurement methods for important parameters of DC and AC motors. The ability to analyze the problems of electromechanical drives and control systems in the context of practical work and systematic literature research.	R2
	CLO-3 Learning outcomes - 3	Ability to analyze and design electromechanical drive control systems systems; be able to compare and extrapolate the advantages and disadvantages of different electromechanical drive system circuits and various types of motors. They should also be able to design improvements and demonstrate a sense of creativity and seek out basic innovative ideas during the session.	R3
	CLO-4 Learning outcomes - 4	To be able to assess the impact of electromechanical drives and controls on the progress of society and the lives of people, and to be able to take on challenges in their learning. To be able to improve problems that occur in real production systems and to develop	R6

		innovative ideas for improving the performance of electromechanical drives and controls.	
Content	This course is a specialized course for mechanical engineering majors, which plays the role of starting and finishing in the teaching plan and lays the necessary foundation for students to learn the subsequent specialized courses. It not only has strong theory, but also has strong practice and application. The main contents include: the dynamics of electromechanical transmission system; the working principle and characteristics of DC motor and AC motor; the control of electric motor; the operation of electric motor and the control of electric motor; the operation of electric motor and the control of electric motor. This course is designed to provide students with the ability to analyze electromechanical drive control systems from a systematic point of view and to correctly apply theories to solve practical problems. Through the study of this course, students are able to analyze electromechanical drive control systems from a systematic point of view, and have the ability to correctly apply theories to solve practical problems. The core task of this course is to enable students to master solid theoretical knowledge and improve their design ability, innovation ability, engineering awareness, and ultimately to improve the overall professional quality of students. Knowledge Module 1: Introduction (Weighting Factor 1/32, level: memorization+ understanding) Knowledge Module 2: Fundamentals of Electromechanical Drivetrain Dynamics (Weighting Factor 2/32, Level: Memorization+ Understanding+ Application)		

	Knowledge Module 3: Principles of operation and characteristics of DC motors (Weighting Factor 5/32, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Principles of operation and characteristics of AC motors (Weighting 5/32, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Controlling Electric Motors (Weighting Factor 4/32, Level: Understanding+ Application+ Analysis) Knowledge Module 6: Relay-Contactor Control (Weighting Factor 2/32, Level: Memorization+ Understanding+ Applications) Knowledge Module 7: Fundamentals of Power Electronics (Weighting Factor 2/32, Level: Memorization+ Understanding+ Applications) Knowledge Module 8: DC Speed Control Systems (Weighting Factor 5/32, Level: Understanding+ Application+ Analysis) Knowledge Module 9: AC Automatic Speed Control Systems (Weighting Factor 4/32, Level: Understanding+ Application+ Analysis) Knowledge Module 10: Stepper Motor Control Systems (Weighting Factor 2/32, Level: Understanding+ Application+ Analysis)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and non-written exam (50%), of which the process assessment includes: unit test 40% + post-course homework 30% + computer experiments 30%, and non-written exam. 100 minutes.

Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform China University MOOC website: https://www.icourse163.org Zhihuishu Online Learning Platform: https://www.zhihuishu.com Yuketang: https://www.yuketang.cn
Reading list	[1] Control of Electromechanical Drives (Sixth Edition), Chen Bing, Feng Qingxiu, Huazhong University of Science and Technology Publishing House, 2023. [2] Electromechanical Drive Control (Fifth Edition) Study Guide and Exercise Answers, Feng Qingxiu, Huazhong University of Science and Technology Press, 2023. [3] Electromechanical Drive Control, Feng Wang, Tsinghua University Press, 2011. [4] Electromechanical Drive Control, Hu Shijun, Huazhong University of Science and Technology Press, 2014. [5] ZHANG Yilong, MA Tianbing, ZHANG Shuangshuang. An investigation on the reform of electromechanical transmission control course and hybrid teaching method under the background of new engineering[J]. China Education Technology Equipment,2020, (12):92-94. [6] HAN Qingjue, WEN Tao, GONG Zhongliang. Research and Exploration on Civic and Political Elements in the Teaching Content of Electromechanical Transmission and Control Courses--Taking the Basis of Electromechanical Transmission System Dynamics as an Example[J]. Agricultural Engineering and Installation Journal of International Law, 2021, 48(01):46-48.

	[7] WANG Can, QIN Zhantian. Research on blended teaching of electromechanical transmission and control course under the background of new engineering[J]. Journal of Science and Education,2021, (35):126-128.
revision time	July 2024

24. Innovation and Entrepreneurship Cases in Mechanical Engineering

Module name	Innovation and Entrepreneurship Cases in Mechanical Engineering
Module level	Undergraduate
Code	3080201304
Courses	Innovation and Entrepreneurship Education
Semester	Summer Term
Contact person	Zhang Kaida
Lecturer	Qi Yunshu
Language	Chinese
Relation to curriculum	Compulsory / Semester 6
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, fieldwork, project-based learning, 2 study hours/week
Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 1.5 study hours per week, including pre-course

	study, post-course practice, and review for exams.		
Credit points ETCS	2		
Requirements according to the examination	A student must have registered for the course.		
Regulations			
Recommended prerequisites	Advanced Manufacturing Technology, Innovative Design Thinking, and Fundamentals of Entrepreneurship		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	To be able to remember the scope of business in the field of mechanical engineering and the focus of innovation and entrepreneurship in the mechanical industry, and to understand national policies and regulations in the field of	R2

		mechanical engineering, as well as professional skills in the fields of mechanical engineering and intelligent manufacturing. They will be able to link theory with practice and apply their sense of innovation, creativity, analytical and practical skills in real projects.	
Learning outcomes and their corresponding PLOs	CLO-2 Learning Outcome-2	Ability to identify appropriate techniques, resources, and methods for general engineering problems in the field of mechanical engineering. The projections and modeling of general engineering problems are carried out using a variety of sources, modern engineering tools, and information technology tools.	R3
	CLO-3 Learning Outcome-3	Cultivate students' scientific and technological literacy, professional ethics, and conscientious compliance with laws and norms related to science and technology; develop a rigorous and serious scientific attitude, patience and meticulous work ethic. We have a team spirit of cooperation and a creative spirit	R7

		of enterprise.	
	CLO-4 Learning Outcome-4	Understand and analyze mechanical innovation principles and methods The methodology of the program is based on the following principles and can be applied in mechanical engineering projects.	R10
Content	This course is a dual-venture practice course for mechanical engineering majors, and it is a compulsory course to cultivate students' innovative awareness, inspire innovative thinking and introduce innovative entrepreneurship methods. In the process of teaching, the course comprehensively applies and summarizes the relevant knowledge of the students' prerequisite courses, on the basis of learning the theoretical knowledge of innovation and entrepreneurship, through reading the excellent cases of innovation and entrepreneurship in the field of mechanical engineering, and inspiring the students' thinking process by combining with the new technology and new products to broaden the students' ideas of innovation and entrepreneurship in the field of mechanical engineering and to master the practical knowledge of innovation and entrepreneurship in the field of mechanical engineering, laying a foundation for the further study of the relevant specialized courses and the students to engage in mechanical engineering and technology and innovation and design. This course is a foundation for students to further study the relevant specialized courses and to engage in mechanical engineering and technology work and innovative design in the future. This course is one of the main courses for the quality		

	education and innovation ability training of the students specialized in machinery. Knowledge Module 1: Overview of the field of Mechanical Engineering (Weighting Factor 2/32, Level: Understanding+ Application+ Analysis) Knowledge Module 2: Example of the development of a new internal combustion engine (Weighting Factor 8/32, Level: Understanding+ Application+ Analysis) Knowledge Module 3: Innovative Design for CNC Milling of Cylindrical Cams (Weighting Factor 8/32, Level: Comprehension - Creation) Knowledge Module 4: Palletizing Manipulators (Weighting Factor 6/32, Level: Understanding - Evaluation) Knowledge Module 5: Flexible Manufacturing Units (Weighting Factor 8/32, Level: Understanding - Evaluation)
Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 40% + post-course homework 30% + classroom participation 30%, and the final closed -book examination of 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform

Reading list	[1] Cases in Mechanical Innovation and Entrepreneurship, self-published [2] TRIZ Theory and Mechanical Innovation Practice, Shen Menghong, Mechanical Industry Press, 2012. [3] Mechanical Innovation Design and Examples, Yu Huili, Mechanical Industry Press, 2017 [4] Conceptualization Method of Mechanical Innovation Design, Fu Wei, Hunan Science and Technology Press, 2006.
	[5] Fundamentals of Mechanical Innovation Design, Jin Xiaoming, Li Libin, National Defense University of Science and Technology Press, 2006. [6] Wu Hecheng. Mechanical innovation design of the new era development needs[J]. Times Automobile,2024,(24):71- 73. [7] ZHANG Hengguo, JIAO Linquan, LIU Xiaolun, et al. Research on the innovation progress and industrial development trend of bionic machinery[J]. Science and Technology Perspectives,2024,14(25):124-128.
revision time	July 2024

25. Mechanical Innovative Design

Module name	Mechanical Innovative Design
Module level	Undergraduate
Code	3080201303
Courses	Innovation and Entrepreneurship Education
Semester	Fall Semester
Contact person	Feng Yunhao
Lecturer	Liu Zhuo, Wang Gaofeng
Language	Chinese
Relation to curriculum	compulsory , 7th semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, field instruction, lab, 2 study hours/week
Work load	. Total study hours: 56 study hours= Lecture 32 study hours+ Self-study 24 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion, questions, and labs. . Self-study: approximately 1.5 study hours per week, including pre-course study, post-course practice, and review for exams.

Credit points ETCS	2		
Requirements according to the examination	A student must have registered for the course.		
Regulations			
Recommended prerequisites	Principles of Machinery, Mechanical Design, Creative Design Thinking		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome -1	To be able to describe national guidelines, policies and regulations in the field of mechanical engineering, to utilize professional skills in the fields of mechanics, automatic control, Electrotechnics and electronics, to create innovative design methods and to apply them in the practice of innovative mechanical design.	**R1**

Learning outcomes and their corresponding PLOs	CLO-2 Learning Outcome -2	Through the theoretical and practical learning in this course, they can summarize the principles of mechanism design and selection, and demonstrate the process of mechanism configuration; they can memorize the basic modes, concepts and characteristics of various creative principles, and give examples to illustrate the principles; they can review the innovative design methods and apply them to the practice of mechanical innovative design.	**R2**
	CLO-3 Learning Outcome -3	Students should be able to demonstrate the basic methods of literature search, data search and the use of modern information technology to obtain relevant information to solve problems in design and engineering practice; they should be able to use two-dimensional or three-	**R5**

		dimensional drawing software to simulate the configuration of a mechanism, and skillfully practice the process of innovation of mechanical products.	
	CLO-4 Learning Outcome -4 •	To anticipate the future development of engineering materials in the light of cutting-edge technology and research results; to have a sense of self-directed and lifelong learning; and to have the ability to continuously learn and adapt to development. Power.	**R11**
	The Mechanical Innovation Design Course is a dual-creation education course that aims at cultivating students' innovative consciousness, inspiring innovative thinking and introducing innovative methods. In the teaching process, the course integrates and summarizes what students have learned in the middle school, combines new technologies and products, stimulates students' thinking process, and lays the foundation for them to study related programme courses in depth and to engage in mechanical engineering and innovative design in the future. Foundation. This course is the core course of quality education and innovation ability cultivation for mechanical majors, and its		

Content	main task is to let students master the theoretical basis of innovation design, creative thinking methods and creation principles; and be able to apply these methods to the practice of mechanical innovation design. Knowledge Module 1: Innovative Design of Schematic Programs (Weighting Factor 4/32, Level: Memorization+ Understanding) Knowledge Module 2: Innovative Design of Organizations (Weighting Factor 4/32, Level: Memorization+ Understanding+ Application) Knowledge Module 3: Application of Innovative Mechanical Design Solutions (Weighting Factor 8/32, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Innovative Mechanical Design Cases (Weighting 16/32, Level: Memorization+ Understanding+ Application)
Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 30% + post-course homework 30% + individual demonstration 30% + experiment 10%, and final closed-book examination of 100 minutes.
Media employed	Computers, MOOC online site, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Mechanical Innovative Design, Zhang Youzhen, Tsinghua University Press, 2018 [2] Mechanical Innovative Design, Huang Chunying, Higher Education Press, 2000.

	[3] Mechanical Innovative Design, Wang Shucai, Wu Xiao, Huazhong University of Science and Technology Press, 2013. [4] Mechanical Innovative Design, Luo Shaoxin, Mechanical Industry Press, 2008. [5] Mechanical Innovative Design, Wang Zhiping, Mechanical Industry Press, 2013 [6] Mechanical Innovative Design, Chunlin Zhang, Machinery Industry Press, 2004. [7] Wu Hecheng. Mechanical innovation design of the new era development needs[J]. Times Automobile,2024,(24): 71- 73. [8] WANG Longfei, CHEN Changxiu. Exploration on the Status and Path of Innovation and Entrepreneurship Education in Higher Vocational Colleges and Universities--Taking Mechanical Design and Manufacturing Major as an Example[J]. Shaanxi Education(Higher Education),2024,(10):74-76.
revision time	July 2024

26. Labor Practice

Module name	Labor Practice
Module level	Undergraduate
Code	3080201518
Courses	Intensive Practical Training
Semester	Spring Semester
Contact person	Li Anning
Lecturer	Zhang Feifei, Zhang Kaida
Language	Chinese
Relation to curriculum	Compulsory,2rd Semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 1 semester hour / week
Work load	. Total study hours: 42 study hours= Lecture 6 study hours+ Intensive Practical Training 10 study hours+ Self-study 26 study hours, 16 weeks to complete . Lecture: 1 hour per week, including lecture, discussion and questions. . Self-study: approximately 1.6 study hours per week, including pre-course study, post-course practice, and review and preparation for exams.
Credit points ETCS	1.5

Requirements according to	A student must have registered for the course.		
the Examination Regulations			
Recommended Prerequisites	Physical Education, Mental Health Education		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning outcomes - 1	Students can remember the meaning of labor and describe the Marxist concept of labor and General Secretary Xi Jinping's concept of labor; they can list the meaning and path to realization of the spirit of the model worker and the spirit of the artisan; they can exercise the ability to use their hands and minds in social Labor Practice, school Labor Practice, and family Labor Practice according to the requirements; they can deduce the value of labor in the practice of exerting their efforts and sweating; they can establish a correct attitude	R7

Learning outcomes and their corresponding PLOs		toward labor. In addition, they are constantly innovating and enriching the content of labor education in the military, public service, volunteer service and passing on the red genes, so as to enhance creative labor abilities.	
	CLO-2 Learning outcomes - 2	Enhance students' spirit of labor, labor value orientation and labor skills; cultivate students' ability to open up their life and career prospects by hard work and sweat without craving for comfort, fearing difficulties or complaining about others; improve students' ability to practice hands-on skills, observation and creative thinking, problem-solving skills, and written and verbal expression; cultivate students' ability to form regular operating habits and good vocational behaviors. Through sweating and exerting efforts, students can receive exercise, sharpen their will, feel the joy of harvesting from labor, and develop sincere feelings of respect for labor, love for labor, and cherishing the	R8

		fruits of labor.	
	CLO-3 Learning outcomes - 3	Remember the connotation and realization path of the spirit of labor, the spirit of the model worker, and the spirit of the craftsman, and cultivate the awareness and ability of independent and lifelong learning; list the ways of concrete Labor Practice in society, school, and family, and practice hands-on skills; discuss the feelings of military barracks, public service, volunteerism, and the passing on of the red gene to the laboring people, and outline the value and significance of labor education.	R11
	The course "Labor Practice" is a centralized practical teaching course, focusing on popularizing the knowledge of labor science and improving the quality of labor science, combining the two dimensions of the development of labor science and the demand for labor practice, and focusing on the characteristics of contemporary college students from the perspective of cultivating labor morality, promoting the spirit of the model worker, fostering the spirit of the artisan, social labor practice, school labor practice, family labor practice, practice and exercise in the army, and the awareness of public service, tintroduces the basic knowledge in the field of labor in a comprehensive and systematic way, aiming at guiding college students in the new era to firmly establish the Marxist concept of labor, and to truly understand that labor creates value and that labor is		

Content	the key to a happy life. Through the study of this course, we can strengthen students' awareness of labor education, transform their world view, life view and value in labor, cultivate their talents and skills in front-line labor, and realize the combination of labor education and talent cultivation. Knowledge Module 1: Spirit of Labor (Weighting Factor 2/16, Level: Memorization+ Understanding+ Application) Knowledge Module 2: Model Worker Spirit (Weighting Factor 2/16, Level: Memorization+ Understanding+ Application) Knowledge Module Block 3: Craftsmanship (Weighting Factor 2/16, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Social Labor Practice (Weighting Factor 2/16, Level: Understanding+ Application+ Creation) Knowledge Module 5: School Labor Practice (Weighting Factor 2/16, Level: Understanding+ Application+ Creation) Knowledge Module 6: Family Labor Practice (Weighting Factor 2/16, Level: Understanding+ Application+ Creation) Knowledge Module 7: Public Service and Volunteerism (Weighting Factor 2/16, Level: Understanding+ Application+ Creation) Knowledge Module 8: Troop Exercise and Passing on the Red Gene (Weighting Factor 2/16, Level: Understanding+ Application+ Creation)

Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and non-written exam (50%), of which the process assessment includes: project guarantee time 15% + project guarantee quality 20% + project guarantee quantity 15%, and non-written exam includes: theory assessment 25% + practical assessment 25%.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Liu Xiangbing, General Theory of Labor, Higher Education Press, 2020. [2] Tzeng T.S., Gu J.J., et al, General Theory of Labor Education, Educational Science Publishing House, 2020. [3] Li Ke, Transmutation and Review: Historical Logic and Reality Reconstruction of Labor Education, Social Science Literature Press, 2019. [4] Liu Xiangbing et al, An Outline of Labor Education in the New Era, Social Science Literature Publishing House, 2018. [5] Labor Law of the People's Republic of China Labor Contract Law of the People's Republic of China [M] , Bejing: Law Press, 2019. [6] Li Ke, The Spirit of Model Workers [M], Beijing: CPC History Press, 2020. [7] HOU Meiqi, LI Qiankun. High-quality Development and Common Wealth: The Realistic Needs and Value Purpose of College Students' Labor Education in the New Era [J]. Labor Education Review, 2022(2):28-39. [8] Cui Ji, Liu Lei, Niu Luyuan, Li Qianmu. Building an Innovative Talent Cultivation System for Practical Teaching in the Context of Labor Education[J]. Journal of Heihe College,2022(09):29-30.
revision time	July 2024

27. Engineering Drafting Practicum

Module name	Engineering Drafting Practicum
Module level	Undergraduate
Code	3080201519
Courses	Intensive Practical Training
Semester	Spring Semester
Contact person	Cheng Xuelian
Lecturer	Song Yi, He Linan
Language	Chinese
Relation to curriculum	Compulsory , 2 nd semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 2 study hours/week
Work load	. Total study hours: 84 study hours= Lecture 32 study hours+ Self-study 52 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion, questions, and labs. . Self-study: approximately 3.5 study hours per week, including pre-course study, post-course practice, and review for exams.

Credit points ETCS	3		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	Descriptive Geometry and Mechanical Drawing, Introduction to the Mechanical Engineering Profession		
Learning outcomes and their corresponding PLOs	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	Ability to apply, according to user needs Basic skills in the operation of Auto CAD software and access to relevant literature, management of software and files.	R2
	CLO-2 Learning	Be able to follow a two-dimensional graphic Analyze the commands and drawing methods required for a drawing. Apply the	R3, R5

	Outcome-2	execution of various drawing and modification commands of AutoCAD software. Flexibly draw correct 2D drawings.	
Learning outcomes and their corresponding PLOs	CLO-3 Learning Outcome-3	Be able to label graphics according to the Analyze the size of each graphic element in the drawing size, apply AutoCAD software text style, dimensioning style creation The following are some examples of how to correctly dimension drawings, such as building, typing and editing text, and various dimensioning methods.	R3, R5
	CLO-4 Learning Outcome-4	Be able to analyze the presentation of views and drawings of parts and assemblies according to their requirements. Apply mechanical drawing standards to produce the required drawings.	R9, R10

Content	Engineering Drafting Practicum is a centralized practice course for mechanical engineering majors. The course mainly introduces the operation methods of common drawing commands and modification commands of Auto CAD software, and the whole course is interspersed with the contents of engineering drawing methods and drawing standards, the specific contents include the foundation of Auto CAD, the drawing of two-dimensional planar shapes, the text and dimensioning, the drawing of three-view drawings, the drawing of parts drawings and assembly drawings . Through the study of the course, students can use the operation method of common drawing and modification commands of Auto CAD software, so as to make students have strong application ability of digital drawing. Students will be able to draw correctly and quickly according to the national standards, and through the training of various skills, students will be able to improve their ability to use Auto CAD software. Students will be able to use Auto CAD for designing, cultivate students' working style of seriousness, meticulousness and professional spirit of striving for excellence, so as to adapt to the needs of related work in the future. Knowledge Module 1: Fundamentals of AutoCAD Drafting (Weighting Factor 2/32, Level: Understanding+ Application) Knowledge Module 2: Drawing 2D Plane Drawings (Weighting Factor 8/32, Level: Understanding-Analysis) Knowledge Module 3: Text and Dimensioning (Weighting Factor 8/32, Level: Understanding-Analysis) Knowledge Module 4: Drawing of Three Views (Weighting Factor 6/32, Level: Understanding-Analysis) Knowledge Module 5: Drawing of Parts and Assemblies (Weighting Factor 8/32, Level: Understanding - Creating)

Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and non-written exam (50%), of which the process assessment includes: unit test 30% + post-course assignment 30% + individual work presentation 40%, and the non-written exam is 100 minutes.
Media employed	Computers, MOOC online site, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Liu Wenlian, Auto CAD Engineering Drawing Case Tutorial [M], Beijing Institute of Technology Press, 2023, 4th ed. [2] Ouyang Quanhui, Auto CAD Mechanical Drafting Basic Tutorial and Practical Training [M], Peking University Press, 2023. [3] Miao Jun,Zhang Guimei. Computerized Drawing[M],Mechanical Industry Press,2020. [4] Dong Xiangguo, Jing Pan, Auto CAD 2020 Application Tutorial [M], Nanjing Southeast University Press, 2020. [5] CAD-assisted design education and research office. Chinese version of Auto CAD 2015 practical tutorial [M], People's Posts and Telecommunications Press, 2017. [6] Jiang Daochuan. Exploration and Practice of Teaching Reform of Engineering Drawing and CAD Course[J],Plastics Industry,2024,52(04). [7] Mu Haozhi. Research and practice of CAD on-line experimental teaching of Engineering Drawing course based on "Internet+"[J], Journal of Graphics,2017,38(05).
revision time	July 2024

28. 3D Modeling Design Practice

Module name	3D Modeling Design Practice
Module level	Undergraduate
Code	3080201520
Courses	Intensive Practical Training
Semester	Spring Semester
Contact person	Sun Huili
Lecturer	Liu Juan, Feng Yunhao
Language	Chinese
Relation to curriculum	Compulsory, 2rd semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 4 hours/week
Work load	. Total study hours: 140 study hours= Lecture 16 study hours+ In-class practical 48 study hours+ Self-study 76 study hours, completed in 16 weeks . Lectures: 4 hours per week, including lectures, discussions and questions. . Self-study: approximately 4.8 study hours per week, including pre-course study, post-course practice, and review and preparation for exams.

Credit points ETCS	5		
Requirements according to	A student must have registered for the course.		
the examination Regulations			
Recommended prerequisites	Descriptive Geometry and Mechanical Drawing, Introduction to the Mechanical Engineering Profession		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	Remember the common operation buttons and shortcut keys of UG; use the basic operation of drawing 2D shapes in the sketching interface; use the operation of creating 3D solid models; summarize the methods of 3D modeling design, assembly design, and drawing of engineering drawings for mechanical parts.	R1

Learning outcomes and their corresponding PLOs	CLO-2 Learning Outcome-2	Can apply the ideas and methods of computerized 3D modeling to solve mechanical engineering problems; apply the knowledge gained to analyze problems independently. The goal of the program is to help students learn how to solve problems and apply what they have learned in order to develop self-study skills.	R3
	CLO-3 Learning Outcome-3	Apply what you have learned to develop a good spirit of collaboration; apply what you have learned to develop a pragmatic style of learning and a spirit of innovation; apply what you have learned to develop a serious and meticulous work style.	R7

Content	This course is an important tool for engineering design, using computers for three-dimensional parametric modeling design It is an inevitable trend of engineering application to design products by combining engineering case studies and project-driven methods. The course adopts the combination of engineering case study and project-driven method, and uses modularization and grouping to organize teaching and learning, to cultivate students' engineering practice and innovation ability in all aspects, and to lay a good foundation for employment. Knowledge Module 1: UG Overview (Weighting Factor 4/64, Level: Memorization - Understanding) Knowledge Module 2: Sketching (Weighting Factor 8/64, Level: Memorization+ Understanding+ Application) Knowledge Module 3: Feature Modeling (Weighting Factor 12/64, Level: Memory+ Understanding+ Application) Knowledge Module 4: Assembly (Weighting Factor 12/64, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Dynamic Simulation (Weighting Factor 8/64, Level: Memorization+ Understanding+ Application) Knowledge Module 6: Engineering Drawing (Weighting 8/64, Level: Memorization+ Understanding+ Application) Knowledge Module 7: Freeform Characterization (Weighting Factor 8/64, Level: Memorization+ Understanding+ Application) Knowledge Module 8: Comprehensive Exercises (Weighting Factor 8/64, Level: Memorization+ Understanding+ Application)

Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and non-written exam (50%), of which the process assessment includes: computer operation 50% + usual assignments 50%, and the non-written exam is 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] UG NX 10.0 mechanical design tutorial (college undergraduate textbook), Zhan Di You, Machinery Industry Publishing House, 2018 [2] UG NX10.0 three-dimensional modeling and automatic programming project tutorial, Xu Jiazhong, Machinery Industry Publishing House, 2016 [3] UG NX10.0 Chinese version basic tutorial (2nd edition), Zheng Zhenping, machinery industry publishing house, 2017 [4] UG Practical Tutorial, Zhao Bo, Gong Mian, Tu Jianzhong, Tsinghua University Press, 2010 [5] UG surface modeling example tutorial, Shen Chungen, Xu Honglong, Zhou Liping, Chemical Industry Publishing Co.
	The United Kingdom of Great Britain and Northern Ireland, 2012 [6] UG NX5 CNC machining practical tutorial, Zhang Xiaohong, Zheng Zhenping, Machinery Industry Publishing House, 2010 [7] China University MOOC website: https://www.icourse163.org

	[8] Zhihuishu Online Learning Platform: https://www.zhihuishu.com [9] Yuketang: https://www.yuketang.cn
revision time	July 2024

29. Integrated Smart Manufacturing Practices

Module name	Intelligent Manufacturing Integrated Practice
Module level	Undergraduate
Code	3080201521
Courses	Intensive Practical Training
Semester	Fall Semester
Contact person	Li Yuezhen
Lecturer	Li Yuezhen, Xu Ying, Hu Hai
Language	Chinese
Relation to curriculum	compulsory , 3rd semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 3 hours/week
Work load	. Total study hours: 112 study hours= Centralized Practicum 48 study hours+ Self-study 64 study hours, completed in 16 weeks . Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: approximately 4 study hours per week, including pre-class pre-study, post-class practice, and review and preparation for exams.

Credit points ETCS	4		
Requirements according to	A student must have registered for the course.		
the examination Regulations			
Recommended prerequisites	Descriptive Geometry and Mechanical Drawing, Introduction to the Mechanical Engineering Profession		
Learning	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	To be able to carry out the implementation of specific research programs and engineering practice, and according to the problems arising in the process of implementation, to make reasonable explanations against the scientific objectives, to obtain reasonable and effective conclusions, and to apply them to engineering practice.	R4

outcomes and their corresponding PLOs	CLO-2 Learning Outcome-2	Be able to simulate and model complex engineering problems in mechanical engineering and related fields using appropriate techniques, modern information tools and resources, and be able to understand their limitations.	R5
	CLO-3 Learning Outcome-3	Combining cutting-edge technology and research results, predicting the development prospect of intelligent manufacturing, having the awareness of independent and lifelong learning, and the ability to continuously learn and adapt to the development.	R11
	The practical course "Comprehensive Practice of Intelligent Manufacturing" is an important course for learning and applying mechanical knowledge; this course requires students to understand the ideas and methods of parametric design in computerized 3D modeling. The company has mastered the feature-based solid modeling software UG, and can independently complete the three-dimensional modeling design and assembly design of mechanical parts, on the basis of which it has mastered the model format conversion software BP. Students will learn how to operate Customer 3.0 and related slice analysis software, and how to convert two-dimensional and three-dimensional		

Content	graphics into real objects. Students will develop practical skills, innovative design abilities and the ability to design. The students will be able to stand at the frontier of intelligent manufacturing and solve complex engineering problems of products and systems related to intelligent manufacturing engineering. Cultivate technical, skillful and application-oriented talents for job groups. Knowledge Module 1: Introduction to Additive Manufacturing Technologies (Weighting Factor 4/48, Level: Memorization+ Understanding) Knowledge Module 2: 3D Sketching and Feature Modeling (Weighting Factor 16/48, Level: Memory+ Understanding+ Application) Knowledge Module 3: Simulated Assembly (Weighting Factor 10/48, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Slicing Environment Setup (Weighting Factor 10/48, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Printing and Physical Assembly (Weighting Factor 8/48, Level: Memorization+ Understanding+ Application)
Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and non-written exam (50%), of which the process assessment consists of: computer operation 50% + usual assignments 50%, and the non-written exam is 100 minutes.
Media	Computers, online website, Hengxing Capability Platform, Chaoxing Learning

employed	Platform
Reading list	[1] Sheng Zhang , Yansong Xu , Shanshan Sun , et al. Research and Development of 3D Printing Materials [J]. China Plastic materials . 2016. [2] Zhu Yanqing , Shi Jifu , Wang Leilei , et al. 3D Printing Technology Development Status [J]. Manufacturing Technology and Machine bed . 2015. [3] Jiang Liang . Research on Clinical Application of 3D Visualization Technology and 3D Printing Technology in Liver Surgery [D]. Xinjiang Medical University, 2018. [4] Qingyun Liu . Application of Computer Aided Technology in Plastic 3D Printing [J]. Engineering Plastics Applications . 2018.
	[5] Ma Shengjun . Research and development of CAD/CAM system for 3D printing of biomaterials [D]. Shenyang Polytechnic University, 2016. [6] LI Xiaoli, MA Jianxiong, LI Ping, et al. 3D printing technology and application trends[J]. Automation Instrumentation,2014,35(01):1-5. [7] HE Chao-liang, TANG Zhaohui, TIAN Huayu, et al. Research progress on the preparation of biomedical polymer materials by 3D printing technology[J]. Journal of Polymer Science,2013,(06):722-732.
revision time	July 2024

30. Metalworking Practice

Module name	Metalworking Practice
Module level	Undergraduate
Code	3080201522
Courses	Intensive Practical Training
Semester	Fall Semester
Contact person	Bing Cuiying
Lecturer	Xu Shengjie, Ji Yuanjing
Language	Chinese
Relation to curriculum	compulsory 2nd semester
Type of teaching, contact hours	Lecture, demonstration, practice, on-site teaching, discussion method, case study method, 2 study hours/week
Work load	. Total study hours: 84 study hours= Lecture 32 study hours+ Self-study 52 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 3 study hours per week, including pre-class pre-study, post-class practice, and review and preparation for exams.
Credit points ETCS	2

Requirements according to the examination regulations	A student must have registered for the course.		
Recommended prerequisites	*Fundamentals of Engineering Materials and Mechanical Manufacturing, Principles of Machinery, Mechanical Design*		
Learning outcomes and their corresponding	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1	Remember the basic principles, methods and applications of Advanced Manufacturing Technology, and be able to analyze and compare the advantages and disadvantages of modern manufacturing processes and propose reasonable improvement plans.	R1
	CLO-2	To train students to apply modern manufacturing automation technology, intelligent manufacturing technology and flexible manufacturing technology to design solutions and practice technology application and innovation in projects to enhance the efficiency and	R3

PLOs		intelligence of manufacturing systems.	
	CLO-3	Students will develop a sense of creativity and critical thinking through the review of Advanced Manufacturing Technology, develop the ability to solve complex engineering problems, and develop an understanding of the responsibilities involved.	R6
	CLO-4	Students are trained to be team players, to collaborate on real-world problems in an interdisciplinary environment, and to be able to work with people from different backgrounds on manufacturing technology projects.	R8
Content	This course is an internship course for science and engineering students, and the syllabus is applicable to all undergraduate and specialized majors. Through the metalwork internship, students will be familiar with the general process of mechanical manufacturing, the main process methods of mechanical parts processing, and initially establish the engineering concepts and perceptual knowledge of the process of mechanical manufacturing; they will learn about the process characteristics and processing range of each type of processing, the structural principles of commonly used equipment and their safe operation procedures, and initially master the basic operation methods of the processing equipment and the processing skills, and independently complete the processing of the simple parts through the actual operation. Through the practical operation, students can independently finish the processing and production of simple parts. Through the internship, students can build up the engineering consciousness of safe production, product quality, production cost, energy saving and environmental protection, cultivate		

	the style of diligent thinking, pioneering and innovation, the courage to practice, and the style of connecting theory with practice, as well as the good qualities of obeying the rules and regulations, caring for the public property, love of labor, and unity and mutual assistance, broaden their professional vision, and increase the competitiveness of employment. Knowledge Module 1: Safe and Civilized Production (Weighting Factor 2/84, Level: Memory+ Understanding+ Application) Knowledge Module 2: Basic Clamping Operations (Weighting 32/84, Level: Understanding+ Application+ Creation) Knowledge Module 3: Basic Welding Operations (Weighting 14/84, Level: Understanding+ Application+ Creation) Knowledge Module 4: Basic Turning Operations (Weighting 12/84, Level: Understanding+ Application+ Creation) Knowledge Module 5: CNC Machining Operations (Weighting 6/84, Level: Understanding+ Application+ Creation)
	(build) Knowledge Module 6: Basic Casting and Forging Operations (Weighting Factor 6/84, Level: Understanding+ Application+ Creation) Knowledge Module 7: Basic Machining Center Operations (Weighting Factor 12/84, Level: Understanding+ Analysis+ Application+ Creation)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and final examination (50%), of which the process assessment includes: unit test 40% + post-course work 30% + personal presentation 30%, and the final closed-book examination of 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning

	Platform
Reading list	. DING Wenfeng,WAN Nian,ZHAO Biao,et al. Research status and trend of aerospace advanced manufacturing theory and technology[J/OL]. Journal of Aeronautics and Astronautics, 1-37[2025-03-17]. http://kns.cnki.net/kcms/detail/11.1929.v.20241118.1404.012.html. . Wang Hongyan. Research on the Trend of Integration and Development of Industrial Internet and Advanced Manufacturing Industry[J]. Modern Management Science,2024,(02):173-181. . Huang Qunhui, He Jun. "The Third Industrial Revolution and the Adjustment of China's Economic Development Strategy: The Perspective of Techno-Economic Paradigm Shift[J]. China Industrial Economy,2013,(01):5-18. doi:10.19581/j.cnki.ciejournal.2013.01.001. . Li JH. Development Reality and Future Path Thinking of China's Advanced Manufacturing Industry[J]. Humanities Journal,2020,(01):22-32.DOI:10.15895/j.cnki.rwzz.2020.01.001. . Wang Lei,Lu Bingheng. Research on the development of additive manufacturing technology and industry in China[J]. China Engineering Science,2022,24(04):202-211. . Liu ZF. Green Manufacturing Theory Methods and Applications [M] Beijing: Tsinghua University Press, 2021

	. Zhou Jun. Advanced Manufacturing Technology [M] Beijing: Tsinghua University Press , 2022
revision time	July 2024

31. Programming Control Design Practices

Module name	Programming and Control Design Practice
Module level	Undergraduate
Code	3080201523
Courses	Intensive Practical Teaching
Semester	Fall Semester
Contact person	Li Anning
Lecturer	Li Anning, Feng Lili, Zhao Qingzhi
Language	Chinese
Relation to curriculum	compulsory , 4th semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 3 hours/week
Work load	. Total study hours: 112 study hours= Lecture 48 study hours+ Self-study 64 study hours, completed in 16 weeks . Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: 4 study hours per week, including pre-course study, post-course practice, and review and preparation for exams.

Credit points ETCS	4		
Requirements according to	A student must have registered for the course.		
the examination Regulations			
Recommended prerequisites	*Integrated Practice in Intelligent Manufacturing, Metalworking Practice*		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	Ability to memorize and explain the basic principles, fundamental theories and methods of PLC control methods, as well as the ability and skills to correctly use a variety of controls . Be able to carry out control according to the control requirements of the control system. PLC selection, I / O port allocation design, according to the control system requirements to	R1 R2

Learning outcomes and their corresponding PLOs		achieve the function of the control system device components selection and control line design and installation, according to the requirements of the circuit diagram drawing, the use of programming software for control system program writing, able to independently complete the operation of the control system debugging.	
	CLO-2 Learning Outcome-2	Ability to link theory with practice and conduct basic engineering training. The students have the ability to acquire, analyze, summarize, communicate, and use information and new technologies; they have the ability to design, operate, debug, and maintain industrial control objects; and they have the ability to independently analyze, design, and implement systems. The ability to implement and evaluate, and the ability to self-learn, understand and	R3 R5

		express themselves. Power.	
	CLO-2 Learning Outcome-3	Cultivate students' engineering thinking ability, improve their hands-on ability and their ability to think comprehensively. Strengthen students' training in "project" (project, engineering, subject) and "teamwork" spirit of cooperation, and realize the role change from student (classroom) to worker (workplace).	R7
	CLO-3 Learning Outcomes-4	To develop students' ability to work in teams and accomplish teamwork tasks. To develop good work ethics, critical and self-critical skills, professionalism, teamwork and tolerance, communication and interpersonal skills, planning and organizational skills, and implementation skills. Power.	R9, R10

Content	Programming Control Design Practice is a practical teaching session course for mechanical engineering majors Programs. The main contents of the course include basic programming software practice, basic programming instruction training, traffic light training at crossroads, multiple liquid mixing training, light training in Tianta, vending machine training, washing machine control training. Through the study of this course, students with the simulation software advanced interactivity and training platform equipment to provide a typical comprehensive training environment, the abstract theoretical knowledge of the study is converted into a real and visible "instantiation" experience, so that students quickly learn the relevant professional knowledge and skills of PLC for the subsequent study of other industrial control technology and to lay a good foundation for the subsequent study of related jobs. This will lay a good foundation for the subsequent study of other industrial control technologies and the related work positions. Knowledge Module 1: Basic Exercises (Weighting Factor 2/48, level: understanding + application) Knowledge Module 2: Basic Programming Instruction Practicum (Weighting Factor 5/48, Level: Understanding+ Application) Knowledge Module 3: Intersection Traffic Light Practicum (Weighting Factor 7/48, Level: Understanding+ Application) Knowledge Module 4: Multiple Liquid Mixing Practicum (Weighting Factor 7/48, Level: Understanding+ Application) Knowledge Module 5: Hands-on Training on the Light of the Sky Tower (Weighting Factor 7/48, Level: Understanding+ Application) Knowledge Module 6: Vending Machine Practical Training (Weighting Factor 10/48, Level: Understanding+ Application) Knowledge Module 7: Washing Machine Control Practical Training (Weighting Factor 10/48, Level: Understanding+ Application)

Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and non-written exam (50%), of which the process assessment includes: 20% of the project guarantee time + 40% of the project quality + 40% of the project quantity; the non-written exam includes: 20% of the theory assessment + 30% of the practical assessment.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Principles and Applications of Programmable Controllers, edited by Zhong Zhaoxun, South China University of Technology Publishing House, 8th edition, January 2015. [2] Preparation Guide for Mechatronics Equipment Assembly and Debugging, edited by Cheng Zhou, Higher Education Publishing House, March 2021. [3] PLC Technology Application, edited by Tang Zichun, Higher Education Press, December 2020. [4] PLC Technology and Application, Gao Yuning, Cao Tuo, Higher Education Press, May 2022. [5] Wu Qiong, Chen Hui, Qiao Jianwei, et al. A high-voltage, high-speed open-type three-phase asynchronous motor for freezers. Electrical Machines and Control Applications,2021,48(8):67-71. [6] Lin Wencheng. Design of automatic control system of constant power hydraulic motor based on PLC. Journal of Wuhan Shipbuilding Vocational and Technical College, 2021, 20(4):128-131.
revision time	July 2024

32. Engineering Quality Management Training

Module name	Engineering Quality Management Training
Module level	Undergraduate
Code	3080201524
Courses	Intensive Practical Training
Semester	Spring Semester
Contact person	Zhao Chengyuan
Lecturer	Xia Fuzhi, Wang Haitao
Language	Chinese
Relation to curriculum	compulsory 4 th semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 2 study hours/week
Work load	. Total study hours: 70 study hours= Lecture 32 study hours+ Self-study 38 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 2.4 hours per week, including pre-study, post-study exercises, review and preparation.

Credit points ETCS	2.5		
Requirements according to	A student must have registered for the course.		
the examination Regulations			
Recommended prerequisites	*Introduction to Mechanical Engineering, Descriptive Geometry and Mechanical Drawing, Electrotechnics, Fundamentals of Engineering Materials and Mechanical Manufacturing, Materials Mechanics, Interchangeability and Technical Measurement.*		
Learning	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	Be able to outline the basic theoretical knowledge of site production management and be proficient in the use of site management tools and methods for site management analysis, control and improvement.	R4

outcomes and their corresponding PLOs	CLO-2 Learning Outcome-2	To be able to read, write and translate foreign literature related to mechanical engineering; to access, use and manage related technical data; to have the ability to apply production management systems.	R5
	CLO-3 Learning Outcome-3	Ability to outline the basic principles of production management The students will be able to analyze and solve the problems of production and operation systems in modern manufacturing and service enterprises by using their knowledge flexibly, and will be able to cope with the ever -changing technological upgrading of the industry and the changes in policies and markets.	R9
		Be able to predict the current status and development of the discipline in the specialty and similar fields. They will develop innovation, entrepreneurship and	

	CLO-4 Learning Outcome-4	systematic thinking skills, and lifelong learning ability; they will have core competitiveness in the field of mechanical engineering, and will be able to take charge of their own business in related professional and technical fields or in management.	R10
Content	This course is an Intensive Practical Training teaching link for students after completing the basic courses and most of the specialized courses, and it is a training for students to apply the learned theoretical knowledge to solve the actual engineering problems and lay the foundation for the graduation design. It is a training for students to apply the theoretical knowledge they have learned to solve practical engineering problems and to lay the foundation for graduation design. It cultivates students to master the basic theoretical knowledge of quality management in the process of machinery production and to understand the direction of the management of machinery production, so as to enable them to adapt to the job requirements of the quality management of machinery production after graduation, and emphasizes on the cultivation of students' innovative consciousness, engineering quality and engineering ability. It will provide strong support and promotion for the subsequent courses, internship and employment. Knowledge Module 1: Introduction (Weighting Factor 1/32, level: memorization+ understanding) Knowledge Module 2: Facility Planning and Design of Production Systems		

	(Weighting Factor 2/32, Level: Understanding+ Application) Knowledge Module 3: Demand Forecasting and Production Planning (Weighting Factor 2/32, Level: Understanding+ Application+ marks)
	(analyze) Knowledge Module 4: Work Study and Job Design (Weighting Factor 4/32, Level: Understanding+ Application) Knowledge Module 5: Enterprise Resource Planning (Weighting Factor 4/32, Level: Understanding+ Application) Knowledge Module 6: Production Site Management and Job Sequencing (Weighting Factor 4/32, Level: Understanding+ Application) Knowledge Module 7: Project Management (Weighting Factor 4/32, Level: Comprehension+ Application) Knowledge Module 8: Enterprise Materials Management (Weighting Factor 4/32, Level: Understanding+ Application+ Analysis) Knowledge Module 9: Equipment Management (Weighting Factor 2/32, Level: Understanding+ Application+ Evaluation) Knowledge Module 10: Quality Management (Weighting Factor 2/32, Level: Understanding+ Application) Knowledge Module 11: Manufacturing Technology (Weighting Factor 3/32, Level: Understanding+ Application)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and non-written exam (50%), of which the process assessment includes: unit test 40% + post-course homework 30% + personal presentation 30%, and the non-written exam includes theory assessment 20% + practical assessment 30%.

Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Pan Jiaxian, Modern Production Management (Third Edition), Tsinghua University Press, 2011.2 [2] Sun Shudong, Production Operation and Management, Science Press, 2010.7 [3] A Concise Course on Production Management in Modern Industrial Enterprises, Guan Shixun, Chen Xiaodong, Tongji University Publishing House, 1996.3. [4] Production and Operations Management, Wang Daoping, Hunan University Press, 2004.113. [5] YU Yanli, SUN Weijing, LI Shengming, et al. Exploration and practice of digitalization of quality management in mechanical manufacturing[J]. Times Machinery,2024, (21):4-6. [6] Macao Xu. Research on quality control and management in new energy machinery manufacturing process[J]. Mechanical Testing Report, 2024, (15):56-58. [7] LONG Haiqiang, ZHANG Bo, QIU Hong. The teaching reform practice of mechanical production management oriented to the improvement of vocational literacy[J]. Modern Machinery,2024, (13):70-72.
revision time	July 2024

33. Structural Optimization Design Practice

Module name	**Structural Optimization Design Practice**
Module level	Undergraduate
Code	3080201525
Courses	Intensive Practical Training
Semester	Spring Semester
Contact person	He Linan
Lecturer	Feng Yunhao, Xu Wenfei
Language	Chinese
Relation to curriculum	Compulsory 4 th semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 2 study hours/week
Work load	. Total study hours: 70 study hours= Lecture 32 study hours+ Self-study 38 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 2 study hours per week, including pre-course study, post-course practice, and review for exams.

Credit points ETCS	2.5		
Requirements according to	A student must have registered for the course.		
the examination Regulations			
Recommended prerequisites	*Engineering Drafting Practicum, 3D Modeling Design Practice, Intelligent Manufacturing Comprehensive Practice*		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	Training through hands-on projects, combined with 3D modeling techniques, through topology optimization using Altair Inspire software, the existing structure of the load, force and other analyses, according to the results of software calculations, to get the optimized structure, so as to design a reasonable parts model, to solve the complex	R3

		problems in the manufacturing process of mechanical products.	
Learning outcomes and their corresponding PLOs	CLO-2 Learning Outcome-2	Learning through training in operational programs. Using Altair Inspire software, the structural analysis is carried out, and the optimized structure is obtained according to the results of the software operation, and a reasonable part model is designed from. Solve complex problems in the manufacture of mechanical products.	R5
	CLO-3 Learning Outcome-3	Students will be able to learn through hands-on programs to develop a love of work and dedication to their jobs. To develop students' creative thinking and innovative abilities.	R10

	CLO-4 Learning Outcome-4	They can apply the design method of structural optimization through practical operation, have the ability to analyze problems and solve problems in mechanical structure through project and self-study process, and improve their innovative ability and professional skills through continuous learning in combination with their professional characteristics.	R11
	Lightweighting Factor Design of Structures is an innovative practical course for four-year undergraduates of mechanical engineering majors. Its main contents include: ① overview of light-weighting Factor design of structure; ② foundation of optimal design of structure; ③ engineering cases of optimal design of structure. Through this course, students should learn how to use optimization software such as Altair Inspire. On the basis of this method, they are able to apply the knowledge and skills related to the specialty of mechanical engineering to engage in the structural optimization and light-weighting Factor design of mechanical products, and to engage in the design, manufacture, applied research, teaching and research of mechanical products, engineering project management, production management and technical service and other related work. Through this course, students will be able to study the basic concepts and methods of structural light-weighting Factor design, introduce the ideas		

Content	and methods of parametric design, use simulation software to decompose and analyze the model, establish the operational logic of structural light-weighting Factor design, reflect the innovation and creativity of students, and ultimately achieve the purpose of improving the comprehensive professional quality of students. Knowledge Module 1: Basic Concepts of Optimized Design of Structures Knowledge Module 2: Approaches to Light-weighting Factor Design of Structures (Weighting Factor 2/32, Level: Memory+ Understanding) Knowledge Module 3: Altair Inspire Structural Design Optimization (Weighting Factor 8/32, Level: Memory-Application) Knowledge Module 4: Altair Inspire Structural Optimization Design Engineering Cases (Weighting Factor 10/32, Level: Comprehension - Evaluation) Knowledge Module 5: Altair Inspire Motion Simulation and Optimization Engineering Cases (Weighting Factor 12/32, Level: Comprehension - Evaluation)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and non-written exam (50%), of which the process assessment includes: project guarantee time 20%+project quality 60%+project quantity 20%; and the result assessment includes: theory assessment 40%+practical assessment 60%.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
	[1] Chen Liang,Wu Shifu. Study on the influence of housing cross-section shape structure on transmission lightweighting[J/OL]. Mechanical Design

Reading list	and Manufacturing,1-5[2024-12-24]. [2] SUN Yanwei, GAO Jianhong, GUO Haibo, et al. Analysis of lightWeighting Factor design of engine flywheel[J]. Diesel Engine Design and Manufacturing,2024,30(04):11-15. [3] YU Peng, WANG Jian, NIE Jin, et al. Research on lightweighting of suspension mounts for new energy vehicles[J]. Agricultural Equipment and Vehicle Engineering,2020,58(11):19-22. [4] WANG Wen, CHEN Wengang, WANG Haijun, et al. Research progress on friction reduction modification of automotive lightWeighting Factor valve materials [J/OL]. Thermal Processing Technology,2024,(23):1-6. [5] LIU Jiahao, LIU Mingxuan, WEI Shuyuan, et al. Static analysis and lightWeighting Factor design of dynamic platform of die-cutting machine[J/OL]. Journal of Tianjin Polytechnic University,1-11[2024-12-24]. [6] CHEN Zhou, WANG Yaning, OU Shubo, et al. LightWeighting Factor design method for roll-on/roll-off vessels[J]. Marine Engineering,2024,53 (06):42-46. [7] Ding Zhaoxing. LightWeighting Factor chassis structure design for new energy vehicles[J]. Automotive Knowledge,2024,24 (12):34-36.
revision time	July 2024

34. Mechanical Design Course Project

Module name	Mechanical Design Course Project
Module level	Undergraduate
Code	3080201503
Courses	Intensive Practical Training
Semester	Fall Semester
Contact person	Xiu Tongze
Lecturer	Zhang Kaida, Wang Hongxia
Language	Chinese
Relation to curriculum	Compulsory / 5 th semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 2 study hours/week
Work load	. Total study hours: 84 study hours= Lecture 32 study hours+ Self-study 52 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 3 study hours per week, including pre-class pre-study, post-class practice, and review and preparation for exams.
Credit points ETCS	3

Requirements according to	A student must have registered for the course.		
the examination Regulations			
Recommended prerequisites	*Introduction to Mechanical Engineering, Metalworking Practice, Mechanical Engineering Design*		
Learning outcomes and their	**Course Learning Outcome (CLO)**	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	To be able to analyze problems in the field of mechanical engineering by remembering the basic principles and methods of the discipline, to study problems in the context of norms and standards, and to draw valid conclusions in the design, manufacture, development, applied research, and management of products and equipment.	R2

corresponding PLOs	CLO-2 Learning Outcome-2	To be able to understand the basic theories, basic skills and basic knowledge, simplify and analyze all kinds of complex force models, reasonably choose the design scheme according to the design principle, propose solutions for the determination of various parameters and calibration methods in the design process, and to be able to reflect the sense of innovation and seek for basic innovative ideas in the design process.	R3
	CLO-3 Learning Outcome-3	To be able to produce two-dimensional drawings of designs according to the design plan, to perform the selection of drawings for different models and the production of parts and assembly drawings. To be able to develop, select and use appropriate techniques, resources, modern engineering tools and information technology tools	R5

		for general engineering problems in the field of mechanical engineering, including the prediction and modeling of general engineering problems, and to be able to understand their limitations.	
	CLO-4 Learning Outcome-4	Understand the relevant technical standards and industry regulations in the field of mechanical engineering, and be able to reasonably analyze and evaluate the practice of mechanical engineering and general problems in the field of mechanical engineering based on the background knowledge of mechanical engineering, and propose solutions that will have a positive impact on society and safety.	R11
	Mechanical Design Course Project is an important teaching link with strong practicability and outstanding comprehensiveness, and it is a longer, more systematic and more comprehensive engineering design ability training for mechanical engineering related majors, which occupies an important position in realizing the overall cultivation goal of students. It plays an important role in realizing the overall training objectives of students. It is of great significance in establishing students' innovative		

Content	spirit, cultivating students' design consciousness, stimulating students' interest in learning, and deepening students' understanding and mastery of the contents learned in class. Knowledge Module 1: Introduction to Mechanical Design Course Project, Design Objectives (Weighting Factor 2/32, Level: Memorization+ Understanding) Knowledge Module 2: Mechanical Design Course Project Content and Requirements (Weighting 2/32, Level: Memorization+ Understanding+ Application) Knowledge Module 3: Steps in Designing a Mechanical Design Course (Weighting Factor 4/32, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Design Methods for Mechanical Design Courses (Weighting Factor 8/32, Level: Memorization+ Understanding)+
	(Applications) Knowledge Module 5: Writing a Design Statement for a Mechanical Design Course (Weighting 16/32, Level: Memorization+ Understanding+ Application)
Study and examination requirements and forms of examination	The course assessment consists of a process assessment (50%) and a work submission evaluation system (50%), of which the process assessment consists of: unit test 40% + post-course work 30% + class participation 30%.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform

Reading list	[1] Course Design of Mechanical Design [M] . Northwestern Polytechnical University Li Yuxi. Higher Education Publishing House, 2020 [2] Course Design of Mechanical Design [M]. Liu Jianhua. Electronic Industry Press,2016 [3] Course Design of Mechanical Design [M] . Feng Liyan. Machinery Industry Press,2021 [4] China University MOOC website: https://www.icourse163.org [5] Zhihuishu Online Learning Platform: https://www.zhihuishu.com [6] Wu Zongze, Luo Shengguo. Mechanical Design Course Project manual [M]. Beijing: Higher Education Press, 2018. [7] WANG X, WANG Jisen, LI Hongwei. Mechanical Design Course Project guidebook [M]. Beijing: Machinery Industry Publishing House, 2020.
revision time	July 2024

35. Mechanical CAD/CAM Technology Practice

Module name	Mechanical CAD/CAM Technology Practice
Module level	Undergraduate
Code	3080201210
Courses	Intensive Practical Training
Semester	Spring Semester
Contact person	Xiu Tongze
Lecturer	Zhao Chengyuan , He Linan
Language	Chinese
Relation to curriculum	compulsory, 5 th semester
Type of Teaching, Contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 3 hours/week
Work load	. Total study hours: 112 study hours= Lecture 48 study hours+ Self-study 64 study hours, completed in 16 weeks . Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: approximately 4 study hours per week, including pre-class pre-study, post-class practice, and review and preparation for exams.

Credit points ETCS	4		
Requirements according to	A student must have registered for the course.		
the examination Regulations			
Recommended prerequisites	*Principles of Machinery, Mechanical Design, Fundamentals of Engineering Materials and Mechanical Manufacturing*		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	They should be able to memorize the general principles and methods of CAD/CAM technology, and combine them with literature research to select or design reasonable technical routes, so as to solve complex engineering problems and establish correct and usable engineering models.	R2

Learning outcomes and their corresponding PLOs	CLO-2 Learning Outcome-2	The ability to analyze the effects of common factors in an engineering study and to investigate and obtain optimized, technologically advanced process conditions in order to design an engineering structure that meets specific needs.	R3
	CLO-3 Learning Outcome-3	Being able to select or design technically feasible, economically reasonable, safe and environmentally friendly process routes that can meet the needs of industrial production according to the sources of raw and auxiliary materials and conditions of technology and equipment, so as to be able to cope with the ever-changing technological upgrading of the industry and changes in policies and markets.	R6

	CLO-4 Learning Outcome-4	Identify relevant technical standards and industry regulations in the field of mechanical engineering, and be able to reasonably analyze and evaluate mechanical engineering practices and general problems in the field of mechanical engineering based on background knowledge of mechanical engineering, and propose solutions to positively impact society and safety.	R11
Content	Mechanical CAD/CAM Technology Practice is an innovative course for mechanical majors. It not only has strong theory, but also has strong practice and application. In the overall situation of cultivating mechanical, electromechanical and near-mechanical engineering talents, it has the function of enhancing students' practical operation ability, laying a foundation for students to study the subsequent courses and solving the actual production problems. Cultivating students' drawing ability and innovation ability is the teaching goal of this course. Knowledge Module 1: Introduction to CAD/CAM (Weighting Factor 2/48, Level: Memorization+ Understanding) Knowledge Module 2: 2D Graphing (Weighting Factor 4/48, Level: Memorization+ Understanding+ Application)		

	Knowledge Module 3: Graphic Editing and Annotation (Weighting Factor 4/48, Level: Memory+ Understanding+ Application) Knowledge Module 4: 3D Surface Modeling (Weighting Factor 12/48, Level: Memory+ Understanding+ Application) Knowledge Module 5: 3D Solid Modeling (Weighting Factor 12/48, Level: Memory+ Understanding+ Application) Knowledge Module 6: 2D Milling (Weighting Factor 4/48, Level: Memory+ Understanding+ Application) Knowledge Module 7: 3D Surface Machining (Weighting Factor 8/48, Level: Memorization+ Understanding+ Application) Knowledge Module 8: Lathe Machining (Weighting Factor 2/48, Level: Memorization+ Understanding+ Application)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and final examination (50%), of which the process assessment includes: 40% of on-line experiments, 30% of usual assignments, 30% of classroom participation, and a final closed-book examination of 100 minutes.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	1. Teaching materials [1] Mechanical CAD/CAM (Third Edition), edited by Zhou Wei, Higher Education Press, 2021.

	2. Reference books [2] Mechanical CAD/CAM Technology, edited by H. M. Tsai, Mechanical Industry Press, 2009. [3] Mechanical CAD/CAM, edited by Wei Minsheng and Zhu Xilin, Wuhan University of Technology Press, 2001. [4] Mechanical CAD/CAM, Ke Jiyou, Beijing University of Technology Press, 2009. [5] Mechanical CAD/CAM (3rd Edition), Zhou Wei, Higher Education Press, 2021. 3. Web resources [6] China University MOOC website: https://www.icourse163.org [7] Zhihuishu Online Learning Platform: https://www.zhihuishu.com
revision time	July 2024

36. Mechatronic System Integrated Practice

Module name	Mechatronic System Integrated Practice
Module level	Undergraduate
Code	3080201528
Courses	Intensive Practical Training
Semester	Spring Semester
Contact person	Liu Juan
Lecturer	He Linan , Xu Ying
Language	Chinese
Relation to curriculum	compulsory, 6 th semester
Type of Teaching, Contact hours	Lecture, simulation, practice, on-site teaching, discussion method, case study method, 2 study hours/week
Work load	. Total study hours: 126 study hours= Lecture 32 study hours+ Self-study 94 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: approximately 5.9 study hours per week, including pre-class pre-study, post-class practice, and review for exams.

Credit points ETCS	4.5		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	*Principles of Machinery, Mechanical Design*		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	Through comprehensive practical training on mechatronic systems, they will be able to apply the general principles and methods of mechatronic design, and select or design reasonable mechanical engineering equipment by combining them with literature research.	R2

Learning outcomes and their corresponding PLOs	CLO-2 Learning Outcome-2	Through the integrated mechatronics system practice training, the students will be able to analyze and deduce the influence of common factors in the mechanical engineering project research, and study to obtain the optimization of the system. The aim is to create a technologically advanced mechanical engineering structure and to design mechanical engineering equipment that meets specific needs.	R3
	CLO-3 Learning Outcome-3	To be able to select or design technically feasible, economically reasonable, safe and environmentally friendly mechanical engineering works that can meet the needs of industrial production according to the sources of raw and auxiliary materials and the conditions of technical equipment, so as to be able to cope with the ever-changing technological upgrading of the industry and	R6

		changes in policies and markets.	
	CLO-4 Learning Outcome-4	Be able to master and apply engineering management principles and methods, conduct technical and economic analysis of mechanical engineering projects, propose reasonable solutions, and have certain organizational, management and leadership abilities.	R10
Content	This course introduces the methodology and engineering approach to the design of mechatronic systems rather than a specific technology. Emphasis is placed on the interrelationships and interactions between the basic structural elements of mechatronic systems and the methods of matching them. For the introduction of several structural elements, the emphasis is placed on the characteristics, scope of application and selection method of each element, so as to avoid duplication with the contents of other courses. The most representative industrial robots and CNC machine tools in the mechatronics industry are mainly used as the design and analysis objects to introduce the design methods of typical mechatronics systems as well as typical case studies. Knowledge Module 1: Mechanical Technology (Weighting Factor 16/126, level: memorization) Knowledge Module 2: Mechanical Structures Case Study (Weighting Factor 16/126, Level: Understanding - Analysis) Knowledge Module 3: PLC Control Systems (Weighting Factor 16/126, Level: Memorization+ Understanding+ Application) Knowledge Module 4: PLC Case Study (Weighting Factor 24/126,		

	Level: Understanding - Analysis) Knowledge Module 5: CNC Control Systems (Weighting Factor 36/126, Level: Memorization+ Understanding+ Application) Knowledge Module 6: CNC Machine Tool Case Study (Weighting Factor 18/126, Level: Comprehension - Analysis)
Study and examination requirements and forms of examination	The course is evaluated by a combination of process assessment and non-written exam, which comprehensively assesses the completion of the process of the practical project, the application of the theoretical knowledge involved in the project and the ability to master the project. Process assessment of 100 points, accounting for 50% of the total grade, including: ① project to keep hours; ② project quality; ③ project quantity; final exam consists of two parts: 1. the theoretical knowledge related to the project assessment, accounting for 20% of the total grade; 2. the project on-site practical examination, accounting for 30% of the total grade, the practical examination of 90 and above, on behalf of the practical examination passes. Practical examination is a necessary condition for passing the course.
Media employed	Computer, China University MOOC, Wisdom Tree, Rain Classroom, Hengxing Capability Platform, Learning Channel
	[1] Mechatronics System Design, Jiang Peigang, edited by Jiang Peigang, Mechanical Industry Press, 2023, 2nd ed. [2] Mechatronics System Design, edited by Yiyuan Ge and Tianlu Wei, Mechanical Industry Press, 2023. [3] Mechatronics System Design, edited by Yang Junwei, Mechanical Industry Press, 2023. [4] Ma Wenlong. Application of mechatronics technology in agricultural machinery design[J]. China Agricultural Resources and

Reading list	Zoning,2024,45(08):253+266. [5] Lu Rongzhi. Design and stability analysis of mechatronics system of robot mobile platform[J]. Smart China,2024, (11):71-72. [6] Li Shenhai. Design of mechatronics system based on multi-sensor information fusion[J]. China New Technology
	New Technology Products, 2024, (08):40-42. [7] Song Peng. Research on the application of mechatronics technology in mechanical design and manufacturing[J]. Modern Manufacturing Technology and Equipment,2023,59(12):43-45.
revision time	July 2024

37. Mechanical Manufacturing Comprehensive Practice

Module name	Mechanical Manufacturing Comprehensive Practice
Module level	Undergraduate
Code	3080201529
Courses	Intensive Practical Training
Semester	Spring Semester
Contact person	Cui Hongwei
Lecturer	Cui Hongwei, He Linan, Song Yi
Language	Chinese
Relation to curriculum	compulsory , 6 th semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 3 hours/week
Work load	. Total study hours: 112 study hours= Lecture 48 study hours+ Self-study 64 study hours, completed in 16 weeks . Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: 4 study hours per week, including pre-course study, post-course practice, and review and preparation for exams.

Credit points ETCS	4		
Requirements according to	A student must have registered for the course.		
the examination Regulations			
Recommended prerequisites	*Advanced Mathematics*		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	Be able to describe and explain mechanical engineering expertise and be able to solve complex engineering problems based on specialized knowledge in mechanical analysis, design, manufacturing processes, CNC programming and machining, development and modification.	R1

Learning outcomes and their corresponding PLOs	CLO-2 Learning Outcome-2	To be able to apply specialized knowledge in mechanical engineering and related fields to complex engineering and economic problems, taking into account the needs of the community. The program design, structural analysis, process development, etc., is based on social, health, safety, legal and cultural factors, and fully reflects a sense of innovation;	R3
	CLO-3 Learning Outcome-3	To be able to describe and explain the principles of mechanical engineering management, to have project management skills, and to be able to select appropriate management and economic decision-making methods in accordance with the practice of mechanical engineering and related fields;	R10

Content	The practical course "Integrated Mechanical Manufacturing Practice" is an important course for learning and applying mechanical knowledge. Integrated Mechanical Manufacturing Practice can improve students' general ability and develop their problem solving skills; they can better understand mechanical knowledge and apply it to real projects; they can help develop students' sense of creativity and teamwork; they can practice their hands-on and creative abilities by designing, machining, and assembling mechanical models; they can develop students' sense of competition and teamwork; and they can apply the theoretical knowledge they have learned in real projects. Students will be able to apply their theoretical knowledge in real life projects. Knowledge Module 1: Lathe Main Drivetrain Mapping (Weighting Factor 8/48, Level: Memorization+ Understanding+ Application) Knowledge Module 2: Integrated Practice of Turning Processes (Weighting Factor 10/48, Level: Memorization+ Understanding+ Application) Knowledge Module 3: Integrated Practice of Milling Processes (Weighting Factor 10/48, Level: Memorization+ Understanding+ Application) Knowledge Module 4: Comprehensive Practice of the Diversion Process (Weighting Factor 6/48, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Machine Tool Structural Profiling Practice (Weighting Factor 8/48, Level: Memorization+ Understanding+ Application) Knowledge Module 6: Statistical Analysis of Processing Errors (Weighting Factor 6/48, Level: Memorization+ Understanding+ Application)

Study and examination requirements and forms of examination	The course assessment consists of usual grade (50%) and final examination (50%), of which usual grade includes: usual performance 45% + practical operation 55%, and the final examination adopts the form of large-scale homework.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] ZHANG Jingran,LI Xueguang,XU Ying. Comprehensive Reform and Practice of the Teaching of "Basic Mechanical Manufacturing Technology" Course[J] . Education and Teaching Forum,2024,(22):125-128. [2] WANG Huijun, LIU Hu, WANG Kan. Engineering practice-oriented reform of mechanical manufacturing technology course[J] . Modern Agricultural Machinery,2024,(06):94-96.
	[3] Liu Jing,Zhu Hua,Chang Junran,et al. Comprehensive practice of mechanical design [M]. Chongqing University Press:202006.297. [4] Zhu Shuangxia. Mechanical design [M] . Chongqing University Press:201903.351. [5] Zhu Shuangxia,Zhang Honggang. Mechanical Engineering Design[M] . Chongqing University Press:201608.292. [6] Beijing Zhaodi Technology Co. UG NX Quick Start Tutorial [M] . Machinery Industry Publishing House:202008.406.

revision time	July 2024

38. Engineering Simulation Practices

Module name	Engineering Simulation Practice
Module level	Undergraduate
Code	3080201530
Courses	Intensive Practical Training
Semester	Spring Semester
Contact person	Liu Juan
Lecturer	He Linan , Ying Xu
Language	Chinese
Relation to curriculum	compulsory, 6 th semester
Type of Teaching, Contact hours	Lecture, simulation, practice, on-site teaching, discussion method, case study method, 2 study hours/week
Work load	. Total study hours: 112 study hours= Lecture 32 study hours+ Self-study 80 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. Self-study: approximately 5 study hours per week, including pre-course study, post-course practice, and review and preparation for exams.

Credit points ETCS	4		
Requirements according to the examination Regulations	A student must have registered for the course.		
Recommended prerequisites	*3D Modeling Design Practice Practice of Mechanical CAD/CAM Technology*		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	Ability to apply the basic principles of SolidWorks software and mechanical engineering disciplines. Simulation and analysis of problems in the field of mechanics, and analysis of general engineering problems in the field of mechanical engineering in the areas of design, manufacture, development,	R2

Learning outcomes and their corresponding PLOs		and applied research of products and equipment, etc. through literature research, and obtaining valid conclusions.	
	CLO-2 Learning Outcome-2	To be able to demonstrate the actual motion of a mechanism, to use the laws of motion of a mechanism to deduce the forces on a mechanism at rest or in operation, and finally to propose improvements to the model of the mechanism and further optimization of the design based on the data analyzed and studied.	R3
	CLO-3 Learning Outcome-3	To be able to analyze and compare practical activities and solutions to complex problems in the field of mechanical engineering, and to select or design technically feasible, economically rational, safe and environmentally friendly mechanical structures to meet the needs of industrial production.	R6

	CLO-4 Learning Outcome-4	Be able to apply engineering management principles and methods to conduct technical and economic analyses of mechanical engineering projects; propose reasonable solutions and have a certain degree of organization. Organizational, managerial and leadership skills.	R10
Content	This course is a specialized basic course for mechanical engineering majors, providing a comprehensive and systematic introduction to making Processes, methods and techniques of product motion simulation and finite element analysis with SolidWorks software The content includes SolidWorks Motion module animation, basic motion and Motion analysis, SolidWorks Simulation module finite element analysis overview, analysis flow, mesh control, contact type, symmetry setting, shell unit, beam unit, hybrid unit, and comprehensive examples of motion simulation and analysis, etc. The course aims to develop students' ability to solve engineering problems by using simulation technology. The course focuses on cultivating students' ability to solve engineering problems by using simulation technology. Through systematic study of the simulation modules of SolidWorks software, the course helps students to master the key skills of modern engineering analysis. Knowledge Module 1: Overview of SolidWorks Motion (Weighting Factor 7/112, Level: Memorization) Knowledge Module 2: Fundamentals of SolidWorks Motion Simulation (Weighting Factor 14/112, Level: Memorization+		

	Understanding+ Application) Knowledge Module 3: Overview of SolidWorks Simulation (Weighting Factor 14/112, Level: Recall) Knowledge Module 4: SolidWorks Simulation Finite Element Analysis (Weighting Factor 21/112, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Grid Control (Weighting Factor 17.5/112, Level: Understanding - Analyzing) Knowledge Module 6: Exposure Settings (Weighting Factor 17.5/112, Level: Understanding - Analysis) Knowledge Module 7: Symmetrical and Self-Balancing Assemblies (Weighting Factor 14/112, Level: Memorization+ Understanding+ Application) Knowledge Module 8: Grid Types (Weighting Factor 7/112, Level: Memorization+ Understanding+ Application)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and final examination (50%), of which the process assessment includes: project time +40% + project quality 30% + project quantity 30%, the final examination includes project-related theoretical knowledge assessment and project site practice assessment.
Media employed	Computer, China University MOOC, Wisdom Tree, Rain Classroom, Hengxing Capability Platform, Learning Channel
Reading list	[1] SOLIDWORKS Simulation basic tutorial (2018 edition), Chen Chaoxiang, Hu Qideng editors, Machinery Industry Press, 2020.

	[2] SOLIDWORKS 2018 Chinese version mechanical design from beginner to proficient, Hu Renxi and other editors, mechanical industry press, 2019 [3] Li Huimin. Simulation design of industrial robot palletizing based on SolidWorks[J]. Modern Information Science,2024,8(22):194-198. [4] XU Yingmei, FAN Yichen, YANG Zirun. Design of intelligent washing machine based on SolidWorks[J]. Science and Technology Innovation and Productivity,2024,45(11):110-112. [5] YAO Zhifeng, SHI Jing. Investigation and practice of three-dimensional modeling of industrial robots based on SolidWorks [J]. China Machinery, 2024, (31):39-42. [6] Wang HM. Mechanical structure design technology of crane combined with SolidWorks and mechanical simulation[J]. Mechanical Management Development,2024,39(10):122-124. [7] Meng Na. Structural design and motion simulation of a new type of lock body based on SolidWorks[J]. Automotive Journal, 2024, (06):92-94.
revision time	July 2024

39. Mechanical Engineering Production Internship

Module name	Mechanical Engineering Production Internship
Module level	Undergraduate
Code	3080201531
Courses	Intensive Practical Training
Semester	Fall Semester
Contact person	Wang Haitao
Lecturer	Wang Haitao, He Linan, Feng Yunhao, Li Yuezhen
Language	Chinese
Relation to curriculum	compulsory, 7 th semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 2 study hours/week
Work load	. Total study hours: 112 study hours= Lecture 32 study hours+ Self-study 80 study hours, completed in 16 weeks . Lecture: 2 study hours per week, including lecture, discussion and questions. . Self-study: 5 study hours per week, including pre-course study, post-course practice, and review and preparation for exams.

Credit points ETCS	4		
Requirements according to	A student must have registered for the course.		
the examination Regulations			
Recommended prerequisites	*Mechanical Engineering Design*		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	To develop students' ability to apply their knowledge to the comprehensive design of machining process regulations. Students will be able to apply basic knowledge and professional knowledge to comparatively analyze the influencing factors and constraints of mechanical engineering problems, and be able to select and optimize various	R1

Learning outcomes and their corresponding PLOs		technological solutions and propose feasible solutions.	
	CLO-2 Learning Outcome-2	To broaden students' horizons and develop their ability to select and design manufacturing and process equipment. To acquire the required literature and conduct scientific research, to develop students' design consciousness and innovative thinking, to improve students' ability to analyze and solve practical problems independently, and to develop students' basic practical skills in document editing, written expression, oral expression, computer application, and so on.	R3

	CLO-3 Learning Outcome -3	To develop students' ability and methodology to connect theory with practice, to investigate and research, to observe and analyze problems and to solve them in production practice.	R4
	CLO-4 Learning Outcome-4	Students learn about industry laws and regulations, develop the professionalism to work independently and communicate well, and are trained to analyze social, health, safety, legal, cultural, and environmental factors in their internships. Students will be able to understand and evaluate the impact of professional engineering practice on environmental and social sustainability in response to complex engineering problems.	R6

Content	This course is an important practical teaching activity for students to learn about enterprises and to link theory to practice. It is a practical link for the basic training of the theory and skills of the specialty, and it is a practice and test of the comprehensive quality of the students' professional knowledge, ability and personality, and it is also a comprehensive practical teaching link in the program of professional training. This course is a compulsory practical course for mechanical engineering majors. Its purpose is to consolidate the theoretical knowledge learned, and make the theory closely combined with the production practice, to improve the understanding of this specialty, and to lay the necessary foundation for the subsequent professional classroom learning. The task is to be familiar with the processing of parts and the main process equipment, familiar with the production drawings, technical documents, standards and norms, to understand the method of technological innovation in the production, and to cultivate the ability to think independently and to analyze and solve problems. Learn the procedures of factory production, organization, and management. Knowledge Module 1: Fundamentals of Machining (Weighting Factor 8/32, Level: Comprehension+ Application) Knowledge Module 2: Machining Processes (Weighting Factor 8/32, Level: Understanding+ Application) Knowledge Module 3: Processing Lines (Weighting Factor 8/32, Level: Understanding+ Application) Knowledge Module 4: Production Management (Weighting Factor 8/32, Level: Understanding+ Application)
Study and	

examination requirements and forms of examination	The course assessment includes process assessment (50%) and non-written exam (50%), of which the process assessment includes: 20% of the project guarantee time + 40% of the project quality + 40% of the project quantity; the result assessment is a practical assessment.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	. Ling, C.J. . General Knowledge of Work Safety [M] . Beijing: Machinery Industry Press, August 2012. . Park Changli . Cultivation of Professional Ethics for Professional and Technical Personnel [M]. Xi'an: Xi'an University of Electronic Science and Technology Press, June 2012. . Wang, L. T. . Advanced Manufacturing Technology[M] . Beijing: Machinery Industry Press, August 2020. . Li Zhen, Yu Xinjie, Zhu Guiping, Dong Jiajia, Wang Jia. Practicing the educational concept of "three-in-one" in production internship[J] . Experimental Technology and Management, 2020, 37 (03): 196-199. . Yu Microwave, Liu Keping. Stimulating education in production internship teaching[J] . Laboratory Research and Exploration, 2011, 30 (10): 365-367. . Wisdom Tree . Factory production labor education [EB/OL].2022-08-15] . https://coursehome.zhihuishu.com/courseHome/1000066473#teachTeam . China University MOOC website . Automated production line installation and commissioning [EB/OL].2022-08- 15] .

	https://www.icourse163.org/course/DKY-1003787004?from=searchPage&outVendor=zw_mooc_pcssjg_
revision time	July 2024

40. Comprehensive practice in non-standard machining

Module name	Comprehensive practice of non-standard processing
Module level	Undergraduate
Code	3080201532
Courses	Intensive Practical Training
Semester	Fall Semester
Contact person	Cui Hongwei
Lecturer	Cui Hongwei,Jin Shun
Language	Chinese
Relation to curriculum	compulsory , 7 th semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 3 hours/week
Work load	. Total study hours: 112 study hours= Lecture 48 study hours+ Self-study 64 study hours, completed in 16 weeks . Lectures: 3 hours per week, including lectures, discussions and questions. . Self-study: approximately 4 study hours per week, including pre-class pre-study, post-class practice, and review and preparation for exams.

Credit points ETCS	4		
Requirements	A student must have registered for the course.		
according to the examination Regulations			
Recommended prerequisites	*Mechanical Manufacturing Comprehensive Practice*		
	Course Learning Outcome (CLO)	**Description**	**Supported Programme Learning Objective (PLOs)**
	CLO-1 Learning Outcome-1	Ability to identify literature research, professional synergies, and analyze complex problems in mechanical engineering and related fields to obtain valid and reasonable conclusions.	R2

Learning outcomes and their corresponding PLOs	CLO-2 Learning Outcome-2	The ability to remember the implementation of specific research programs and engineering practices, and to reasonably interpret problems that arise during implementation in relation to the scientific objectives, and to draw reasonable and valid conclusions that can be applied to engineering practices.	R4
	CLO-3 Learning Outcome-3	Be able to analyze the impacts of mechanical engineering and related practices on sustainable development, and be able to use scientific evaluation methods to analyze the impacts of engineering practices on environmental and social sustainability in the practice of mechanical engineering and related fields.	R6

		The concept of sustainable development can be integrated into engineering practice.	
	CLO-4 Learning Outcome-4	They are capable of independent and lifelong learning, understanding the cutting-edge dynamics and development trends in mechanical engineering and related fields, possessing a strong understanding of technology, economics, management, law and information, and having the ability to analyze and solve problems in a comprehensive manner.	R11
	The practical course "Comprehensive Practice of Non-standard Machining" is an important course for learning and applying mechanical knowledge. The main contents of this course include the basic knowledge of non-standard machining production, the performance and operation method of main equipment, the setting, organization, management and guarantee of production practice, and the practical operation of main positions. Through the study of this course, students can understand the production knowledge of non-standard processing, the operation skills of the main positions and the basic knowledge of production management, and lay a foundation for graduation internship and graduation design.		

Content	Knowledge Module 1: Introduction (Weighting Factor 2/48, Level: Memorization+ Understanding) Knowledge Module 2: Common Machine Tools and Cutting Tools (Weighting Factor 4/48, Level: Memorization+ Understanding+ Application) Knowledge Module 3: General Knowledge and Productive Skills for Operators (Weighting Factor 16/48, Level: Recall+ Understanding+ Application) Knowledge Module 4: Basic General Knowledge and Productive Skills for Mechanics (Weighting Factor 4/48, Level: Memorization+ Understanding+ Application) Knowledge Module 5: Programmer's Basic Knowledge and Production Skills (Weighting Factor 8/48, Level: Memorization)
	+(Understanding + applications) Knowledge Module 6: Basic General Knowledge and Productive Skills for QCs (Weighting Factor 4/48, Level: Memorization+ Understanding+ Application) Knowledge Module 7: General Knowledge and Production Skills for Craftsmen (Weighting Factor 10/48, Level: Recall+ Understanding+ Application)
Study and examination requirements and forms of examination	The course assessment consists of process assessment (50%) and final practical examination (50%), of which the process assessment includes: unit test 40% + post-course homework 30% + classroom participation 30%, and final practical examination of 100 minutes.

Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
Reading list	[1] Dang Xiaoxue. Modularized design of non-standard automation equipment[J]. China Machinery,2024, (27):25-28. [2] Liu Peng Overlook. Analysis of multi-point clamping mechanism in non-standard automation equipment[J]. Specialty Vehicles,2024, (09):116-118. [3] LIU Jing, ZHU Hua, CHANG Junran, et al. Comprehensive practice of mechanical design [M]. Chongqing University Press:202006.297. [4] Zhu Shuangxia. Mechanical design [M]. Chongqing University Press:201903.351. [5] Zhu Shuangxia,Zhang Honggang. Mechanical Engineering Design [M]. Chongqing University Press:201608.292. [6] Beijing Zhaodi Technology Co. UG NX Quick Start Tutorial [M]. Machinery Industry Publishing House:202008.406.
revision time	July 2024

41. Mechanical Engineering Graduation Internship

Module name	Mechanical Engineering Graduation Internship
Module level	Undergraduate
Code	3080201533
Courses	Intensive Practical Training
Semester	Spring Semester
Contact person	Wang Haitao
Lecturer	Wang Haitao, He Linan, Feng Yunhao, Li Yuezhen
Language	Chinese
Relation to curriculum	compulsory, 8 th semester
Type of teaching, contact hours	Lecture, demonstration, simulation, practice, on-site teaching, discussion method, case study method, 2 study hours/week
Work load	1. Total study hours: 112 study hours= 32 study hours of lecture+ 80 hours of self -study, to be completed in 16 weeks. 2. Lectures: 2 study hours per week, including lectures, discussions and questions. 3. Self-study: 5 hours per week, including pre-course study, post-course exercises, review and preparation for examinations.

Credit points ETCS	4		
Requirements according to the examination	A student must have registered for the course.		
Regulations			
Recommended prerequisites	Mechanical Engineering Production Internship		
Learning	**Course Learning Outcome (CLO) Course learning outcomes, recommended 3-4**	**Description**	**Supported Programme Learning Objective (PLOs) Supported graduation objectives**
	CLO-1 Learning Outcome-1	Apply the theoretical knowledge learned in the classroom to the actual production and deepen the understanding of professional knowledge. According to the internship experience The internship report should include the introduction of	R1

outcomes and their corresponding PLOs		the internship organization, the description of the internship position, the content of the internship, the internship gain and experience, etc., so as to reflect the results of the internship and the growth of oneself.	
	CLO-2 Learning Outcome-2	Students are encouraged to identify problems, solve them, and try to come up with innovative solutions during the internship.	R3
	CLO-3 Learning Outcome-3	To fulfill the tasks arranged by the company, including job practice, project participation and technical learning. They learn to use the skills and methods of operation in the field of mechanical engineering.	R4

	CLO-4 Learning Outcome-4	Cultivate students' professional qualities, including hard work, excellence, dedication, honesty and trustworthiness. The Government of the People's Republic of China is committed to the development of a spirit of cooperation, as well as the ability to work in a team and to communicate and coordinate with others.	R7
Content	This course is an important practical teaching activity for students before graduation, a basic practical link for graduation design and successful employment, a practice and test of students' professional knowledge, ability, personality and other comprehensive qualities, as well as a necessary practical link in the professional training program. Sections. This course is designed to enable students to understand and master the basic production knowledge of related industries and enterprises, and to print and distribute the information in the form of a booklet, a booklet, and a booklet. The internship is to prove, consolidate and enrich the contents of the basic courses of professional technology and professional courses, cultivate the students to link theory with practice, improve their ability and methods of investigation and research, observation, analysis and problem solving in production practice, and pave the way for the subsequent employment. Through the graduation internship, students		

	should also understand the production mode and management mode of modern enterprises, and cultivate the idea of loving their specialty, repaying the society and serving the country. Knowledge Module 1: Pre-service Training (Weighting Factor 2/32, Level: Understanding+ Application) Knowledge Module 2: Job Placement (Weighting Factor 28/32, Level: Understanding+ Application) Knowledge Module 3: Assessment (Weighting Factor 2/32, level: understanding+ application)
Study and examination requirements and forms of examination	The course assessment includes process assessment (50%) and non-written exam (50%), of which the process assessment includes: 20% of the project guarantee time + 40% of the project quality + 40% of the project quantity; results assessment includes Including: Theory 40% + Practical 60%.
Media employed	Computers, online website, Hengxing Capability Platform, Chaoxing Learning Platform
	[1] Ling, C.J.. General Knowledge of Work Safety [M]. Beijing: Machinery Industry Press, August 2012. [2] Park, Chang-li. A Course on Professional and Technical Personnel's Cultivation of Professional Ethics [M]. Xi'an: Xi'an University of Electronic Science and Technology Press, June 2012. [3] Wang Longtai. Advanced Manufacturing Technology [M]. Beijing: Mechanical Industry Press, August 2020.

Reading list	[4] Li Zhen, Yu Xinjie, Zhu Guiping, Dong Jiajia, Wang Jia. Practicing the concept of "three-in-one" education in production internship[J]. Experimental Technology and Management, 2020, 37 (03): 196-199. [5] Yu Microwave, Liu Keping. Stimulating education in production internship teaching[J]. Laboratory Research and Exploration, 2011, 30 (10): 365-367. [6] Wisdom Tree. Factory production labor education [EB/OL].2022-08-15]. https://coursehome.zhihuishu.com/courseHome/1000066473#teachTeam [7] China University MOOC Website. Automated production line installation and commissioning [EB/OL].2022-08-15] . https://www.icourse163.org/course/DKY- 1003787004?from=searchPage&outVendor=zw_mooc_pcssjg_
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