Module Descriptions

Contents

Module Descriptions - General Education 1

Ideological and Moral Cultivation and Legal Basis 2

Outline of Modern Chinese History 11

Basic Principles of Marxism 24

Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics 40

Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era 51

Situation and Policy (1) - (8) 69

National Security Education 74

Military Theory for College Students 85

Practical Writing 93

Mental Health Education for College Students 100

University Physical Education and Health (1) 107

University Physical Education and Health (2) 117

University Physical Education and Health (3) 126

University Physical Education and Health (4) 137

Introduction to Artificial Intelligence 148

Career Development and Employment Guidance for College Students (1) 156

Career Development and Employment Guidance for College Students (2) 164

Basics of Innovation and Entrepreneurship 171

Module Descriptions - Foreign language 184

College English (1) 185

College English (2) 192

College English Extension Series (1) 200

College English Extension Series (2) 207

Module Descriptions - Mathematics and physics basics 215

Advanced Mathematics A(1) 216

Advanced Mathematics A(2) 224

Linear Algebra 232

Probability Theory and Mathematical Statistics 239

Functions of Complex Variables 246

College Physics (1) 252

College Physics (2) 259

College Physics Experiment 266

Module Descriptions - Engineering basics 273

C Language Programming A 274

Circuit Analysis 293

Data Structure A 304

Analog Electronic Technology 319

Digital Electronic Technology 332

Signals and Systems 342
Communication Fundamentals 355
Module Descriptions - Engineering application 367
PCB Design and Drawing 368
C++ Programming Language 376
High Frequency Electronic Circuits 388
Digital Signal Processing 399
Principle and Application of Microcontroller 411
STM32 Electronic System Design and Engineering Application 423
Robot Development 435
FPGA Principles and Applications 446
Principles and Applications of Embedded Systems 460
Module Descriptions - Centralized practice 473
Labor education for college students 474
Admission Education and Military Training 481
Social Practice and Volunteer Service 486
Metalworking Practice A 491
Electronic and Electrical Practice A 500
Electronics Technology Internship and Electronic Product Assembly and Debugging Internship 505
Analog Unit Circuit Simulation and Development Comprehensive Practical Training Internship 512
Digital Unit Circuit Simulation and Development Comprehensive Practical Training Internship 519
Microcontroller System Comprehensive Practical Training Internship 527
Electronic System Engineering Practical Training Internship 534
Embedded System Comprehensive Practical Training Internship 541
Graduation Internship 548
Module Descriptions - Graduation thesis/design 554
Graduation Comprehensive Training 555
Module Descriptions - Autonomous development(optional) 562

Module Descriptions - General Education

Ideological and Moral Cultivation and Legal Basis

Competence field	General Education
Curriculum designation	Ideological and Moral Cultivation and Legal Basis
Curriculum code	9123311011
Semester(s) in which the curriculum is taught	1st Semester
Person responsible for the curriculum	Lihong Jiang
Lecturer	Lihong Jiang, Peng Zhang
Language	Chinese
The relationship between the curriculum and the major	"Ideological and Moral Cultivation and Legal Basis" is one of the compulsory general education courses for the electronic information engineering major. Through the theoretical and practical teaching of this course, students are helped to form lofty ideals and beliefs, promote great patriotism, establish correct outlook on life and values, point out the right direction for students of this major to serve society and benefit mankind, establish engineering ethics, data privacy and social responsibility, and define the boundaries of technology application with the concept of the rule of law and professional ethics. Ensuring that innovation is on a safe and compliant track and preventing the abuse of technology is an essential core quality for outstanding engineers.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theoretical teaching + practical teaching Teaching hours (Contact hours): 48 hours Among them: Theoretical instruction: 40 class hours Practical teaching: 8 hours Class size: 4 classes with 160 students
Workload	Total workload = 92 class hours; Contact hours = 48 hours; Self-study hours = 44 hours;
Credit points (ECTS)	3.1
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	no
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to help students form lofty ideals and beliefs, promote great patriotism, establish correct outlook on life and values, strengthen ideological and moral cultivation, enhance the consciousness of learning and applying the law, and comprehensively

	improve the ideological and moral quality, behavioral cultivation and legal literacy of college students. The specific goals include: **Knowledge:** And have a deep understanding of patriotism, the establishment of a correct outlook on life and values, the firm establishment of socialist core values, and the cultivation of good ideological and moral qualities, behavioral cultivation and legal literacy. **Skills:** Enhance the ability to recognize, analyze and solve problems using Marxist positions, perspectives and methods, and fasten the buttons of life. Strengthen ideological and moral cultivation, enhance the consciousness of learning and applying the law, and comprehensively improve the ideological and moral quality, behavioral cultivation and legal literacy of college students. **Ability:** Form lofty ideals and beliefs after theoretical study and practical experience, promote the great spirit of patriotism, establish correct outlook on life and values, firmly establish the core socialist values, cultivate good ideological and moral qualities and legal qualities, and further enhance the ability to distinguish right from wrong, good from evil, beauty from ugliness and self-cultivation; Have a professional spirit of dedication to one's job, abide by professional ethics and behavioral norms, and have a sense of social responsibility and commitment.
Contents	**Theoretical instruction (40 contact hours, 32 self-study hours)** Introduction to Shouldering the Great Rejuvenation and Becoming a New Person of The Times (4 theoretical hours, 2 self-study hours) 1. We are in a new era of socialism with Chinese characteristics 2. The new era calls for new people of The Times who will shoulder the great responsibility of national rejuvenation 3. Continuously enhance ideological and moral qualities as well as legal literacy Chapter 1: Understanding the Truth of Life and Grasping the Direction of Life (4 theoretical hours, 2.5 self-study hours) 1. Outlook on life is a general view of life 2. A correct outlook on life 3. Create a meaningful life Chapter 2: Pursuing Great Ideals and Firm Beliefs (6 Theoretical hours, 3 Self-study hours) 1. The connotation and importance of ideals and beliefs 2. Firm faith, belief and confidence 3. Fly your youthful dreams in the practice of realizing the Chinese Dream

	Chapter 3: Inheriting Fine Traditions and Promoting the Chinese Spirit (6 Theoretical hours, 2.5 Self-study hours) 1. The Chinese spirit is the soul of rejuvenating and strengthening the country 2. Be a loyal patriot of the new era 3. Let reform and innovation be the driving force for the voyage of youth Chapter 4: Defining Value Requirements Practicing Value Standards (4 Theoretical hours, 7.5 Self-study hours) 1. The common value pursuit of all the people 2. Notable features of the core socialist values 3. Actively practice the core socialist values Chapter 5: Adhering to Moral Norms and Cultivating Moral Character (8 theoretical hours, 2.5 Self-study hours) 1. Core and Principles of Socialist morality 2. Absorb and draw on excellent moral achievements 3. Engage in moral practice of virtue and goodness Chapter 6: Learning the Rule of Law Thought to Enhance Legal Literacy (8 Theoretical hours, 12 Self-study hours) 1. Characteristics and Operation of Socialist law 2. Upholding the rule of law in all respects 3. Uphold the authority of the Constitution 4. Be conscious of respecting, learning, abiding by and applying the law **Practical teaching (8 contact hours , 12 self-study hours)** The practical activity for this semester is: "Red Yiyang" College Students' Commentary Competition
Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Assignments (20%) : Online assignments. 3. Practical Assignment (10%) : Video shooting for the "Red Yiyang" College Students' Commentary Competition. 4. Final Assessment (60%) : Final examination.
Media employed	Multimedia computers, projectors

Reading list	1. Textbooks [1] Compilation Group. Ideological and Moral Cultivation and Legal Basis [M]. Beijing: Higher Education Press, 2023. 2. Reference book [1] Marx K, Engels F. Collected Works of Marx and Engels[M]. Beijing: People's Publishing House, 1995. [2] General Office of the CPC Central Committee. Opinions on Cultivating and Practicing the Core Socialist Values[N]. Beijing: People's Publishing House, 2014. [3] J. Xi. Xi Jinping: The Governance of China, Volume II[M]. Beijing: Foreign Languages Press, 2017. [4] Z. Mao. Selected Works of Mao Zedong, Volume II[M]. Beijing: People's Publishing House, 2006. [5] National People's Congress of the People's Republic of China. Constitution of the People's Republic of China[S]. Beijing: People's Publishing House, 2018. [6] Characteristics for a New Era[M]. Beijing: Learning Press; People's Publishing House, 2018. [7] J. Xi. Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era: Report to the 19th National Congress of the Communist Party of China[N]. Beijing: People's Publishing House, 2017.

“Ideological and Moral Cultivation and Legal Basis” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
Introduction to Shouldering the Great Responsibility of Rejuvenation and Becoming New people of The Times	1.We are in a new era of socialism with Chinese characteristics 2.The new era calls for new people of The Times who will shoulder the great responsibility of national rejuvenation 3.Constantly improve ideological and moral qualities and legal literacy	4	2	Learning Pass Watch videos and courseware, complete exercises (2 class hours)	Exercise grading

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Chapter 1 Understanding the True Meaning of Life Grasping the Direction of Life	1.One's outlook on life is the overall view of life 2. A correct outlook on life 3. Create a meaningful life	4	2.5	1. Complete the life coordinate map. (0.5 class hours) 2. Learning Pass Watch videos and courseware, complete exercises (2 hours)	1. Class sharing 2. Exercise correction
Chapter 2 Pursuing Lofty Ideals Firm Beliefs	1.The connotation and importance of ideals and beliefs 2.Firm faith, belief and confidence 3.Fly your youthful dreams in the practice of realizing the Chinese Dream	6	3	1. Complete the following thought-provoking question: What do you think of the view that "ideals are too far away, just enjoy the present"? Are personal ideals and social ideals a paradox? How do you think college students should realize their ideals? Some people think that the younger generation in China has no faith. What do you think? (1 class hour) 2. Learning Pass Watch videos and courseware and complete exercises (2 hours)	1. Ask questions in class 2. Exercise correction

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Chapter 3 Inheriting Fine Traditions and Promoting the Chinese Spirit	1.The Chinese spirit is the soul of rejuvenating and strengthening the country 2. Be a loyal patriot of the new era 3. Let reform and innovation be the driving force for the voyage of youth	6	2.5	1. Read the article "Where is the Chinese Spirit? We Must Figure it out!" published in People's Daily Then discuss in groups. (0.5 hours) 2. Learning Pass Watch videos and courseware, complete exercises (2 hours)	1. Random sharing in class 2. Exercise correction
Chapter 4 Clarifies Value Requirements Practice Value criteria	1. The common value pursuit of all the people 2. Notable features of the core socialist values 3. Actively practice the core socialist values	4	7.5	1. Work in groups to complete "micro-photos" that embody the core socialist values at the individual level (5.5 class hours) 2. Watch videos and courseware on Learning Pass and complete exercises (2 hours)	1. Group presentation in class 2. Exercise correction
Chapter 5 Adhering to Moral Norms and Cultivating Moral Character	1.Core and Principles of Socialist morality 2.Absorb and draw on excellent moral achievements 3.Engage in moral practice of virtue and goodness	8	2.5	1. Group Talk about the moral models in my mind (0.5 class hours) 2. Learning Pass Watch videos and courseware and complete exercises (2 hours)	1. Random sharing in class 2. Exercise correction

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Chapter 6 Learning the Rule of Law Ideology to Enhance Legal Literacy	1.Characteristics and Operation of Socialist law 2. Upholding the rule of law in all respects 3. Uphold the authority of the Constitution 4. Be conscious of respecting, learning, abiding by and applying the law	8	12	1. Self-study of the Criminal Law and the Civil Code (10 hours) 2. Watch videos and courseware on Learning Pass and complete exercises (2 class hours)	1. Random questions in class 2. Exercise correction
(Theoretical Instruction) Tips		40	32		
Practical teaching					
Red Yiyang Commentary Competition	"Red Genes in Yiyang" Hunan City University's second "Red Yiyang" College Student Commentary Competition	8	12	Search for materials, determine the theme, go deep into society, search for Yiyang citizens who inherit and practice the spirit of red culture, record the red genes passed down from generation to generation by Yiyang people with the camera, and make them into teaching micro-videos (5-10 minutes) to participate in the competition (12 class hours)	Presentation of the micro-video works

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
(Practical Teaching) Tips		8	12		
Total		48	44	Total hours = 92 hours	
Credits (ECTS)		3.1			

Outline of Modern Chinese History

Competence field	General Education
Curriculum designation	Outline of Modern Chinese History
Curriculum code	9124311041
Semester(s) in which the curriculum is taught	2nd Semester
Person responsible for the curriculum	Fengjiao Peng
Lecturer	Yongqing Yi, Cuijiao Zhou
Language	Chinese
The relationship between the curriculum and the major	Outline of Modern Chinese History is a compulsory core course of ideological and political theory for undergraduate students in higher education institutions as determined by the Opinions on Further Strengthening and Improving Ideological and Political Theory Courses in Higher Education Institutions issued by the Publicity Department of the Central Committee of the Communist Party of China and the Ministry of Education in 2005 and its implementation plan. This course is an excellent course of ideological and political theory in Hunan Province and a first-class undergraduate course of blended online and offline teaching in Hunan Province. It aims to cultivate students' ability to study the development process of modern and contemporary Chinese history and its basic laws by applying the positions, viewpoints and methods of dialectical materialism and historical materialism, and to improve students' ability to identify, analyze and solve problems. To lay a solid foundation for students' subsequent study of ideological and political theory courses; Teach students to understand national history and conditions, to deeply understand the historical inevitability of the "Four choices", and to understand the reason that "why the Communist Party of China can succeed, why socialism with Chinese characteristics is good, ultimately it is Marxism that works, it is Sinicized and modernized Marxism that works".
Teaching methods, number of teaching hours	Target students: Students majoring in electronic information Engineering Teaching method: Theoretical teaching + practical teaching Teaching hours (Contact hours): 48 hours Among them: Theoretical instruction: 40 hours Practical teaching: 8 hours Class size: 4 classes with approximately 160 students
Workload	Total workload =86 class hours; Contact hours =48 hours; Self-study hours =38 hours;

Credit points (ECTS)	2.9
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Ideological and Moral Cultivation and Legal Basis
Curriculum objectives /expected learning outcomes	**Learning outcomes:** Through theoretical teaching, guided by Marxism, educate students to understand the development process and basic laws of modern and contemporary Chinese history, deepen their understanding of China's national conditions, grasp the historical inevitability of the "four choices", and enhance their sense of historical responsibility to devote themselves to the great cause of realizing the Chinese Dream of the great rejuvenation of the Chinese nation. **Knowledge:** This course, through thematic teaching of modern and contemporary Chinese history, is divided into five topics: basic conditions of modern China, history and the people chose Marxism, history and the people chose the Communist Party of China, history and the people chose the socialist path, history and the people chose reform and opening up, etc., to help students understand national history and conditions. Deeply understand the historical inevitability of the "four choices", deeply understand why the Communist Party of China can, why Marxism works, and why socialism with Chinese characteristics is good, and be more determined to strive unremittingly for the great rejuvenation of the Chinese nation under the strong leadership of the Communist Party of China. **Skills:** 1. Teach students to master the basic content and thread of the development of modern and contemporary Chinese history through the study of major events, figures, economic and cultural changes in modern Chinese history, and to grasp the internal logic of the development of modern and contemporary Chinese history. 2. Develop students' ability to analyze and solve fundamental problems in modern and contemporary Chinese history using Marxist theories related to dialectical materialism and historical materialism, and enhance students' literacy in the humanities and social sciences. **Ability:** 1. In practical teaching, the core is to cultivate the socialist core values of college students. In the form of activities such as the micro-theater creation and display activities of our school 'Five micro' practical teaching model and the provincial college students' research-based learning competition, students are educated to inherit and carry forward the traditions of patriotism and revolution. Carry forward the national spirit with patriotism at its core and the spirit of

	The Times with reform and innovation at its core. 2. Learn about cutting-edge academic achievements and related theoretical research, and develop problem awareness through analysis and discussion of relevant issues; Learn to apply the basic principles of Marxism to analyze and evaluate historical events and figures, and improve the ability to analyze and solve problems. 3. Through the exploration of the laws and characteristics of the development of modern and contemporary Chinese history, cultivate students' patriotic feelings and sense of responsibility, and promote the core socialist values.
Contents	**Theoretical instruction (40 contact hours, 30 self-study hours)** Topic 1: The Basic National Conditions of Modern China (6 contact hours, 4 self-study hours) Teaching content: 1. China and the World Before the Opium War (1) China before the Opium War ----- from glory to decline (2) The world before the Opium War 1840: From Backwardness to rise (3) Western Invasions and the semi-colonial and semi-feudal nature of modern Chinese society (4) The principal contradiction and historical mission of modern China 2. Aggression against China by capital-imperialism (1) What exactly did the invasion of capitalism and imperialism bring to China? (2) How do you view the impact of imperialist aggression on China's social development? 3. The Chinese nation's struggle against Aggression and its failures (1) The course of the struggle against foreign aggression (2) The significance of the anti-aggression struggle in modern China (3) The reasons and lessons learned from the failures of previous anti-aggression wars Topic 2: History and the People Chose Marxism (10 contact hours, 6 self-study hours) Teaching content: 1. Various plans to save the country (1) Themes of Modern Chinese History: Saving the nation from peril and rejuvenating China (2) The Awakening of National Consciousness and "Open Eyes to the World" (3) The Chinese have gone through a deep process from the material level to the institutional level and then to the ideological level when learning from the West to seek the truth of saving the country

	(4) The skepticism and reservation of Western capitalist thought by China's advanced elements (5) The bourgeois nation-building plan failed to save China, and China needed a "third civilization" above capitalist civilization 2. The Impact of the October Revolution and the Spread of Marxism in China (1) The implications of the victory of the October Revolution for China's anti-aggression Struggle (2) Marxism adapted to the realistic needs of modern China's salvation and survival (3) The advanced Chinese raised the banner of Marxism (4) The May Fourth Movement: The Combination of Marxist Theory and the Chinese Workers' Movement (5) The Early Marxist thought Movement in China (6) The birth of the Communist Party of China, a new revolutionary party of the working class under the guidance of Marxist-Leninist revolutionary theory 3. The Process of Sinicization of Marxism (1) Why must Marxism be Sinicized? (2) The proposition of Sinicization of Marxism (3) The historical process and theoretical achievements of the Sinicization of Marxism (4) The historical significance of China's choice of Marxism and its commitment to advancing the Sinicization of Marxism Topic 3: History and the People's Choice of the Communist Party of China (10 contact hours, 10 self-study hours) Teaching content: 1. The exploration of the way out for the state by each class (1) The exploration of the peasant class (2) The exploration of the self-strengthening faction of the landlord class (3) Explorations by the bourgeois Reformists (4) Explorations by bourgeois revolutionaries 2. The founding of the Communist Party of China (1) The founding of the Communist Party of China was an objective requirement of the development of the Chinese revolution (2) The Communist Party of China is the product of the combination of the Chinese Workers' Movement and Marxism-Leninism (3) The founding of the Communist Party of China Iii. The New Democratic Revolution Led by the Communist Party of China (1) The First Cooperation between the Kuomintang and the Communist Party and the Great Revolution

	(2) Agrarian Revolutionary Wars and the Long March (3) The Second Cooperation between the Kuomintang and the Communist Party and the Chinese Nation's War of Resistance against Japanese Aggression 4. The War of Liberation and the founding of the People's Republic of China Without the Communist Party of China, there would be no New China (1) From the fight for peace and democracy to the self-defense War (2) The Nationalist government was surrounded by the entire nation (3) The formation of a pattern of multi-party cooperation and political consultation led by the Communist Party of China (4) The founding of the People's Republic and the establishment of the ruling position of the Communist Party of China were the choice of history and the people Topic 4: History and the People Chose the Socialist Path (2 contact hours, 2 self-study hours) Teaching content: 1. The bankruptcy of the Third Way after the victory of the War of Resistance (1) The emergence of the Third Way (2) Bankruptcy of the Third Way (3) The historical role of the Third Way (4) Political Implications of the Third Way 2. Only socialism can save China (1) The spread of socialist thought in China (2) Three Debates on socialist thought (3) Socialism is the historical choice of the Chinese people (4) China cannot pursue democratic socialism Iii. The Establishment of the socialist system in China (1) Transition from New Democracy to socialism (2) The choice of the path of socialist industrialization (3) The general line of the Party during the transitional period (4) The full establishment of the basic socialist system 4. Follow our own path and build socialism with Chinese characteristics (1) Pioneering Socialism with Chinese characteristics (2) The cross-century development of the cause of socialism with Chinese characteristics (3) Advancing socialism with Chinese characteristics at a new historical starting point (4) Upholding and developing socialism with Chinese characteristics in the new era

	Topic 5: History and the People Chose Reform and Opening Up (4 contact hours, 4 self-study hours) Teaching content: 1. The Tortuous development of socialist construction (1) The Rectification movement and the struggle against the right Wing (2) The Great Leap Forward, the People's Commune Movement and its correction (3) The Decade of the "Cultural Revolution" 2. The Beginning of Reform and Opening Up (1) A historic great turning point (2) A breakthrough in rural reform (3) Adjustments to foreign policy 3. The full unfolding of the new situation of reform and opening up and modernization (1) The focus of reform has shifted from rural areas to urban areas (2) The formation of a multi-level opening-up pattern (3) The theory of the primary stage of socialism and the Party's basic line 4. New Historic breakthroughs in reform and opening up (1) Deng Xiaoping's Southern Tour and the 14th National Congress of the Communist Party of China (2) The deepening of economic system reform 5. Cross-century development of reform and opening up and modernization 6. Great progress made in reform, opening up and modernization since the Third Plenary Session of the Eleventh Central Committee of the Communist Party of China 7.Online Class: How to Understand the Basic Conditions of Modern China? (8 contact hours, 4 self-study hours) Content: Wisdom Tree Online Open Course **Practical teaching (8 contact hours, 8 self-study hours)** Participate in the competition on the implementation of Thought on Socialism with Chinese Characteristics for a New Era and research-based Learning outcomes of Ideological and Political Theory courses organized by the Department of Education of Hunan Province.
Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Online (20%) : Research-based learning reports 10%. 3. Final assessment (60%) : final exams.
Media employed	Multimedia computers, projectors, smart trees

Reading list	1. Textbooks [1] Editorial Committee. Outline of Modern and Contemporary Chinese History: Key Textbook of the National Project for Marxist Theory Research and Construction [M]. Revised ed. 2023. Beijing: Higher Education Press, 2023. 2. Reference book [1] Marx K, Engels F. Selected Works of Marx and Engels, Vols. 1–2 [M]. Beijing: People's Publishing House, 1995. [2] Compilation and Translation Bureau for the Works of Marx, Engels, Lenin and Stalin under the CPC Central Committee (ed.). Marx and Engels on China [M]. Beijing: People's Publishing House, 1997. [3] Compilation and Translation Bureau for the Works of Marx, Engels, Lenin and Stalin under the CPC Central Committee (ed.). Lenin and Stalin on China [M]. Beijing: People's Publishing House, 1963. [4] Z. Mao. Selected Works of Mao Zedong, Vols. 1–4 [M]. Beijing: People's Publishing House, 1991. [5] B. Jian. Outline of Chinese History [M]. Beijing: People's Publishing House, 1979. [6] W. Fan. Modern History of China [M]. Beijing: People's Publishing House, 1955. [7] X. Chen. The Metabolism of Modern Chinese Society [M]. Shanghai: Shanghai Academy of Social Sciences Press, 2006. [8] S. Gong. Outline of Modern Chinese History [M]. Beijing: Peking University Press, 1985.

“Outline of Modern Chinese History” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
Topic 1: Basic Conditions of Modern China	1. China and the World Before the Opium War 2. Aggression against China by capital-imperialism 3. The Chinese nation's fight against aggression and its failures	6	4	1. Preview: Wisdom Tree Video Learning (2 hours) 2. After-class assignments: (1) What did the invasion of capital-imperialism bring to China? (2) How to understand the social nature and basic characteristics of modern China? (2 hours)	Class questions, homework correction
Topic 2: History and the People chose Marxism	1. All kinds of plans to save the country 2. The Impact of the October	10	6	1. Preview before class: Preview the textbook frequently and preview the lecture PPT. (2 class hours)	

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	Revolution and the Spread of Marxism in China 3. The process of Sinicizing Marxism			2. Practice and Reflection: (1) The significance of the Reform Movement of 1898. (2) Briefly describe the theory of the Three Principles of the People and the bourgeois republic plan. (3) How did the October Revolution drive China's advanced elements to shift from bourgeois democracy to socialism? (4 class hours)	Class sharing, homework correction
Topic 3: History and the People chose the Communist Party of China	1. The exploration of the country's way out by all classes 2. The founding of the Communist Party of China 3. The New Democratic Revolution led by the Communist Party of China 4. There would be no New China without the Communist Party	10	10	1. Preview before class: Watch the video and preview the lecture PPT. (2 class hours) 2. Practice and Reflection: (1) What new looks emerged in the Chinese revolution after the founding of the Communist Party of China? (2) How did Chinese Communists, with Mao zengdong as the main representative, explore and open up a new path for the Chinese revolution? (3) Why is the Chinese War of Resistance against Japanese Aggression regarded as a sacred national liberation	Classroom questioning and homework correction

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				war? (4) How do you evaluate the line implemented by the Kuomintang government during the War of Resistance against Japanese Aggression and its position and role on the front battlefield? (5). How to recognize the historical role of the democratic parties? How was the pattern of multi-party cooperation and political consultation under the leadership of the Communist Party of China formed? (8 hours)	
Topic 4: History and the People chose Socialism	1. The bankruptcy of the Third Way after the victory of the War of Resistance 2. Only socialism can save China 3. The establishment of the socialist system in China	2	2	1. Preview before class: Read the content of Chapter 8 of the textbook and write down the difficult problems encountered during the preview. 2. Learn to think: Characteristics of China's socialist transformation and its historical experience. (2 hours)	Random sharing in class and homework correction

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Topic 5: History and the People chose Reform and opening Up	1. The tortuous development of socialist construction 2. The beginning of reform and opening up 3. The full unfolding of the new situation of reform and opening up and modernization 4. New historic breakthroughs in reform and opening up 5. The cross-century development of reform and opening up and modernization 6. Great progress made in reform and modernization since the Third Plenary Session of the Eleventh Central Committee of the Communist Party of China	4	4	1. Preview before class: Read the textbook content and record the difficult problems encountered during the preview process. (2 class hours) 2. Practice and Reflection: Briefly describe the content and historical significance of the Third Plenary Session of the Eleventh Central Committee of the Communist Party of China. (2 hours)	Random questions in class and homework correction

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Online class: How to Understand the basic Conditions of Modern China?	Wisdom Tree Online Open Course	8	4	1. Self-study (2 hours) 2. Learning Pass Watch videos and courseware, complete exercises (2 class hours)	Random questions are asked in class and homework is corrected
(Theoretical teaching) Tips		40	30		
Practical teaching					
1. Research-based learning reports	Participate in the competition on research learning outcomes of ideological and political theory courses on Socialism with Chinese Characteristics for a New Era organized by the Department of Education of Hunan Province for college students.	8	8	Search for literature on different themes (12 class hours) 1. Research on the high Degree of fit between Marxism and Chinese Fine Traditional culture 2. Research on the Formation and Development of the "Two Combinations" and the Cultural Form of Chinese-Style Modernization 3. Research on the Methods and approaches for College Students to	1. Write reports in groups. The participating research learning groups can choose any topic or aspect of it to conduct research learning. The title of the learning outcome report is self-determined, and the word count should be controlled between 3,000 and 5,000 words.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				study and Practice Thought on Socialism with Chinese Characteristics for a New Era 4. Research on the Responsibilities and Missions of College Students in the New Era in building a modern Chinese civilization 5. Research on ways and means for College Students to understand and master the worldview and methodology of Thought on Socialism with Chinese Characteristics for a New Era 6. Research on Ideas and Countermeasures for Serving Hunan's "Three Highs and Four New" strategy	
(Practical teaching) Subtotals		8	8		
Total		48	38	Total hours = 86 hours	
Credits (ECTS)		2.9			

Basic Principles of Marxism

Competence field	General Education
Curriculum designation	Basic Principles of Marxism
Curriculum code	9121311021
Semester(s) in which the curriculum is taught	3rd Semester
Person responsible for the curriculum	Quan Shen
Lecturer	Xueming Shen, Qian He
Language	Chinese
The relationship between the curriculum and the major	"Basic Principles of Marxism" is one of the ideological and political theory courses for undergraduate students majoring in electronic information engineering and is a public compulsory basic course in general education. The purpose and requirements of this course focus on teaching Marxist worldview and methodology, providing students with a systematic education of Marxist theory, and explaining the intrinsic connection between adhering to Marxist worldview and methodology and holding high the banner of socialism with Chinese characteristics To help students further understand and grasp the theoretical qualities, basic viewpoints and contemporary values of Marxism through the combination of theory and practice, and to lay a solid theoretical foundation for students to establish the ideals and beliefs of building socialism with Chinese characteristics and consciously adhere to the Party's basic line. To enable students majoring in electronic information engineering to grow into innovative talents with a historical perspective, a global vision, critical thinking and social responsibility, so as to better contribute wisdom and strength to the great rejuvenation of the Chinese nation and the modernization with Chinese characteristics.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + practice Teaching hours (Contact hours): : 48 hours Among them: Theoretical instruction: 40 hours Practical teaching: 8 hours Class size: Four classes with approximately 165 students
Workload	Total workload =86 class hours; Contact hours =48 hours; Self-study hours =38 hours;
Credit points (ECTS)	2.9
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.

Prerequisite curriculum	Ideological and Moral Cultivation and Legal Basis,Outline of Modern Chinese History
Curriculum objectives /expected learning outcomes	**Learning outcomes:** This course aims to guide students to master the basic positions, viewpoints and methods of Marxism through systematic teaching, to strengthen their ideals and beliefs in building socialism with Chinese characteristics, to adhere to the path of socialism with Chinese characteristics, to consciously establish the lofty ideal of communism, and to view the new situations and new problems emerging in current capitalist society correctly and rationally. To achieve the transformation from knowledge cognition to value recognition and then to practical ability. **Knowledge:** Enable students to systematically grasp the core content and internal logic of the Marxist theoretical system and form a complete knowledge framework. First, accurately understand and express the basic categories such as matter, consciousness, practice, contradiction, social existence, social consciousness, commodity, value, surplus value, and scientific socialism. 2 Master the basic principles of dialectical materialism and historical materialism; Understand the core essence of the labor theory of value and the theory of surplus value; Recognize the historical inevitability and long-term nature of socialism replacing capitalism. Third, understand the historical process of the emergence and development of Marxism, its background of The Times and its theoretical qualities that keep pace with The Times, and clarify the theoretical achievements of the Sinicization of Marxism and its guiding role in China's socialist modernization drive. **Skills:** Develop students' initial technical ability to analyze texts and real-world problems using the basic principles of Marxism. First, be able to analyze and interpret social reality problems using Marxist positions, viewpoints and methods; 2. Have the ability to discern and criticize wrong social thoughts, and adhere to the correct political direction and value orientation; Third, be able to read and understand the classics of Marxism and grasp their main ideas and argumentative logic; 4. Be able to express Marxist theory clearly and accurately through essays, discussions and other forms. **Ability:** Guide students to internalize knowledge as their own way of thinking and values. One is to be able to combine the basic principles of Marxism with social practice to guide personal study, work and life; 2 Think with dialectical materialism and historical materialism, and improve the scientific thinking ability to analyze and solve problems;

	Third, establish a correct worldview, outlook on life and values, and enhance a sense of social responsibility and historical mission; Fourth, have a profound understanding of the scientific and revolutionary nature of Marxism, enhance theoretical, political and emotional identification with socialism with Chinese characteristics, and consciously integrate personal development into the great cause of national development and national rejuvenation.
Content	**Theoretical instruction (40 contact hours, 30 self-study hours)** **Introduction (6 contact hours, 2 self-study hours)** 1. Teaching objectives Understand and grasp what Marxism is as a whole. Understand the historical process and development stages of the emergence of Marxism. Master the distinct features of Marxism. Have a deep understanding of the contemporary value of Marxism. 2. Teaching content The founding and development of Marxism. The basic characteristics of Marxism: scientific, people-oriented, practical, developmental. The contemporary value of Marxism: The cognitive tool for observing changes in the contemporary world, the action guide for the development of contemporary China, and the scientific truth leading the progress of human society. Learn and apply Marxism consciously. 3. Teaching focus The connotation, origin, development, distinct features and contemporary value of Marxism, and the attitude and approach to learning Marxism. 4. Teaching difficulties The distinct features and contemporary value of Marxism. **Chapter 1: The materiality of the world and its laws of Development (8 contact hours, 4 self-study hours)** 1. Teaching objectives Learn and master the fundamental principles of dialectical materialism, with emphasis on grasping the dialectical relationship between matter and consciousness, the material unity of the world, and the basic links and laws of the connection and development of things. 2. Teaching content World Diversity and material Unity: Matter and its forms of existence, the dialectical relationship between matter and consciousness, and the material unity of the world.

	The connection and development of things: The universality of connection and development, the basic links of connection and development, the law of unity of opposites is the fundamental law of the development of things. Materialist dialectics is the fundamental method of understanding and transforming the world: Materialist dialectics is the scientific method of understanding, and learning materialist dialectics constantly enhances the ability of thinking. 3. Teaching focus The material unity of the world, matter determines consciousness, the dialectical unity of subjective initiative and objective regularity, the basic links of connection and development, the basic laws of connection and development, materialist dialectics is a scientific method of cognition, constantly enhancing thinking ability in practice. 4. Teaching difficulties The material unity of the world, the fundamental laws of connection and development. **Chapter 2: Practice and Cognition and Its Laws of Development (8 contact hours, 4 self-study hours)** 1. Teaching objectives Study the basic viewpoints of the Marxist view of practice, epistemology and axiology, and master the essence of practice, cognition, truth and value and their interrelationships. 2. Teaching content Practice and Cognition: The essence and basic structure of practice, the essence and process of cognition, the dialectical movement of practice and cognition and its laws. Truth and Value: The objectivity, absoluteness and relativity of truth, the criterion for testing truth, the dialectical unity of truth and value. Understanding the world and transforming the world: The combination of understanding the world and transforming the world, starting from reality and being realistic, achieving a virtuous interaction between theoretical innovation and practical innovation. 3 Teaching Focus Scientific view of practice, active reflection theory, practice as the foundation of cognition, the essence and development law of cognition, objectivity, absoluteness and relativity of truth, dialectical unity of truth and value, understanding the world and transforming the world, epistemology and ideological line. 4. Teaching difficulties The nature and development of cognition, the dialectical unity of

	truth and value. **Chapter 3: Human Society and Its Laws of Development (6 contact hours, 4 self-study hours)** 1. Teaching objectives Learn and grasp the fundamental principles of historical materialism, with emphasis on understanding the dialectical relationship between social existence and social consciousness, the laws governing the movement of basic social contradictions, the driving forces of social development, and the role of the masses and individuals in social history. 2. Teaching content The existence and development of human society: The contradictory movement and laws of social existence and social consciousness, the contradictory movement and laws of productive forces and production relations, the contradictory movement and laws of the economic base and the superstructure, the general laws and special forms of the replacement of social forms. The driving force of social and historical development: The role of the basic contradictions of society in historical development, the role of class struggle and social revolution in the development of class society, the role of culture in social development, the role of science and technology in social development. The role of the people in the development of history: The people are the creators of history, and the role of individuals in social history. 3. Teaching focus The dialectical relationship between social existence and social consciousness, the role of the mode of material production in social existence and development, the law of movement of basic contradictions of society, the role of basic contradictions and principal contradictions of society in historical development, the role of class struggle and social revolution in the development of class society, the role of culture in social development, the role of science and technology in social development The role of the masses and individuals in social history. 4. Teaching difficulties The laws that the relations of production must fit the productive forces and that the superstructure must fit the economic base, and that the fundamental contradictions of society are the fundamental driving force for social development. **Chapter 4: The Essence and Laws of Capitalism (4 contact hours, 4 self-study hours)** 1. Teaching objectives

	Accurately recognize the inherent contradictions of the capitalist mode of production, deeply understand the essence of the capitalist economic system, correctly grasp the general laws of large-scale socialized production and the movement of the commodity economy, correctly recognize and grasp the essence of the capitalist political system and ideology, and master the basic principles of Marxist political economy. 2. Teaching content Commodity economy and the Law of Value: The formation and development of the commodity economy, the law of value and its role, the fundamental contradictions of the commodity economy based on private ownership, scientific understanding of Marx's labor theory of value. Capitalist economic system: The emergence of the capitalist economic system, labor becoming a commodity and money transforming into capital, capitalist ownership, the production of surplus value is the absolute law of the capitalist mode of production, the fundamental contradiction of capitalism and the economic crisis. Capitalist political system and ideology: Capitalist political system and its essence, capitalist ideology and its essence. 3 Teaching Focus The fundamental contradictions of the commodity economy on the basis of private ownership, the labor theory of value and its significance, the primitive accumulation of capital, the theory of surplus value and its significance, the fundamental contradictions of capitalism and the economic crisis, the characteristics and essence of the capitalist political system, the characteristics and essence of the capitalist ideology. 4. Teaching difficulties Labor theory of value, surplus theory of value. **Chapter 5: The Development and Trends of Capitalism (4 contact hours, 4 self-study hours)** 1. Teaching objectives Understand the process of capitalism evolving from free competition to monopoly, scientifically recognize the essence of state monopoly capitalism and economic globalization, correctly recognize the new characteristics of the changes in contemporary capitalism, and deeply understand the historical status of capitalism and the historical inevitability of its replacement by socialism. 2. Teaching Content The formation and development of Monopoly Capitalism: Capitalism from Free Competition to Monopoly, the Development of Monopoly Capitalism, Economic Globalization and Its impact.

	A correct understanding of the new changes in contemporary capitalism: New Characteristics of changes in Capitalism after World War II, contradictions and conflicts of Capitalism in the context of great changes in the world. The historical position and development trend of capitalism: The historical position of capitalism, the historical inevitability of capitalism being replaced by socialism. 3 Teaching Focus The formation and characteristics of private monopoly capitalism, the features and essence of state monopoly capitalism, the manifestations and influences of economic globalization, the new changes and essence of capitalism after World War II, the contradictions and conflicts of capitalism in the context of the great changes in the world, the historical status of capitalism and the historical inevitability of its replacement by socialism. 4. Teaching difficulties The new characteristics of changes in capitalism after World War II and the historical inevitability of capitalism being replaced by socialism. **Chapter 6: The Development of Socialism and Its Laws (2 contact hours, 4 self-study hours)** 1. Teaching objectives Learn and understand the five-hundred years of development of socialism, grasp the general principles of scientific socialism, recognize the inevitability and long-term nature of the establishment of socialism in relatively economically and culturally backward countries, understand the diversity of the development path of socialism, follow the development law of socialism advancing in practice, and master the basic principles of scientific socialism. 2. Teaching content The five-hundred-year history of socialism: Socialism from fantasy to science, socialism from ideal to reality, Socialism from one country to multiple countries, and socialism in China with vigorous vitality. General Principles of Scientific Socialism: The general Principles of scientific socialism and their main contents, and the correct grasp of the general principles of scientific socialism. Exploring the laws of the development of real socialism in practice: The long-term nature of building socialism in relatively economically and culturally backward countries, the diversity of socialist development paths, and the advancement of socialism through practical exploration. 3. Teaching focus

	The five-hundred-year history of socialism, the general principles of scientific socialism, the long-term nature of building socialism in economically and culturally backward countries, the diversity of socialist development paths, and the progress of socialism in practice. 4. Teaching difficulties General principles of scientific socialism. **Chapter 7: The Lofty Ideal of Communism and Its Ultimate Realization (2 contact hours, 4 self-study hours)** 1. Teaching objectives Study and master the scientific methodological principles for predicting the future society, grasp the basic characteristics of a communist society, deeply understand the historical inevitability and long-term nature of realizing communism, and grasp the dialectical relationship between the lofty ideal of communism and the common ideal of socialism with Chinese characteristics. 2. Teaching content Looking forward to the Future Communist New Society: Methodological principles for envisioning the future society, basic characteristics of communist society. The realization of communism is an inevitable trend of historical development: The realization of communism is an inevitable trend of historical development, the realization of communism is a long-term historical process. The lofty ideal of communism and the common ideal of socialism with Chinese characteristics: Adhere to the dialectical unity of lofty ideals and common ideals, strengthen ideals and beliefs, and devote oneself to the cause of socialism with Chinese characteristics in the new era. 3 Key points of instruction The scientific methodological principles for foreseeing future societies, the basic characteristics of communist society, the inevitability of the realization of communist ideals, the long-term nature of the realization of communist ideals, the relationship between the lofty ideals of communism and the common ideal of socialism with Chinese characteristics. 4. Teaching difficulties Basic characteristics of communist society. **Theoretical instruction (8 contact hours, 8 self-study hours)** Practical content: "Red Yiyang" Commentary Competition
Learning and examination requirements and examination format	1. Classroom performance (10%) : Scores for students' performance in areas such as classroom attendance, classroom discussions, and answering questions.

	2. Online learning (20%) : Watch Rain Classroom video resources and participate in learning discussions. 3. Practical teaching (10%) : "Red Yiyang" College Student Commentary Competition. 4. Final exam (60%) : Closed-book exam, out of 100 points, computer-based. Test types: single-choice questions, multiple-choice questions, true or false questions.
Use Tools	Multimedia computer, projector, Rain Classroom APP
Catalogue of Books	1. Textbooks [1] Editorial Board for Marxist Theory Textbooks. Basic Principles of Marxism[M]. Beijing: Higher Education Press, 2023. 2. Referecne book [1] Marx K, Engels F. Selected Works of Marx and Engels: Vols.1–3[M]. Beijing: People's Publishing House, 2012. [2] Marx K, Engels F. Collected Works of Marx and Engels[M]. Beijing: People's Publishing House, 2009. [3] Lenin V I. Selected Works of Lenin: Vols.1–4[M]. Beijing: People's Publishing House, 1995. [4] Z. Mao. Selected Works of Mao Zedong: Vols.1–4[M]. Beijing: People's Publishing House, 1991. [5] X. Deng. Selected Works of Deng Xiaoping: Vols.2–3[M]. Beijing: People's Publishing House, 1994. [6] Z. Jiang. Selected Works of Jiang Zemin: Vols.2–3[M]. Beijing: People's Publishing House, 2006. [7] Communist Party of China Central Committee. Decision of the Central Committee of the Communist Party of China on Several Major Issues Concerning the Building of a Harmonious Socialist Society[M]. Beijing: People's Publishing House, 2006. [8] The Governance of China. Beijing: Foreign Languages Press, 2014. [9] J. Xi. Hold High the Great Banner of Socialism with Chinese Characteristics and Strive in Unity to Build a Modern Socialist Country in All Respects: Report to the 20th National Congress of the Communist Party of China[M]. Beijing: People's Publishing House, 2022.

“Basic Principles of Marxism” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
Introduction	1. The meaning of Marxism. 2. The founding and development of Marxism. 3. Basic characteristics of Marxism: Scientific nature, people-oriented nature, practical nature, developmental nature. 4. The contemporary value of Marxism: The cognitive tool for observing changes in the contemporary world, the action guide for the development of contemporary China, and the scientific truth leading the progress of human society. 5. Consciously study and apply Marxism, and the attitude and approach to learning Marxism.	6	2	Homework: Rain Classroom Video Learning (2 hours)	Participate in Rain Class discussions.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Chapter 1 The Materiality of the world and Its Laws of development	1. World Diversity and material unity: Matter and its form of existence, dialectical relationship between matter and consciousness, dialectical unity of subjective initiative and objective regularity, material unity of the world. 2. The connection and development of things: The universality of connection and development, the basic links of connection and development. 3. The law of unity of opposites is the fundamental law of the development of things, the law of quantitative change and qualitative change, and the law of negation of negation. 4. Materialist dialectics is the fundamental method of understanding and transforming the world: the essential characteristics and cognitive functions of materialist dialectics, learning materialist dialectics, constantly enhancing thinking ability.	8	4	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (2 class hours) 2. Homework: Use the principle of the dialectical relationship between the universality and particularity of contradictions to illustrate the importance of integrating the basic principles of Marxism with China's specific realities. (2 class hours)	1. The Rain Classroom platform automatically records video views. 2 Share randomly in the classroom.
Chapter 2 Practice and Understanding and Their Development Patterns	1. Practice and Cognition: The establishment and development of the scientific view of practice, the essence and basic structure of practice, the essence and process of cognition, the dialectical movement of practice and cognition and its laws. 2. Truth and Value: The objectivity, absoluteness and relativity of truth, the criterion for testing truth, the	8	4	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (2 class hours) The great achievements of philosophy and social sciences in the world are created by answering and solving major	1. The Rain Classroom platform automatically records video views. 2 Share and submit assignments in groups.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	dialectical unity of truth and value. 3. Understanding the World and transforming the World: The fundamental purpose of understanding the world is to transform it, to be realistic and pragmatic, to adhere to upholding the right path and innovation, and to achieve a virtuous interaction between theoretical innovation and practical innovation.			problems facing people and society. Researchers live in the real world, and what they study and what they advocate will leave a social imprint. "Please, in light of this material, discuss its implications for understanding the dialectical unity of truth and value. (2 class hours)	
Chapter 3 Human Society and Its Laws of Development	1. The existence and development of human society: Social existence and social consciousness, basic social contradictions and their movement laws, universal human interaction and the formation and development of world history, social progress and the replacement of social forms, civilization and its diversity. 2. The driving forces of social and historical development: The role of the basic contradictions of society in historical development, the role of class struggle and social revolution in the development of class society, the role of science and technology in social development, the role of culture in social development. 3. The role of the people in history: The people are the creators of history, the role of the individual in social history, the relationship among the masses, classes, political parties, and leaders.	6	4	1. Preview before class: Read the content of Chapter 3 of the textbook and record the difficult problems encountered during the preview. (2 class hours) 2. Learn to think: How does historical materialism go beyond Idealist history? "Times make heroes" or "heroes make times"? How to correctly understand and handle the relationship between the masses, classes, political parties, and leaders? (2 class hours)	Questions in class.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Chapter 4 The Nature and Laws of Capitalism	1. Commodity Economy and the Law of Value: The formation and development of the commodity economy, the Law of value and its role, the fundamental contradictions of the commodity economy based on private ownership, a profound understanding of the contemporary value of Marx's labor theory of value. 2. Capitalist economic system: The emergence of the capitalist economic system, labor becoming a commodity and money transforming into capital, the production of surplus value is the absolute law of the capitalist mode of production, the basic contradiction of capitalism and the economic crisis. 3. The superstructure of capitalism: The political system of capitalism and its essence, the ideology of capitalism and its essence.	4	4	1. Preview before class: Read the content of Chapter 4 of the textbook and record the difficult problems encountered during the preview. (2 class hours) 2. After-class assignment: How to understand the capitalist political system and ideology in the context of the great changes unseen in a century in this topic? (2 class hours)	Questions in class.
Chapter 5 The Development of Capitalism and Its Trends	1. The formation and development of Monopoly Capitalism: Capitalism from Free Competition to Monopoly, the Development of Monopoly Capitalism, Economic Globalization and Its impact. 2. A Correct understanding of the New changes in Contemporary Capitalism: The changes and essence of capitalism after World War II, the new characteristics of the changes in contemporary capitalism, the contradictions and conflicts of capitalism in the context of the great	4	4	1. Preview before class: Read the content of Chapter 5 of the textbook and record the difficult problems encountered during the preview. (2 class hours) 2. Homework: Some say that economic globalization is global capitalism; Some say globalization is Americanization. Use the principles you've learned to	Questions in class.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	changes in the world. 3. The historical status and Development Trend of Capitalism: The historical status of capitalism and the historical inevitability of capitalism being replaced by socialism.			analyze these views. (2 hours)	
Chapter 6 The Development of Socialism and Its Laws	1. The Five-hundred-year history of socialism: Socialism from fantasy to science, socialism from ideal to reality, Socialism from one country to many countries, socialism has flourished in China. 2. General Principles of Scientific Socialism: The main content of the basic principles of scientific socialism, the correct grasp of the basic principles of scientific socialism, the basic principles of scientific socialism and socialism with Chinese characteristics. 3. Exploring the laws of the development of real socialism in practice: The long-term nature of the process of socialist construction, the diversity of the paths of socialist development, and the advancement of socialism in practice.	2	4	1. Preview before class: Read the content of Chapter 6 of the textbook and record the difficult problems encountered during the preview. (2 class hours) 2. Homework: In light of the basic principles of scientific socialism, discuss why socialism with Chinese characteristics is scientific socialism, not any other kind of socialism. (2 class hours)	Questions in class.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Chapter 7 The Lofty Ideals of Communism and Their Ultimate Realization	1. Looking Forward to the Future Communist New Society: Methodological principles for Envisioning the future Society, basic characteristics of the Communist society. 2. The realization of communism is an inevitable trend of historical development: The realization of communism is an inevitable trend of historical development, and the realization of communism is a long-term historical process. 3. The lofty Ideal of Communism and the Common Ideal of socialism with Chinese characteristics: Adhere to the dialectical unity of the lofty ideal and the common ideal, hold firm to ideals and beliefs, and devote oneself to the great cause of socialism with Chinese characteristics in the new era.	2	4	1. Preview before class: Read the content of Chapter 6 of the textbook and record the difficult problems encountered during the preview process. (2 class hours) 2. Homework after class: What is the relationship between the Chinese Dream and the lofty ideal of communism? What is the relationship between faith, belief and confidence? (2 class hours)	Share in class.
(Theoretical teaching) Tips		40	30		
Practical teaching					
"Red Yiyang" Commentary Competition	--	8	8	The participating teams go deep into society to look for Yiyang citizens who carry forward and practice the spirit of red culture, record the red genes passed down from generation to generation by	1. Collect video materials. 2 Share in class.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				Yiyang people with their cameras, and make them into teaching micro-videos (5-10 minutes) to participate in the competition. The ideological and political classroom where the students are located participates in the presentation and evaluation, and ideological and political teachers evaluate the students' practical teaching performance of ideological and political courses accordingly. In each teaching class, 1 to 2 groups of works will be recommended to the Youth League Committee of the affiliated secondary college for display and evaluation.	
(Practical Teaching) Tips		8	8		
Total		48	38	Total hours = 86 hours	
Credits (ECTS)		2.9			

Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics

Competence field	General Education
Curriculum designation	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics
Curriculum code	9122311081
Semester(s) in which the curriculum is taught	4th Semester
Person responsible for the curriculum	Huabing Yang
Lecturer	Xianggang Li, Weihong Kuang.
Language	Chinese
The relationship between the curriculum and the major	" Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics " provides value guidance, thinking methods, and strategic vision for students majoring in Electronic Information Engineering: it cultivates a sense of mission to serve the country through science and technology, guides them in overcoming "bottleneck" technologies; it provides methodologies such as contradiction analysis and systems thinking to help solve complex engineering problems; and it elucidates national strategies such as innovation-driven development and building a cyber power, enabling professional learning to resonate with China's modernization.
Teaching methods number of t eaching hours	Target students: Electronic Information Engineering major Teaching methods: Theoretical teaching + practice Teaching hours: 48 hours in: Theoretical instruction: 32 hours Online /Practical Teaching: 16 hours Class size: Approximately 200 students in 4 classes
Workload	Total workload = 84 class hours; Contact hours = 48 hours; Self-study hours = 36 hours;
Credit points (ECTS)	2.8
Requirements according to the examination regulations	Only students with a class attendance rate of more than 2/3 and a homework completion rate of more than 2/3 are eligible to take the exam.
Prerequisite curriculum	Ideological and Moral Cultivation and Legal Basis , Outline of Modern Chinese History , Basic Principles of Marxism .
Curriculum objectives /expected learning outcomes	By combining theoretical and practical teaching, students are guided to systematically grasp the core essence of Marxism adapted to Chinese conditions, and to enhance their confidence in the path,

	theory, system, and culture of socialism with Chinese characteristics. Specific objectives are broken down as follows: **Knowledge :** 1. To accurately grasp the ideological essence, development trajectory, and core viewpoints of Mao Zedong Thought and the theoretical system of socialism with Chinese characteristics; 2. To systematically understand the Party's basic theories, basic lines, and basic strategies since the reform and opening up, as well as the historical achievements the Party has made in the periods of revolution, construction, and reform; 3. To gain a deeper understanding of the historical context, theoretical connotations, and practical requirements of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era. **Skill :** 1. Able to use Marxist standpoints, viewpoints and methods to conduct rational analysis and dialectical thinking on real-world social problems, historical events and policy guidelines; 2. Possess the ability to clearly express theoretical understanding and demonstrate practical results through micro-video creation, research-based learning reports, and practical surveys; 3. To gain a preliminary understanding of methods for collecting data, summarizing viewpoints, and conducting preliminary research that connects theory with practice in social practice and group collaboration. **Ability :** 1. Enhance understanding and acceptance of the Party and the country's major policies and guidelines, strengthen the "Four Confidences," and form a scientific political and historical perspective; 2. They are able to understand and explain the profound truths of "why the Communist Party of China is capable, why socialism with Chinese characteristics is good, and why Marxism works" in practice; 3. By participating in activities such as the "Five Micro" practices and research-based learning competitions, we cultivate social observation skills, the ability to connect theory with practice, and teamwork awareness, and promote the internalization and moral education of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era.
Contents	**Theoretical instruction (32 contact hours, 26 self-study hours)** Topic 1: The Historical Process and Theoretical Achievements of the Sinicization and Modernization of Marxism . (2 contact hours , 2 self-study hours) 1. What is the Sinicization and modernization of Marxism?

	2. Why must Marxism be adapted to the Chinese context and modernized? Topic 2: Mao Zedong Thought and its historical significance . (6 contact hours , 4 self-study hours) 1. What were the socio-historical conditions for the formation and development of Mao Zedong Thought? 2. How to grasp the main content and living soul of Mao Zedong Thought? 3. How can we scientifically understand the historical status of Mao Zedong Thought? Topic 3: Theory of New Democratic Revolution. (2 contact hours , 2 self-study hours) 1. What is the general line of the New Democratic Revolution? 2. How should we understand the necessity and significance of the Chinese revolution's path of encircling the cities from the countryside and seizing power by armed force? 3. How to understand the three magic weapons of the New Democratic Revolution and their interrelationship? Topic 4: Theory of Socialist Transformation . (2 contact hours , 2 self-study hours) 1. Why is the New Democratic society considered a transitional society? 2. How should we understand the Party's general line during the transition period? 3. How should we understand the great significance of China establishing the basic socialist system? Topic 5: Theoretical Achievements of the Preliminary Exploration of the Path of Socialist Construction . (2 contact hours , 2 self-study hours) 1. How should we understand the great significance of the Party's initial exploration of the path of socialist construction? 2. What were the lessons learned from the Party's initial exploration of the path of socialist construction? Topic 6: The formation and development of the theoretical system of socialism with Chinese characteristics . (6 contact hours , 8 self-study hours) 1. The social and historical conditions for the formation and development of the theoretical system of socialism with Chinese characteristics

	2. The Formation and Development Process of the Theoretical System of Socialism with Chinese Characteristics Topic 7 : Deng Xiaoping Theory . (4 contact hours , 2 self-study hours) 1. How to grasp the main content of Deng Xiaoping Theory? 2. How should we understand the historical significance of Deng Xiaoping Theory? Topic 8: The Important Thought of the "Three Represents" (4 hours of initial study , 2self-study hours) 1. The core viewpoints of the important thought of "Three Represents" 2. The main contents of the important thought of "Three Represents" 3. The Historical Status of the Important Thought of the "Three Represents" Topic 9: The Scientific Outlook on Development . (4 hours of initial study , 2self-study hours) 1. The scientific connotation of the Scientific Outlook on Development ; 2. The main contents of the Scientific Outlook on Development ; 3. The historical significance of the Scientific Outlook on Development . **Practical teaching (16 contact hours , 10 self-study hours)** Participating in the Hunan Provincial Department of Education's Competition on the Achievements of College Students in Implementing Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era and Research-Based Learning in Ideological and Political Theory Courses.
Study and examination requirements and forms of examination	1. Attendance rate (10 %): Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Online (20 %): Research-based learning reports 10% . 3. Final assessment (60%): Final exam.
Media employed	Multimedia computer , projector, Rain Classroom

Reading list	1. Main teaching materials: The textbook for the National Marxist Theory Research and Construction Project, "An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics" (2023 Revised Edition), published by Higher Education Press. 2. References: (1) Biography of Mao Zedong, edited by Jin Chongji, Central Literature Publishing House, 1996; (2) Selected Works of Mao Zedong, Volumes 1-4, People's Publishing House, 1991 edition; (3) Selected Works of Deng Xiaoping, Volumes 1-3, People's Publishing House, 1994 edition; (4) Selected Works of Jiang Zemin, Volumes 1-3, People's Publishing House, 2006 edition; (5) Selected Works of Hu Jintao, Volumes 1-3, People's Publishing House, 2016 edition;

"Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self -study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
Topic 1: An Overview of the Sinicization and Modernization of Marxism	1. What is the Sinicization and modernization of Marxism? 2. Why must Marxism be adapted to the Chinese context and modernized?	2	2	1. Online learning. (2 class hours)	1. Correcting exercises.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self -study hours	Self-study content	Self-study hours supervision methods
Topic 2: Mao Zedong Thought and Its Historical Status	1. What were the socio-historical conditions for the formation and development of Mao Zedong Thought? 2. How to grasp the main content and living soul of Mao Zedong Thought? 3. How can we scientifically understand the historical status of Mao Zedong Thought?	6	4	Watch the micro-lesson videos on Rain Classroom and preview the teaching PPT. (4 class hours)	The Rain Classroom platform automatically records video views.
Topic 3: The Theory of New Democratic Revolution	1. What is the general line of the New Democratic Revolution? 2. How should we understand the necessity and significance of the Chinese revolution's path of encircling the cities from the countryside and seizing power by armed force? 3. How to understand the three magic weapons of the New Democratic Revolution and their interrelationship?	2	2	Watch the micro-lesson videos on Rain Classroom and preview the teaching PPT.	1. The Rain Classroom platform automatically records video views. 2. Correcting exercises. 3. Random classroom quizzes: to check the effectiveness of review.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self -study hours	Self-study content	Self-study hours supervision methods
Topic 4: Theory of Socialist Transformation	1. Why is the New Democratic society considered a transitional society? 2. How should we understand the Party's general line during the transition period? 3. How should we understand the great significance of China establishing the basic socialist system?	2	2	Watch the Rain Classroom micro-lesson videos and preview the teaching PPTs. Related exercises.	1. The Rain Classroom platform automatically records video views. 2. Correcting exercises.
Topic 5: Theoretical Achievements of the Preliminary Exploration of the Socialist Construction Path	1. How should we understand the great significance of the Party's initial exploration of the path of socialist construction? 2. What were the lessons learned from the Party's initial exploration of the path of socialist construction?	2	2	1. Pre-class preparation: Watch the Rain Classroom micro-lesson video and preview the teaching PPT.	1. The Rain Classroom platform automatically records video views. 2. Correcting exercises.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self -study hours	Self-study content	Self-study hours supervision methods
Topic 6: The Formation and Development of the Theoretical System of Socialism with Chinese Characteristics	How can we grasp the formation and development process of the theoretical system of socialism with Chinese characteristics?	6	8	1. Pre-class preparation: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. 2. Homework	1. The Rain Classroom platform automatically records video views. 2. Exercises revised. 3. Random classroom quizzes: to check the effectiveness of review.
Topic 7: Deng Xiaoping Theory	1. How to grasp the main content of Deng Xiaoping Theory? 2. How should we understand the historical significance of Deng Xiaoping Theory?	4	2	1. Pre-class preparation: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. 2. Homework	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, create a WeChat group, and check in daily for record-keeping. 2. Supervision by instructors: Establish fixed times for in-person or online Q&A sessions. Assess the overall review progress of the class by analyzing the frequency and depth of students' questions. 3. Counselor supervision: During the review week, counselors will visit student dormitories to supervise and inspect students' progress.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self -study hours	Self-study content	Self-study hours supervision methods
Topic 8: The Important Thought of the "Three Represents"	How can we accurately grasp the core viewpoints of the important thought of "Three Represents"?	4	2	1. Pre-class preparation: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. 2. Homework	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, create a WeChat group, and check in daily for record-keeping. 2. Supervision by instructors: Establish fixed times for in-person or online Q&A sessions. Assess the overall review progress of the class by analyzing the frequency and depth of students' questions. 3. Counselor supervision: During the review week, counselors will visit student dormitories to supervise and inspect students' progress.
Topic 9: The Scientific Outlook on Development	How to grasp the main contents of the Scientific Outlook on Development?	4	2	1. Pre-class preparation: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. 2. Homework	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, create a WeChat group, and check in daily for record-keeping. 2. Supervision by instructors: Establish fixed times for in-person or online Q&A sessions. Assess the overall review progress of the class by analyzing the frequency and depth of students' questions. 3. Counselor supervision: During the review week, counselors will visit student dormitories

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self -study hours	Self-study content	Self-study hours supervision methods
					to supervise and inspect students' progress.
Subtotal (Theoretical Teaching)		32	26		
Practical Teaching					
Practical teaching	Participating in the Hunan Provincial Department of Education's Competition on the Achievements of College Students in Implementing Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era and Research-Based Learning in Ideological and Political Theory Courses.	16	10	Research materials, case studies, and refer to previous research reports.	Preliminary round: Results will be presented on May 25. College semi-finals: June 1st
Subtotal (Practical Teaching)		16	10		
Total		48	36	Total class hours = 84 hours	
Credit points (ECTS)		2.8			

Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era

Competence field	General Education
Curriculum designation	Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era
Curriculum code	9122311071
Semester(s) in which the curriculum is taught	4th Semester
Person responsible for the curriculum	Zhuofu Liu
Lecturer	Xiye Zhu, Wenxun Zhang
Language	Chinese
The relationship between the curriculum and the major	" Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era " is a general education course on ideological and political theory for all undergraduate majors across the university. It focuses on Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era—the theoretical achievement of the Party Central Committee, represented by General Secretary Xi Jinping, in the practice of socialism with Chinese characteristics since the 18th National Congress of the Communist Party of China. This course is an important component of strengthening ideological and political education for university students in the new era. Its main task is to help students systematically grasp the latest theoretical achievements of the Sinicization of Marxism and enhance their confidence in the path, theory, system, and culture of socialism with Chinese characteristics .
Teaching methods number of t eaching hours	Target students: Electronic Information Engineering majors Teaching methods: theoretical teaching + practical teaching Teaching hours (Contact hours): 48 hours in: Theoretical instruction: 40 hours Practical teaching: 8 hours Class size: Approximately 160 students in 4 classes
Workload	Total workload = 94 class hours; Contact hours = 48 hours; Self-study hours = 46 hours;
Credit points (ECTS)	3.1
Requirements according to the examination regulations	Only students with a class attendance rate of more than 2/3 and a homework completion rate of more than 2/3 are eligible to take the exam.
Prerequisite curriculum	Outline of Modern Chinese History , Ideological and Moral Cultivation and Legal Basis, Situation and Policy, Basic Principles

	of Marxism
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main objective of this course is to help students systematically grasp the latest theoretical achievements of the Sinicization of Marxism and enhance their confidence in the path, theory, system, and culture of socialism with Chinese characteristics . Specific objectives include: **Knowledge:** To understand the social and historical conditions and process of the formation and development of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, to grasp its core essence and main content, to understand its worldview and methodology, and to recognize its historical status and guiding significance . **Skill:** To enhance our understanding of the conditions under which Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era arose, to improve our ability to analyze and solve problems using the worldview and methodology of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, and to correctly and scientifically recognize the historical status of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era. **Ability:** Mastering Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era is the ideological banner of the Communist Party of China in the new era, the fundamental guideline for national political and social life, and the principle and methodology of contemporary Chinese Marxism and 21st-century Marxism. It is essential to establish a correct worldview, methodology, and historical perspective, and firmly establish the political principle of "two establishments . "
Contents	**Theoretical instruction (40 contact hours, 34 self-study hours)** Introduction (2 contact hours, 2 self-study hours) 1. How was Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era established? 2. What major questions of our time does Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era answer? 3. What are the main contents of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era? 4. How to grasp the worldview and methodology of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era 5. How to understand the historical status of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era

	6. How to learn and apply Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era . Chapter 1: Upholding and Developing Socialism with Chinese Characteristics in the New Era (2 contact hours, 2.5 self-study hours) 1. Why is it said that the realization of the great rejuvenation of the Chinese nation has entered an irreversible historical process? 2. How to understand that socialism with Chinese characteristics is the only path to realizing the great rejuvenation of the Chinese nation? 3. How to build a modern socialist country . Chapter 2: Advancing the Great Rejuvenation of the Chinese Nation in an All-Round Way Through Chinese-Style Modernization (3 theoretical study hours, 2 self-study hours) 1. How should we understand the relationship between the Chinese Dream and individual dreams? 2. How should we understand the profound significance of building a moderately prosperous society in all respects in my country's socialist modernization process? 3. How should we understand the Chinese characteristics and essential requirements of Chinese-style modernization? 4. Why is it said that Chinese-style modernization has created a new form of human civilization? Chapter 3: Upholding the Party's Overall Leadership (3 contact hours, 1.5 self-study hours) 1. Why should we uphold the leadership of the Party? 2. How to understand that the Party's leadership is comprehensive, systematic, and holistic? 3. How can we consciously maintain a high degree of consistency with the Party Central Committee in thought, politics, and action? Chapter 4: Adhering to a People-Centered Approach (2 contact hours, 1.5 self-study hours) 1. Why must we adhere to the people-centered ideology? 2. How to understand the continuous pursuit of people's aspirations for a better life? 3. How to promote the all-round development of people and common prosperity for all? Chapter 5: Comprehensively Deepening Reform and Opening Up (3 contact hours, 3 self-study hours) 1. Why is it necessary to comprehensively deepen reforms?

	2. How to advance comprehensive and in-depth reforms 3. How to build a new pattern of opening up to the outside world Chapter 6: Promoting High-Quality Development (3 contact hours, 3 self-study hours) 1. How to grasp the new development stage, implement the new development philosophy, and build a new development pattern 2. How to understand that high-quality development is the primary task of building a modern socialist country in all respects? 3. How to uphold and improve the basic socialist economic system Chapter 7: Education, Science and Technology, and Talent Strategies for Socialist Modernization (2 theoretical hours, 1.5 self-study hours) 1. How to understand the great significance of the strategy of invigorating the nation through science and education in the new era? 2. How to accelerate the building of a strong education nation 3. How to accelerate the building of a science and technology powerhouse 4. How to thoroughly implement the strategy of strengthening the country through talent in the new era Chapter 8: Whole-process people's democracy (3 contact hours, 3 self-study hours) 1. What is whole-process people's democracy? 2. What are the advantages of whole-process people's democracy? 3. How to further develop whole-process people's democracy Chapter 9: Governing the Country According to Law in All Aspects (3 contact hours, 2 self-study hours) 1. Why is it necessary to comprehensively advance the rule of law? 2. Why should we follow the path of socialist rule of law with Chinese characteristics? 3. How to understand the overall goal of comprehensively governing the country according to law? 4. How to build a rule-of-law China Chapter 10: Building a Socialist Cultural Power (2 contact hours, 3 self-study hours) 1. Why build a socialist culture with Chinese characteristics? 2. Why should we uphold the fundamental system of Marxism's guiding role in the ideological sphere? 3. Why should we use the core socialist values to unite people's

	hearts and minds? 4. How to enhance the nation's soft power and the influence of Chinese culture Chapter 11: Strengthening Social Development with a Focus on People's Livelihood (2 theoretical hours, 1 self-study hour) 1. Why is it said that "Of all things, the people's livelihood is the most important"? 2. How to enhance people's sense of gain, happiness, and security 3. How to promote the modernization of social governance Chapter 12: Building a Socialist Ecological Civilization (3 theoretical study hours, 2 self-study hours) 1. Why build an ecological civilization? 2. What kind of ecological civilization should we build? 3. How to build a beautiful China Chapter 13: Fully Implementing the Holistic National Security Concept (2 theoretical study hours, 2 self-study hours) 1. Why is ensuring national security a top priority? 2. What is the holistic national security concept? 3. How to advance the modernization of the national security system and capabilities Chapter 14: Building a Strong National Defense and a Powerful People's Army (2 contact hours, 2 self-study hours) 1. Why is it necessary to build a powerful people's army? 2. How to build a strong national defense and a powerful people's army 3. How does the People's Liberation Army safeguard national sovereignty, security, and development interests? Chapter 15: Upholding "One Country, Two Systems" and Promoting National Reunification (3 theoretical study hours, 2 self-study hours) 1. How to uphold "one country, two systems" 2. Why is it said that "one country, two systems" is feasible, workable, and enjoys popular support? 3. Why is it said that the time and momentum for the complete reunification of the motherland are always on our side? **Practical teaching (8 contact hours , 12 self-study hours)** Research-based learning report : Participation in the Hunan Provincial Department of Education's competition showcasing the

	research-based learning achievements of college students in implementing Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era .
Study and examination requirements and forms of examination	1. Attendance (10%): Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Online learning (20 %): Rain Classroom learning . 3. Practical assignments (10%): Research-based learning report, "micro-lecture", explanation competition 4. Final assessment (60%): Final exam.
Media employed	Multimedia computer, projector
Reading list	1. Reference book [1] J. P. Xi. Xi Jinping: Hold High the Great Banner of Socialism with Chinese Characteristics and Strive in Unity to Build a Modern Socialist Country in All Respects[M]. Report to the 20th National Congress of the Communist Party of China , 2022. [2] J. P. Xi. Xi Jinping: Speech at the Ceremony Marking the Centenary of the Communist Party of China[M].Beijing: Peoples Publishing House, 2021. [3] J. P. Xi. Xi Jinping:On the History of the Communist Party of China[M]. Beijing: Central Party Literature Press, 2021.

“Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Introduction	1. How was Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era established? 2. What major questions of our time does Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era answer? 3. What are the main contents	2	2	Rain Classroom video learning (2 class hours)	Correcting exercises.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era? 4. How to grasp the worldview and methodology of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era 5. How to understand the historical status of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era 6. How to learn and apply Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era .				
2. Upholding and Developing Socialism with Chinese Characteristics in the New Era	1. Why is it said that the realization of the great rejuvenation of the Chinese nation has entered an irreversible historical process? 2. How to understand that socialism with Chinese	2	2.5	1. Pre-class preparation: Watch the pre-class video "China's Economic 'Half-Year Report'" . (0.5 class hours) 2. Homework: Students are requested to create a short video based on the theme, choosing their	Classroom assessment and video presentation

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	characteristics is the only path to realizing the great rejuvenation of the Chinese nation? 3. How to build a modern socialist country .			own perspective, and discussing the changes and achievements in various fields in China over the past decade in the new era. Students are required to appear on camera and give a presentation. The video should be no longer than 10 minutes . (2 class hours)	
3. Advance the great rejuvenation of the Chinese nation in all aspects through Chinese-style modernization.	1. How should we understand the relationship between the Chinese Dream and individual dreams? 2. How should we understand the profound significance of building a moderately prosperous society in all respects in my country's socialist modernization process? 3. How should we understand the Chinese characteristics and essential requirements of Chinese-style modernization? 4. Why is it said that	3	2	1. Each group needs to prepare a well-received film, documentary, or short film in advance and recommend it to the whole class. The recommendation should include basic information about the film, its main content, how it interprets the Chinese Dream or the great rejuvenation of the Chinese nation, and the reasons for the recommendation . (1 class hour) 2. Homework: Discuss what you envision China to be like in 2050. (1 class hour)	1. Group sharing and submission of assignments 2. Sharing will be conducted randomly during class .

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	Chinese-style modernization has created a new form of human civilization?				
4. Uphold the Party's overall leadership	1. Why should we uphold the leadership of the Party? 2. How to understand that the Party's leadership is comprehensive, systematic, and holistic? 3. How can we consciously maintain a high degree of consistency with the Party Central Committee in thought, politics, and action?	3	1.5	1. Pre-class reflection : Consider the questions "What does 'like the body directing the arm, like the arm directing the fingers' mean? How does the Party's leadership achieve 'like the body directing the arm, like the arm directing the fingers'?" (0.5 class hours) 2. Use the camera to showcase the tremendous changes that have taken place in our lives under the leadership of the Party. You must appear on camera, and the video should be no more than 10 minutes long (1 class hour).	1. Classroom Questions 2. Video submission

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
5. Adhere to a people-centered approach	1. Why must we adhere to the people-centered ideology? 2. How to understand the continuous pursuit of people's aspirations for a better life? 3. How to promote the all-round development of people and common prosperity for all?	2	1.5	Pre-class preparation : Students work in groups to research relevant materials and collect stories about "General Secretary Xi Jinping's people-centered approach," then divide the tasks and share their stories in class . (1.5 class hours)	Answering questions in class
6. Comprehensively deepen reform and opening up	1. Why is it necessary to comprehensively deepen reforms? 2. How to advance comprehensive and in-depth reforms 3. How to build a new pattern of opening up to the outside world	3	3	1. Pre-class preparation: Selectively watch the documentary "Dare to Change the World" - "Reform and Overcoming Difficulties," and the micro-documentary "A Century of Exploration" - "A New Pattern of Comprehensive Opening-up," and other video resources related to this chapter . (1 class hour) 2. Homework: Students are asked to become "reporters" and use their cameras to introduce an open China to the world. The video should be no longer than 5 minutes . (2 class hours)	1. The Rain Classroom platform automatically records video views. 2. Exercises revised.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
7. Promote high-quality development	1. How to grasp the new development stage, implement the new development philosophy, and build a new development pattern 2. How to understand that high-quality development is the primary task of building a modern socialist country in all respects? 3. How to uphold and improve the basic socialist economic system	3	3	1. Pre-class preparation: Selectively watch relevant articles and images from the special column " China Economic Forum " and the Xinhua Net "High-Quality Development Research Trip" column , etc. (1 class hour) 2. Homework: Students will conduct a campus interview on camera. Do you know what the new development philosophy is? What vivid examples do you know? What can we do to implement the new development philosophy? (2 class hours)	1. Classroom Questions 2. Video Submission
8. Education, science and technology, and talent strategies for socialist modernization	1. How to understand the great significance of the strategy of invigorating the nation through science and education in the new era? 2. How to accelerate the building of a strong education nation	2	1.5	1. Students, in groups, collect stories of scientists returning to China in recent years, analyze the essence behind these stories, and compile a PowerPoint presentation to prepare for sharing these stories in class . (1.5 class hours)	Sharing during class

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	3. How to accelerate the building of a science and technology powerhouse 4. How to thoroughly implement the strategy of strengthening the country through talent in the new era				
9. People's democracy throughout the whole process	1. What is whole-process people's democracy? 2. What are the advantages of whole-process people's democracy? 3. How to further develop whole-process people's democracy	3	3	Students are asked to interpret the theme of national unity and solidarity and strengthen the sense of community of the Chinese nation through artistic performances such as recitation, dance, singing revolutionary songs, and stage plays (3 class hours).	Randomly select groups to present during class
10. Rule of law in all aspects	1. Why is it necessary to comprehensively advance the rule of law? 2. Why should we follow the path of socialist rule of law with Chinese characteristics? 3. How to understand the overall goal of comprehensively governing	3	2	Through discussion on the question "What legal measures do you expect to be implemented to combat cyberbullying?" (2 class hours) ;	Ask questions randomly during class

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	the country according to law? 4. How to build a rule-of-law China				
11. Building a socialist cultural power	1. Why build a socialist culture with Chinese characteristics? 2. Why should we uphold the fundamental system of Marxism's guiding role in the ideological sphere? 3. Why should we use the core socialist values to unite people's hearts and minds? 4. How to enhance the nation's soft power and the influence of Chinese culture	2	3	1. Pre-class preparation: Selectively watch relevant video resources for this chapter , such as documentaries "If National Treasures Could Talk," "China's Micro-Business Cards: World Heritage Sites," and "Silk Road, Meeting You" (1 class hour). 2. Students are asked to use the internet and books to collect relevant information about their hometown's traditional culture. (2 class hours)	Group sharing and submission of assignments Sharing will be conducted randomly during class .
12. Strengthen social development with a focus on people's livelihood.	1. Why is it said that "Of all things, the people's livelihood is the most important"? 2. How to enhance people's sense of gain, happiness, and security 3. How to promote the modernization of social governance	2	1	Pre-class preparation: Post discussion topic: "Why is ensuring the happiness of the people considered a matter of paramount importance to the nation?" (1 class hour)	Rain Classroom discussion update

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
13. Building a socialist ecological civilization	1. Why build an ecological civilization? 2. What kind of ecological civilization should we build? 3. How to build a beautiful China	3	2	1. Pre-class preparation: Selectively watch documentaries such as " National Parks ," "Ecological Civilization Practice," and "Looking at Mountains and Rivers—Green Waters and Lush Mountains, Ecological Prosperity," etc., which are relevant to this chapter . (0.5 class hours) 2. Students are requested to work in groups to carry out practical environmental volunteer activities both on and off campus (1.5 class hours).	Rain Classroom video progress update
14. Fully implement the overall national security concept	1. Why is ensuring national security a top priority? 2. What is the holistic national security concept? 3. How to advance the modernization of the national security system and capabilities	2	2	Post-class reflection: How can we advance the modernization of the national security system and capabilities? (2 class hours)	Write and submit written materials

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
15. Building a solid national defense and a powerful people's army	1. Why is it necessary to build a powerful people's army? 2. How to build a strong national defense and a powerful people's army 3. How does the People's Liberation Army safeguard national sovereignty, security, and development interests?	2	2	Online VR panoramic tour of the virtual exhibition hall of the Military Museum of the Chinese People's Revolution. (2 class hours) Online exhibition hall website: http://www.jb.mil.cn/zlcl/jbcl/	Sharing viewing experiences during class
16. Uphold the "one country, two systems" principle and promote national reunification.	1. How to uphold "one country, two systems" 2. Why is it said that "one country, two systems" is feasible, workable, and enjoys popular support? 3. Why is it said that the time and momentum for the complete reunification of the motherland are always on our side?	3	2	1. Pre-class preparation: Students should collect relevant information on the development and changes in Hong Kong and Macau under the "One Country, Two Systems" principle in terms of economy, politics, culture, and people's livelihood. (1 class hour) 2. Post-class reflection: How can we understand that the path of Hong Kong and Macao developing and prospering together with the mainland will inevitably become wider and wider? (1 class hour)	1. Gathering information and sharing it in class 2. Submit written materials

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
(Theoretical Teaching) Subtotal		40	34		
Practical teaching					
1. Research-based learning report	Participating in the Hunan Provincial Department of Education's competition showcasing the research-based learning achievements of university students in implementing Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era .	8	12	Literature review for different topics (1-2 class hours) 1. A study on the high degree of compatibility between Marxism and outstanding traditional Chinese culture. 2. A Study on the Formation and Development of the "Two Integrations" and the Chinese-Style Modern Cultural Form 3. A Study on the Methods and Paths for College Students to Study and Practice Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era 4. A Study on the Responsibilities and Missions of College Students in Building Modern Chinese Civilization in the New Era 5. Research on the ways and	1. Groups will write reports to participate in the research-based learning competition. Each group may choose a topic or one aspect of it to conduct research-based learning. The title of the learning outcome report is up to the participants, and the word count should be between 3,000 and 5,000 words.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				methods for college students to comprehend and grasp the worldview and methodology of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era 6. Research on the Ideas and Countermeasures for Serving Hunan's " Three Highs and Four New " Strategy 7. Research on the Ideas and Countermeasures for Yiyang City to Integrate into the Strategy of Strengthening the Provincial Capital and Vigorously Promote Eastward Connection and Integration	
(Practical Teaching) Subtotal		8	12		
total		48	46	Total class hours = 94 hours	
Educational Credits (ECTS)		3.1			

Situation and Policy (1) - (8)

Competence field	General Education
Curriculum designation	Situation and Policy (1) - (8)
Curriculum code	9125111040
Semester(s) in which the curriculum is taught	1st Semester ~ 8th Semester
Person responsible for the curriculum	XunXia Guo
Lecturer	XunXia Guo, GuangMingChen, XiaoBing Mo, HongMei Wan, Peng Zhang, Suixuan Liu.
Language	Chinese
The relationship between the curriculum and the major	" Situation and Policy " is an important component of ideological and political theory courses in universities, offered to all undergraduate majors. It aims to help students correctly understand the domestic and international situation, deeply comprehend the major policies of the Party and the State, and enhance their sense of social responsibility and mission . Graduates of Electronic Information Engineering will undertake responsibilities in scientific research, system integration, and engineering management, requiring them to consider social, legal, environmental, and cultural factors in their technical practice. The "Situation and Policy" course is a crucial pathway to cultivating students' "engineering and social" literacy.
Teaching methods number of t eaching hours	Target students: Electronic Information Engineering major Teaching method: Theoretical teaching Teaching hours (Contact hours): 32 hours in: Theoretical instruction: 32 hours Practical teaching: 0 hours
Workload	Total workload = 40 hours; Contact hours = 32 hours; Self-study hours = 8 hours;
Credit points (ECTS)	1.3
Requirements according to the examination regulations	students with a class attendance rate of more than 2/3 and who have completed 2/3 of their self-study hours can pass the exam.
Prerequisite curriculum	none
Curriculum objectives /expected learning outcomes	**Learning outcomes:** Through this course, students will be able to correctly understand the domestic and international situation and the major policies of the Party and the State, understand "why socialism with Chinese characteristics is good", initially acquire the perspective of using Marxism to analyze the situation and policies, enhance their "four self-confidences", and form a basic sense of national sentiment and

	responsibility to the times. **Knowledge:** 1. Understand the Marxist perspective on situation and policy, and master the basic methods and general principles for analyzing situation and policy. 2. Understand the current national conditions of China, the public opinion base, and the basic spirit of the Party's line, principles, and policies. 3. Understand the main differences between Chinese characteristics and the Western model, and grasp China's position, opportunities and challenges in the global landscape. **Skill:** 1. Able to use Marxist standpoints, viewpoints, and methods to conduct basic analysis of typical situations and policy issues. 2. Able to sort out, summarize, and rationally comment on major domestic and international events and social hotspots. 3. Students can combine classroom learning with real-world cases and current events to develop basic problem awareness and preliminary judgment. **Ability:** 1. Possess basic situational analysis and policy understanding abilities, and maintain rationality and composure amidst complex information. 2. Firmly uphold ideals and beliefs and the "Four Confidences" of socialism with Chinese characteristics, and form relatively stable value judgments. 3. Enhance patriotism and social responsibility, consciously link personal development with the overall situation of national rejuvenation, and strive to grow into responsible college students of the new era.
Contents	**Theoretical instruction (32 contact hours, 8 self-study hours)** Chapter 1: Accelerating the Construction of a Socialist Cultural Power (8 contact hours , 2 self-study hours) 1. Strengthen the national spirit and shoulder historical mission; 2. Extraordinary achievements demonstrate the power of practice; 3. Firmly confidently usher in a new era. Chapter 2:China's Economy Achieves Steady and Sustainable Development (8 contact hours , 2 self-study hours) 1. Where does confidence in development come from? 2. What do we rely on to overcome difficulties? 3. How to be proactive and enterprising . Chapter 3: Cultivating a Green Foundation for Building a Beautiful

	China (8 contact hours , 2 self-study hours) 1、The profound significance of green transformation ; 2、Green China has achieved remarkable results ; 3、Green development is a long and arduous task . Chapter 4: From a Large Educational Country to a Strong Educational Country (8 contact hours , 2 self-study hours) 1、solid foundation Strategic support ; 2、Flourishing High quality and balanced; 3、Deepen reform Systematic advancement.
Study and examination requirements and forms of examination	1. Attendance rate (50 %): Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Self-study rate on the "Study the Great Nation" platform (50 %).
Media employed	Multimedia computer, projector
Reading list	1. Textbooks [1] Shishi Baogao Magazine. Shishi Baogao Daxuesheng Ban: 2024–2025 Xuenian Xia Xueqi [College Students' Edition of Current Affairs Report: Second Semester of Academic Year 2024–2025][M]. Beijing: Shishi Baogao Magazine Press, 2025. 3. Reference book [1] J. Xi. Xi Jinping: The Governance of China, Volume I [M]. Beijing: Foreign Languages Press, 2018. [2] J. Xi. Xi Jinping: The Governance of China, Volume II [M]. Beijing: Foreign Languages Press, 2017. [3] J. Xi. Xi Jinping: The Governance of China, Volume III [M]. Beijing: Foreign Languages Press, 2020. [4] J. Xi. Xi Jinping: The Governance of China, Volume IV [M]. Beijing: Foreign Languages Press, 2022. [5] Editorial Board of CPC Central Committee Documents. Selected Readings from the Works of Xi Jinping, Volume I [M]. Beijing: People's Publishing House, 2023. [6] Editorial Board of CPC Central Committee Documents. Selected Readings from the Works of Xi Jinping, Volume II [M]. Beijing: People's Publishing House, 2023.

“ Situation and Policy (1) - (8) ” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently , which may include court-related activities : previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self -study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
Chapter One: Accelerating the building of a socialist cultural power	1. Strengthen the national spirit and shoulder historical mission; 2. Extraordinary achievements demonstrate the power of practice; 3. Firmly confidently usher in a new era.	8	2	The "Study the Great Nation" app is used to learn about relevant current affairs and policies.	The class monitor supervises the online recording of class hours .

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self -study hours	Self-study content	Self-study hours supervision methods
Chapter Two: China's economy is moving steadily and sustainably.	1. Where does confidence in development come from? 2. What do we rely on to overcome difficulties? 3. How to be proactive and enterprising .	8	2	The "Study the Great Nation" app is used to learn about relevant current affairs and policies.	The class monitor supervises the online recording of class hours .
Chapter Three: Thick green base color Building a Beautiful China	1. The profound significance of green transformation ; 2. Green China has achieved remarkable results ; 3. Green development is a long and arduous task .	8	2	The "Study the Great Nation" app is used to learn about relevant current affairs and policies.	The class monitor supervises the online recording of class hours .
Chapter Four: From a large education nation to a strong education nation	1. solid foundation Strategic support ; 2. Flourishing High quality and balanced; 3. Deepen reform Systematic advancement.	8	2	The "Study the Great Nation" app is used to learn about relevant current affairs and policies.	The class monitor supervises the online recording of class hours .
(Theoretical Teaching) Subtotal		32	8		
total		32	8	Total class hours = 40 hours	
Educational Credits (ECTS)		1.3			

National Security Education

Competence field	General Education
Curriculum designation	National Security Education
Curriculum code	9191311010
Semester(s) in which the curriculum is taught	1st Semester
Person responsible for the curriculum	Xue Du
Lecturer	Yu Zhong, Huan Duan, Xue Du, Ting Zhang, Zhaoyu Zhou
Language	Chinese
The relationship between the curriculum and the major	"National Security Education" and the electronic information major form a complementary relationship of "security foundation" and "technology carrier". The former sets the security boundaries for the electronic information major by explaining regulations such as the Cybersecurity Law, clarifying the legal red lines for the use of technology, indicating the priorities for safeguarding critical information infrastructure, and helping students build a security awareness of "technology for good" to avoid technology abuse. The latter is the core carrier for practicing national security education. The technologies of electronic information, such as network attack and defense, data encryption, and communication security, are the direct means to safeguard national network, data, and communication security, defend against cyber attacks, protect core data, and ensure the security of communication links. They are the technical support for national information security. The combination of the two can also enhance students' core competitiveness, meet the demand for "technology + security awareness" in positions such as national defense, military industry, and cyber security, and enable students to safeguard the country with professional capabilities and realize career value.
Teaching methods, number of teaching hours	Target students: all current undergraduate students Teaching method: Theoretical teaching + practical teaching Teaching hours (Contact hours): 16 hours Among them: Theoretical instruction: 12 class hours Laboratory/practical teaching: 4 hours Class size: Organized by administrative class
Workload	Total workload = 30 class hours; Contact hours = 16 hours; Self-study hours = 14 hours;
Credit points (ECTS)	1
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds will have

	grades.
Prerequisite curriculum	no
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to enable students to have an in-depth understanding of the principles and applications of microcontrollers and to master the design and development methods of microcontroller systems. The specific objectives include: **Knowledge:** Through safety education, college students should learn basic safety knowledge, including national security; Psychological safety; Personal safety; Property safety; Fire safety; Traffic safety; Food safety; Cyber security; Basic knowledge of disaster prevention and risk avoidance. **Skills:** Through safety education, college students should acquire safety prevention skills, safety information search and safety management skills. Master self-protection skills, communication skills, problem-solving skills, etc. based on safety. **Ability:** Through safety education, college students should develop a sense of safety first, establish a positive and correct view of safety, combine safety issues with personal development and national needs and social development, and make active and positive efforts to build a safe life.
Contents	**Theoretical instruction (12 contact hours, 3 self-study hours)** Introduction: Overview and Preparatory Knowledge (1 contact hour, 0.2 self-study hours) 1.Definition and importance of national security; 2.Overview of the curriculum structure. Chapter 1: A Profound Understanding of China's National Security Situation in the New Era (1 contact class hour, 0.4 Self-study class hours) 1.The establishment and scientific connotations of the overall national security outlook; 2.Key areas and basic characteristics of the overall national security outlook. Chapter 2: Continuously Strengthening National Security Education for College Students (1 contact hour, 0.2 self-study hours) 1. Uphold the Party's absolute leadership over national security work; 2. The path of national security with Chinese characteristics; 3. Modernize the national security system and capacity.

	Chapter 3: In-depth Study and Implementation of the Overall National Security Outlook (1 contact hour, 0.4 self-study hours) 1.The significance of coordinating development and security; 2.The scientific implications, approaches and methods of coordinating development and security. Chapter 4: Approaches and Methods for Maintaining National Cyber Security in the New Era (1 contact hour, 0.2 self-study hours) 1. Building a strong homeland security barrier; 2. Ecological security barrier; 3. Resource security barrier; 4. National Cyber Security barrier; 5. Nuclear security barrier. Chapter 5: Strive to Be a Firm Practitioner of the Overall National Security Outlook (1 contact class hour, 0.2 Self-study class hours 1. Enhance national security awareness and uphold the supremacy of national interests; 2. Enhance the sense of foreboding, the spirit of struggle, and the sense of social responsibility. Chapter 6: Insisting on Economic Security (2 contact hours, 0.4 self-study hours) 1. Adhere to the scientific content based on economic security; 2. Risks and challenges to economic security in the new era; 3. Approaches and methods for maintaining economic security in the new era. Chapter 7: Ensuring Military, Scientific, Cultural and Social Security (1 contact hour, 0.2 self-study hours) 1.The scientific connotations of military, science and technology, culture and social security; 2.Analysis of the risks and challenges of security in various fields in the new era; 3.Approaches and methods for maintaining security in various fields. Chapter 8: Insisting on Promoting International Security (1 contact hour, 0.2 self-study hours) 1.The significance of advocating for a new global and regional security outlook; 2.Measures to safeguard the common security of the international community; 3.Strategies and pathways for building a new type of international relations.

	Chapter 9: Strengthening National Security Barriers in Other Areas (1 contact hour, 0.4 self-study hours) 1.The scientific connotations of national territory, ecology, resources, network and nuclear security; 2.Analysis of the risks and challenges to security in various fields in the new era; 3.Ways and means to build security barriers in all fields. Chapter 10: Strive to Be a Firm Practitioner of the Overall National security Outlook (1 contact hour, 0.2 self-study hours) 1.Recognize that national security is the greatest security; 2.Grasping the national interest is the most fundamental interest; 3.Strengthen the sense of foreboding and carry forward the spirit of struggle; 4.Fulfill the legal obligation to safeguard national security and actively participate in national security education. **Practical teaching (4 contact hours, 11 self-study hours)** Practice 1: Core Content in All Areas of National Security Education (2 contact hours, 7 self-study hours) 1.Master the relevant theoretical knowledge; 2.Make a PPT; 3.Course presentation. Practice 2: Safeguarding National Security, Starting with Me (2 contact hours, 4 self-study hours) 1.Think about how a college student should safeguard national security; 2.Submit a reflection report.
Study and examination requirements and forms of examination	1. Attendance (40%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Assignments (60%) : Course presentation, reflection report.
Media employed	Multimedia computers, projectors
Reading list	1. Textbooks [1] Ministry of Education and other relevant central departments, eds. National Security Education: A Reader for College Students[M]. Beijing: Higher Education Press, 2024. 2. Reference book [1] R. Y. Ma and S. Yang. General Introduction to National Security Education in Universities in the New Era[M]. Beijing: Higher Education Press, 2021.

“ National Security Education ” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
Introduction: Overview and Preparatory Knowledge	1. Definition and importance of national security; 2. Overview of the course structure.	1	0.2	After-class reflections: 1. How to understand that the world is entering a new period of turbulence and change amid the century-old transformation. 2. In light of what has been seen and heard in daily life, talk about how to recognize the risks and challenges facing China's national security. How to understand the significance of conducting national security education. 3. Talk about how to learn the national security education course well based on your own learning experience.	1. Question interaction in class
1. Gain a deep understanding of China's national	1. The establishment and scientific connotations of the overall national security outlook;	1	0.4	Thoughts after Class: 1. How to grasp the main stages of the evolution of the Communist Party of China's thought on national security?	1. Question interaction in class

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
security situation in the new era	2. Key areas and basic characteristics of the overall national security outlook.			2. How to understand the core essence of the overall national security outlook? 3. In what aspects are the systems thinking and scientific methods of the overall national security outlook mainly reflected? 4. How to understand that the key to the overall national security outlook lies in the "overall"?	
2. Continuously strengthen national security education for college students	1. Uphold the Party's absolute leadership over national security work; 2. The path of national security with Chinese characteristics; 3. Modernize the national security system and capacity.	1	0.2	After-class reflections: 1. How to understand upholding the Party's absolute leadership over national security work? 2. How to understand the important features of the path of national security with Chinese characteristics? 3. How to grasp the significance of advancing the modernization of the national security system and capacity in the new era and new journey? 4. Talk about your understanding of the key tasks for advancing the modernization of the national security system and capacity.	1. Interactive questions in class
3. Study and implement the overall national security outlook in depth	1. The significance of coordinating development and security; 2. The scientific implications, approaches and methods of coordinating development and security.	1	0.4	After-class reflections: 1. How to understand the significance of coordinating development and security in the face of the profound and complex changes in our country's development environment? 2 Talk about your understanding of the relationship between development and security in light of events at home and abroad that you are familiar with. 3. How to adhere to the scientific way of thinking and firmly establish	1. Interactive questions in class

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				the concept of safe development? 4. How to understand the scientific connotation of ensuring a new development pattern with a new security pattern?	
4. Approaches and methods for maintaining National cyber security in the new era	1. Building a strong homeland security barrier; 2. Ecological security barrier; 3. Resource security barrier; 4. National Cybersecurity barrier; 5. Nuclear security barrier.	1	0.2	Post-class reflection 1. How to correctly understand the relationship between the Party's purpose of serving the people wholeheartedly and the overall national security outlook of adhering to the purpose of people's security? 2. In light of the important statements such as "putting people's lives and health first", "making every effort to ensure the safety of people's lives and property and social stability", and "work safety is a major issue concerning people's livelihood and cannot be relaxed in the slightest", talk about your understanding of the risks and challenges faced in maintaining people's security in the new era. 3. Illustrate the scientific connotation of taking people's safety as the purpose by referring to typical cases of national development in recent years. 4. Through people and events around you, talk about your understanding of the new era's commitment to putting people at the center and advancing the modernization of the national security system and capacity.	1. Interactive questions in class
5. Strive to be a firm practitioner	1. Enhance national security awareness and uphold the supremacy of national interests; 2. Strengthen the sense of foreboding,	1	0.2	After-class reflections: 1 Talk about your understanding of political security in light of your own growth and learning experiences. 2. How do you understand that political security must be fundamental	1. Interactive questions in class

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
of the overall national security outlook	the spirit of struggle, and the sense of social responsibility.			in the work of maintaining and shaping national security? 3. How to grasp the risks and challenges facing China's political security in the new era? 4. In light of daily study and life, talk about the important role of firm confidence in the path, theory, system and culture of socialism with Chinese characteristics in maintaining China's political security.	
6. Adhere to economic security as the foundation	1. Adhere to the scientific connotation based on economic security; 2. Risks and challenges to economic security in the new era; 3. The approaches and methods for maintaining economic security in the new era.	2	0.4	After-class reflections: 1. Why is the security of the basic economic system an important part of economic security? 2. Against the backdrop of the world entering a new period of turbulence and change, what are the main risks and challenges in safeguarding China's economic sovereignty and security? 3. Why should we not follow the old and wrong path in advancing Chinese-style modernization, but firmly follow the path of reform and opening up, which is inevitable? 4. Why should we accelerate the building of a modernized industrial system in the new era and on the new journey?	1. Interactive questions in class

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
7. Insist on military, science and technology, culture, and social security as safeguards	1. The scientific connotations of military, science and technology, culture and social security; 2. Analysis of the risks and challenges to security in various fields in the new era; 3. Ways and means to maintain security in various fields.	1	0.2	After-class reflections: 1. In light of the current domestic and international situation, talk about your understanding of insisting on military security as a guarantee. 2. In light of familiar cases, explain why technological innovation has become the main battlefield of international strategic games. 3. What are the main challenges in maintaining China's cultural security in the context of a century of change? 4. Why uphold and develop the Fengqiao Experience in the new era? What does this mean for maintaining social security?	1. Interactive questions in class
8. Be committed to promoting international security	1. The significance of advocating for a new global and regional security vision; 2. Measures to safeguard the common security of the international community; 3. Strategies and paths for building a new type of international relations.	1	0.2	After-class reflections: 1. How to understand the importance of upholding international security from the perspective of promoting the building of a community with a shared future for mankind? 2. How to understand the relationship between universal world security and the security of each country itself? 3. Where do the main risks and challenges to maintaining international security come from at present? 4. Talk about your understanding of China's global security initiative in light of current political hotspots of concern.	1. Interact with questions in class
9. Build up national security	1. The scientific connotations of territorial, ecological, resource, cyber and nuclear security; 2. Analysis of the risks and challenges	1	0.4	After-class reflections: 1. How to understand the scientific connotation of national security? How do you view the role of developing new energy in ensuring ecological security and resource security?	1. Interactive questions in class

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
barriers in other areas	to security in various fields in the new era; 3. Ways and means to build security barriers in all fields.			2 Talk about how to maintain network security, artificial intelligence and data security in light of your experiences using the Internet and mobile phones. 3 Talk about your understanding of the risks and challenges of maintaining nuclear security in connection with the Fukushima nuclear accident in Japan. 4. Why are biological, space, deep-sea and polar security regarded as the new and important frontiers of national security?	
10. Strive to be a firm practitioner of the overall national security outlook	1. Recognize that national security is the greatest security; 2. Grasping national interests is the most fundamental interest; 3. Strengthen the sense of foreboding and carry forward the spirit of struggle; 4. Fulfill the legal obligation to safeguard national security and actively participate in national security education.	1	0.2	Thoughts after class: 1. Why is the national interest the most fundamental interest? How can college students in the new era enhance their sense of crisis and carry forward the spirit of struggle? 2. In connection with your professional knowledge, talk about your understanding of the theoretical research on promoting and deepening the overall national security outlook. 3. How can college students fulfill their obligation to safeguard national security in their daily study and life?	1. Interactive questions in class
(Theoretical Instruction) Tips		12	3		
Practical teaching					
1. Practice One	Core content in all areas of national security education	2	7	1. Master the relevant theoretical knowledge; 2. Make a PPT;	1. Class presentation

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				3. Course presentation.	
2. Practice Two	Safeguarding national security starts with me	2	4	1. Think about how college students should safeguard national security; 2. Submit a reflection report.	1. Check the reflection report.
(Practical Teaching) Tips		4	11		
Total		16	14	The total class hours = 30 class hours	
Credits (ECTS)		1			

Military Theory for College Students

Competence field	General Education
Curriculum designation	Military Theory for College Students
Curriculum code	9132311020
Semester(s) in which the curriculum is taught	2nd Semester
Person responsible for the curriculum	Li Wan
Lecturer	Li Wan
Language	Chinese
The relationship between the curriculum and the major	This course is a public basic course for all undergraduate students. The course aims to popularize national defense knowledge, enhance students' awareness of national defense and national security, cultivate patriotism, collectivism and organizational discipline, improve students' overall quality, and lay the foundation for them to become socialist builders and successors with a sense of social responsibility.
Teaching methods, number of teaching hours	Target students: All freshmen in the university Teaching method: Theoretical instruction Teaching hours (Contact hours): 36 hours Among them: Theoretical instruction: 36 hours Class size: No more than 100 students per class is recommended
Workload	Total workload = 54 class hours; Contact hours = 36 hours; Self-study hours = 18 hours;
Credit points (ECTS)	1.8
Requirements according to the examination regulations	Students are required to attend on time, with an attendance rate of no less than two-thirds. Students must meet the above conditions to pass the regular grades.
Prerequisite curriculum	no
Curriculum objectives /expected learning outcomes	**Knowledge:** 1. Master the basic concepts of national defense, national defense history and current situation, and understand the connotation and extension of national defense; 2. Understand China's national defense system, national defense strategy, national defense policy and national defense achievements; 3. Be familiar with the main contents of national defense laws, armed forces and national defense mobilization; 4. Understand the connotation of national security, the overall national security outlook and the current national security situation; 5. Understand the development context, main contents and representative ideas of military thought;

	6. Master the basic characteristics of modern warfare, the forms and trends of information-based warfare. **Skills:** 1. Be able to apply knowledge of national defense to analyze real national defense issues; 2. Have basic military theoretical reasoning skills; 3. Be able to write standard military theory course assignments and reports. **Ability:** 1. Enhance national defense awareness and national security consciousness; 2. Cultivate patriotism, collectivism and organizational discipline; 3. Enhance comprehensive quality and establish a scientific view and methodology of war; 4. Inspire enthusiasm for learning high-tech and engaging in national defense construction.
Contents	**Theoretical instruction (36 contact hours, 18 self-study hours)** Chapter 1: National Defense in China (10 contact hours, 3 self-study hours) 1. National Defense Overview: Connotations, Types, History and Implications, Modern National Defense Perspective; 2. Defense law system, citizens' defense rights and obligations; 3. National defense construction: Institutions, strategies, policies, achievements, military-civilian integration; 4. Armed forces: Nature, purpose, mission, composition, development history; 5. National defense mobilization: Connotation, content, significance. Chapter 2: National Security (8 contact hours, 2 self-study hours) 1. National Security Overview: Content, Principles, Overall National security Outlook; 2. National security situation: Geoenvironment, geosecurity, security in emerging fields; 3. International strategic situation: Status quo, development trends, major national military forces and movements. Chapter 3: Military Thought (6 contact hours, 3 self-study hours) 1. Overview of Military Thought: Connotation, development history, status and role; 2. Foreign military Thought: Main contents, characteristics, representative works; 3. Ancient Chinese military thought: Content, characteristics, representative works;

	Chapter 4: Modern Warfare (6 contact hours, 2 self-study hours) 1. Overview of War: Connotations, Characteristics, and development history; 2. New Military Revolution: Connotation, Evolution, Content; 3. Mechanized warfare: Connotation, form, characteristics, examples; 4. Information warfare: Connotations, forms, characteristics, examples, trends. Chapter 5: Informationized Equipment (6 contact hours, 2 self-study hours) 1. Overview of Information Equipment: Content, Classification, Impact, Trends; 2. Informationized combat platform: Trends in the development of main battle equipment in various countries, application of battle examples; 3. Integrated electronic information systems: Command and control, early warning, navigation and other systems; 4. Information-based lethal weapons: New concept weapons, precision-guided weapons, nuclear, biological and chemical weapons, etc. Chapter 6: Final Self-study Review (0 contact hours, 6 self-study hours) 1. Review and consolidate the knowledge points learned this semester
Study and examination requirements and forms of examination	1. Assessment method Course assessment: The course assessment is divided into formative assessment grades and summative assessment grades. Formative assessment includes attendance, class performance, assignments, etc. Summative assessment refers to the final exam. 2. Overall grade assessment Total grade assessment: Total grade = Attendance and class performance grade *20%+ homework grade *20%+ final exam grade *60%
Media employed	Multimedia computers, projectors, online teaching platforms

Reading list	1. Textbooks [1] L. F. Guan, et al. Military Theory for College Students[M]. Beijing: National Defense University Press, 2013. 2. Reference book [1] S. C. Lan, et al. National Defense Education Textbook for Colleges and Universities[M]. Taishan: Taishan Publishing House, 2016. [2] Y. J. Ai, et al. College Military Course Tutorial[M]. Beijing: National Defense University Press, 2015. [3] X. C. Ding and Z. W. Zhang, et al. Military Theory Course[M]. Nanjing: Hohai University Press, 2002. [4] G. Q. Chen, J. H. Zheng, and F. Q. Cai, et al. Military Theory Tutorial for College Students[M]. Shanghai: Shanghai Jiao Tong University Press, 2019.

“ Military Theory for College Students ” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
Chapter 1: China's National Defense	1. National Defense Overview: Connotations, Types, History and Implications, Modern National Defense Perspective; 2. Defense law system, citizens' defense rights and obligations; 3. National defense construction: Institutions, strategies, policies, achievements, military-civilian integration; 4. Armed forces: Nature, purpose, mission, composition,	10	3	1. Read Chapter 1 of the textbook and complete the thinking questions; (1 class hour) 2. Watch national defense education videos. (2 class hours)	1. Discuss thinking questions in class. 2. The teaching platform records video views.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	development history; 5. National defense mobilization: Connotation, content, significance.				
Chapter 2: National Security	1. National Security Overview: Connotation, Principles, Overall National security Outlook; 2. National security situation: Geoenvironment, geosecurity, security in emerging fields; 3. International strategic situation: Status quo, development trends, major national military forces and movements.	8	2	1. Think about the national security situation and participate in the online discussion. (2 credits)	1. Discuss engagement records.
Chapter 3: Military Thought	1. Overview of military Thought: Connotation, development process, status and role; 2. Foreign military thought: Main content, characteristics, representative works; 3. Ancient Chinese military thought: Content, characteristics, representative works;	6	3	1. Read excerpts from representative military works, write reading notes, and complete in-class thinking questions. (2 class hours) 2. Review the key points of the chapter. (1 class hour)	1. Class discussion on thinking questions. 2. In-class quizzes.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Chapter 4: Modern Warfare	1. Overview of War: Connotations, Characteristics, and development history; 2. New Military Revolution: Connotation, Evolution, Content; 3. Mechanized warfare: Connotation, form, characteristics, examples; 4. Information warfare: Connotations, forms, characteristics, examples, trends.	6	2	1. Watch videos of modern warfare examples; (2 class hours)	1. The platform automatically records video views.
Chapter 5: Informationized Equipment	1. Overview of Information Equipment: Connotation, Classification, Impact, Trends; 2. Informationized combat platform: Trends in the development of main battle equipment in various countries, application of battle examples; 3. Integrated electronic information systems: Command and control, early warning, navigation and other systems; 4. Information-based lethal	6	2	1. Watch videos of information warfare examples; (2 class hours)	1. The platform automatically records video views.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	weapons: New concept weapons, precision-guided weapons, nuclear, biological and chemical weapons, etc.				
Chapter Six: Self-Study Review for the Final Exam	Knowledge points learned this semester	0	6	1. Review and consolidate what you learned this term	1. The school organizes online exams uniformly
Combined		36	18	Total hours = 54 hours	
Credits (ECTS)		1.8			

Practical Writing

Competence field	General Education
Curriculum designation	Practical Writing
Curriculum code	9051111050
Semester(s) in which the curriculum is taught	2th Semester
Person responsible for the curriculum	Jian'an Fu
Lecturer	Yuna He, Ping Wang, Lianhua Xu, Xiaoxia Zeng
Language	Chinese
The relationship between the curriculum and the major	"Practical Writing" is an important basic public course in undergraduate education. It aims to implement the spirit of the "Decision of the CPC Central Committee and the State Council on Deepening Educational Reform and Promoting Quality-Oriented Education in an All-Round Way" and fulfill the vocational education curriculum reform and textbook development plan proposed in the "Action Plan for Invigorating Education in the 21st Century". Through the study of this course, students will master the writing rules, methods and skills of practical documents. This not only directly improves their practical writing ability to meet the needs of future work, but also promotes their all-round development and enhances their overall quality through comprehensive training of reading and writing thinking. As one of the basic skills for students after graduation, it is conducive to their sustainable development.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Method: Theoretical Teaching Teaching hours (Contact hours): 16 hours Including: Theoretical Teaching: 16 hours Class Size: 4 classes with approximately 160 students
Workload	Total Workload = 23 hours Contact Hours = 16 hours Self-Study Hours = 7 hours
Credit points (ECTS)	0.8
Requirements according to the examination regulations	Only students with an attendance rate of over two-thirds and a homework completion rate of over two-thirds are eligible to take the exam.
Prerequisite curriculum	Basic Writing and Creative Writing
Curriculum objectives /Expected learning outcomes	**Learning Outcomes:** The main task of this course is to help students master the writing rules, methods and skills of practical documents, improve their practical writing ability and comprehensive literacy, and lay a solid foundation for future work and sustainable development. The

	specific objectives include: **Knowledge:** 1. Master the essential basic theories and fundamental knowledge of practical writing; 2. Understand the writing norms and structural characteristics of various commonly used practical documents; 3. Grasp the relevant national policies and regulations that need to be complied with in practical writing; 4. Learn the key elements (such as viewpoints, materials, language, punctuation) and requirements of standard practical writing. **Skills:** 1. Be able to proficiently write various commonly used practical documents that conform to national policies and regulations, with correct viewpoints, substantial content, reasonable structure, clear hierarchy, and appropriate language; 2. Be able to accurately use punctuation marks in practical writing and ensure clear and coherent expression; 3. Develop the ability to read and analyze practical documents from multiple dimensions (viewpoints, materials, structure, format, language, etc.); 4. Be able to conduct targeted evaluation and revision of practical documents to improve their standardization and effectiveness. **Ability:** 1. Enhance practical writing ability to meet the needs of daily work and social communication; 2. Foster comprehensive thinking ability through the integration of reading and writing training, promoting all-round development and overall quality improvement; 3. Cultivate critical thinking and document evaluation competence, enabling rational judgment of the quality of practical documents; 4. Lay a solid foundation for sustainable career development by mastering essential practical writing skills, and improve adaptability in future work scenarios.
Contents	**Theoretical Teaching (16 Contact Hours, 7 Self-Study Hours)** Chapter 1: Introduction (2 Contact Hours, 0.5 Self-Study Hours) 1. The Importance of Practical Writing in Work and Life 2. Concepts and Characteristics of Practical Documents 3. Differences Between Practical Writing and Literary Writing 4. Theme, Materials, and Structure of Practical Documents 5. Language Requirements for Practical Writing (Illustrate requirements such as clarity, conciseness, and appropriateness with examples) Chapter 2: Party and Government Official Document Writing (2

	Contact Hours, 0.5 Self-Study Hours) 1. Basic Knowledge of Official Documents 2. Notices and Reports 3. Circulars and Announcements Chapter 3: Administrative Document Writing (4 Contact Hours, 1 Self-Study Hour) 1. Plans 2. Summaries 3. Receipts and Couplets Chapter 4: Etiquette Document Writing (2 Contact Hours, 0.5 Self-Study Hour) 1. Opening Speeches and Closing Speeches 2. Applications (Proposal Letters, Competition Application Letters, Speech Drafts) Chapter 5: Specialized Letters (2 Contact Hours, 0.5 Self-Study Hour) 1. Resumes 2. Job Application Letters Chapter 6: News Document Writing (2 Contact Hours, 0.5 Self-Study Hour) 1. News Briefs and News Features 2. Comments and New Media Articles Chapter 7: Assessment (2 Contact Hours, 3.5 Self-Study Hours) 1. Assign Final Assessment Tasks 2. Submit Final Assessment Tasks
Study and examination requirements and forms of examination	1. Attendance and Classroom Performance (20%): Meet the basic course requirements (no lateness, no early departure, no unexcused absence). 2. Assignments (20%): In-class writing tasks and after-class assignments. 3. Final Assessment (60%): Final evaluation.
Media employed	Multimedia Computer, Projector, YUKETANG (Rain Classroom)

Reading list	1. Textbooks [1] J. Fu, A Guide to Practical Writing: Introduction, Guidance and Practice. Chengdu: University of Electronic Science and Technology of China Press, 2013. 2. Reference book [1] Y. Sun, Y. Feng, Practical Writing. Beijing: Tsinghua University Press, 2018. [2] Y. Lu, D. Zhan, et al., A Course in Practical Writing. Shanghai: Fudan University Press, 2015. [3] Y. Du, X. Zhou, Economic Practical Writing. Chengdu: Southwestern University of Finance and Economics Press, 2013.

"Practical Writing" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Introduction	1. The importance of practical writing in work and life; 2. The concept and characteristics of practical documents; 3. The differences between practical writing and literary writing; 4. The theme, materials, and structure of practical documents; 5. The language requirements for practical writing	2	0.5	After-Class Assignment: Master the linguistic characteristics of practical writing and distinguish it from basic writing.	Exercise Correction

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Party and Government Official Document Writing	1. Basic knowledge of official documents; 2. Notices and reports; 3. Circulars and announcements	2	0.5	Write a meeting minutes	Exercise Correction
3. Administrative Document Writing	1. Plans 2. Summaries 3. Receipts and couplets	4	1	Watch the micro-lecture videos on YUKETANG (Rain Classroom) and preview the teaching PPTs.	1. YUKETANG platform automatically records video viewing progress. 2. Exercise correction. 3. In-class random quiz: Verify review effectiveness.
4. Etiquette Documents Writing	1. Opening speeches and closing speeches 2. Applications (Proposal letters, competition application letters, speech drafts)	2	0.5	Watch the micro-lecture videos on YUKETANG (Rain Classroom) and preview the teaching PPTs.	1. YUKETANG platform automatically records video viewing progress. 2. Exercise correction.
5. Specialized Letters	1. Resumes 2. Job Application Letters	2	0.5	Watch the micro-lecture videos on YUKETANG (Rain Classroom) and preview the teaching PPTs.	1. YUKETANG platform automatically records video viewing progress. 2. Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
6. News-Related Documents	1. News Briefs and News Features 2. Comments and New Media Posts	2	0.5	1. Watch the micro-lecture videos on YUKETANG (Rain Classroom) and preview the teaching PPTs. 2. Complete the assigned after-class tasks.	1. The YUKETANG platform automatically records video viewing progress. 2. Exercise revision. 3. In-class random quiz: Verify review effectiveness.
7. Final Assessment	1. Assignment: Students are required to search online for future employment directions and positions related to their major, select one job recruitment posting, and write a resume tailored to that posting. 2. Student Review & Exam Preparation	2	3.5	1. Conduct research, collect relevant cases, and refer to the resume and job application letter writing requirements taught in class; 2. Review key knowledge points and consolidate difficult concepts; 3. Revise and review in-class writing assignments and practice works.	1. Form study groups for peer supervision: Group members agree on daily study schedules and tasks with each other, establish WeChat groups, and check in daily for record-keeping. 2. Instructor supervision: Set fixed offline or online consultation hours. Assess the overall review progress of the class based on the frequency and depth of students' questions. 3. Counselor supervision: Visit students' dormitories during the review week to supervise and inspect their review progress.
Total		16	7	Total Class Hours = 23 hours	
Credit points (ECTS)		0.8			

Mental Health Education for College Students

Competence field	General Education
Curriculum designation	Mental Health Education for College Students
Curriculum code	9131311010
Semester(s) in which the curriculum is taught	1st Semester, 2nd Semester
Person responsible for the curriculum	Fang Sun
Lecturer	Fang Sun, Huan Duan
Language	Chinese
The relationship between the curriculum and the major	"Mental Health Education for College Students" is a public compulsory course that combines knowledge transfer, psychological experience and behavioral training. This course aims to enable students to understand the standards and significance of mental health, enhance self-awareness of mental health care and awareness of psychological crisis prevention, master and apply mental health knowledge, develop self-awareness, interpersonal communication skills, self-regulation skills, effectively improve psychological quality, and promote the all-round development of students.
Teaching methods, number of teaching hours	Target students: all current undergraduate students Teaching method: Theoretical instruction + practical activities Teaching hours (Contact hours): 32 hours Among them: Theoretical instruction: 16 hours Laboratory/practical teaching: 16 hours Class size: Organized by administrative class
Workload	Total workload = 62 class hours; Contact hours = 32 hours; Self-study hours = 30 hours;
Credit points (ECTS)	2.1
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible for qualification.
Prerequisite curriculum	no
Curriculum objectives /expected learning outcomes	**Knowledge:** Understand the relevant theories and basic concepts of psychology, understand the standards and significance of mental health, understand the psychological development characteristics and abnormal manifestations of people during the college stage, and master the basic knowledge of self-adjustment. **Skills:** Master self-exploration skills, psychological adjustment skills, and psychological development skills. Such as learning and development

	skills, environmental adaptation skills, stress management skills, communication skills, problem-solving skills, self-management skills, interpersonal skills and career planning skills, etc. **Ability:** Develop an autonomous awareness of mental health development, be able to objectively evaluate one's physical condition, mental state, behavioral ability, etc., correctly recognize and accept oneself, and be able to adjust oneself or seek help when encountering psychological problems.
Contents	**Theoretical instruction (16 contact hours, 12 self-study hours)** Unit 1: Knocking on the Heart - Happiness Begins Here (3 contact hours, 1 self-study hour) 1. The meaning and criteria of mental health; 2. The current state and influencing factors of mental health among college students; 3. Freshman adaptation and mental health promotion. Unit 2: Exploring Yourself - Live Your True Self (3 contact hours, 2 self-study hours) 1. Overview and Assessment of Self-awareness 2. Characteristics of self-awareness development among college students; 3. Self-awareness bias and adjustment; 4. Integration of ideological and political education into the curriculum (introduction to the video "Touching China Figures - Jiang Mengnan"). Unit 3: Facing the Storm - Managing Negative Emotions (2 contact hours, 2 self-study hours) 1. The nature and types of emotions; 2. The impact of emotions on college students; 3. Emotional management methods. Unit 4: Communicating You and Me - Experiencing the Joy of Interpersonal Interaction (3 contact hours, 2 self-study hours) 1. Interpersonal relationships and interpersonal communication; 2. Characteristics and problems of interpersonal relationships; 3. Interpersonal adjustment and optimization. Unit 5: Encountering Beautiful Love (2 contact hours, 1 self-study hour) 1. An overview of the psychology of love; 2. Enhancing the ability to love; 3. Maintain sexual mental health.

	Unit 6: The Gray and Black Zones of the Mind - Identification and Prevention of Common Mental Disorders (3 contact hours, 4 Self-study hours) 1. A general understanding of abnormal psychology; 2. Preliminary identification of common mental disorders; 3. Knowledge of diagnosis, treatment and rehabilitation. Practical activities **(16 contact hours, 18 self-study hours)** Practice Activity 1: Group Counseling (8 contact hours, 0 self-study hours) Content: Conduct thematic group psychological counseling activities to promote self-exploration and emotional expression Practice Activity 2: Mental Health Knowledge Lecture (2 contact hours, 0 self-study hours) Content: Organize mental health-themed lectures or mental situational drama performances to enhance mental literacy Practice Activity 3: Psychological Theater (6 contact hours, 18 self-study hours) Content: Organize a performance of psychological skits
Study and examination requirements and forms of examination	Examination format: Assessment Final grades include: ① Regular process assessment (20%) : attendance, activity engagement, learning attitude. ② Group counseling participation Record (20%) : Submit activity participation records and personal experience summaries to reflect the depth of self-exploration and emotional expression. ③ Psychological Theater Creation (60%) : Complete the creation, rehearsal and performance of psychological skits in groups, and submit the script, character analysis, rehearsal records and performance reflection reports.
Media employed	Multimedia computers, projectors, Keil and Proteus software, single-chip microcomputer experiment boxes
Reading list	1. Reference book [1] J. P. Xi. Hold High the Great Banner of Socialism with Chinese Characteristics and Strive in Unity to Build a Modern Socialist Country in All Respects[M]. Beijing: People's Publishing House, 2022. [2] H. Xu, Q. H. Wu. General Psychology[M]. Beijing: Beijing Normal University Press, 2015. [3] X. L. Fu. Emotional Psychology[M]. Shanghai: East China Normal University Press, 2025.

“ Mental Health Education for College Students ” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
Unit 1: Knocking on the Heart - Happiness Begins Here	1. The meaning and criteria of mental health; 2. The current state and influencing factors of mental health among college students; 3. Freshman adaptation and mental health promotion.	3	1	Read textbooks and watch related micro-lesson videos	Online learning records
Unit 2: Exploring Yourself - Live Your True Self	1. Overview and Assessment of self-awareness; 2. Characteristics of self-awareness development among college students; 3. Self-awareness bias and	3	2	Complete the self-awareness assessment and watch the ideological and political video	Class sharing, online learning notes

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	adjustment; 4. Integration of ideological and political education into the curriculum (introduction to the video "Touching China Figures - Jiang Mengnan").				
Unit 3: Facing the Storm - Managing Negative Emotions	1. The nature and types of emotions; 2. The impact of emotions on college students; 3. Emotional management methods.	2	2	Read emotional management cases and discuss them in groups	Class group discussion
Unit 4: Communicating You and Me - Experiencing the Joy of Interpersonal Interaction	1. Interpersonal relationships and interpersonal interaction; 2. Characteristics and problems of interpersonal relationships; 3. Interpersonal adjustment and optimization.	3	2	Interpersonal communication scenario simulation, learning communication skills video	Role-playing performance
Unit 5: Encountering a Wonderful Love	1. An overview of the psychology of love; 2. Enhancing the ability to love; 3. Maintain sexual mental health.	2	1	Watch sex education videos	ıti-online learning records

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Unit 6: The Gray and Black Zones of the Mind - Identifying and Preventing Common Mental disorders	1. A general understanding of abnormal psychology; 2. Preliminary identification of common mental disorders; 3. Knowledge of diagnosis, treatment and rehabilitation.	3	4	Study popular science materials on mental illness and discuss in groups	Class group discussion
(Theoretical teaching) Tips		16	12		
Practical teaching					
Practical Activity 1: Group counseling	Conduct thematic group counseling activities to promote self-exploration and emotional expression.	8	0	---	---
Practice 2: Lectures on mental health knowledge	Organize mental health-themed lectures or performances of psychological skits to enhance mental literacy	2	0	---	---
Practice Activity 3: Psychological Theater	Organize performances of psychological skits	6	18	Determine the theme, create the script, prepare for rehearsal, perfect the rehearsal, and perform on the spot	Check the final performance results

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
(Practical Teaching) Tips		16	18		
Total		32	30	Total hours = 62 hours	
Credits (ECTS)		2.1			

University Physical Education and Health (1)

Competence field	General Education
Curriculum designation	University Physical Education and Health (1)
Curriculum code	9103811010
Semester(s) in which the curriculum is taught	1st Semester
Person responsible for the curriculum	Yueshan Ou
Lecturer	Yueshan Ou, Lihong Chen, Yang He, Xufeng Zhang, Le Li
Language	Chinese
The relationship between the curriculum and the major	Physical education is one of the basic courses in the teaching plan of institutions of higher education, the central link of physical education work in colleges and universities, and the main approach to fulfill the tasks of physical education in higher education. Through a reasonable physical education teaching process and scientific physical exercise process, students will enhance their sports awareness, improve their sports ability, develop the habit of physical exercise, receive good ideological and moral education, and become physically strong builders and successors of the socialist cause. It lays a solid physical foundation for future career development in the field of Electronic Information Engineering.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Methods: Theoretical Teaching, Practical Teaching Teaching Hours (Contact Hours): 32 hours Including: Theoretical Teaching: 20 hours Practical Teaching: 12 hours Class Size: Approximately 160 students in four classes
Workload	Total Workload = 32 class hours; Contact Hours = 32 hours; Self-study Hours = 0 hours;
Credit points (ECTS)	1.1
Requirements according to the examination regulations	Only students with an attendance rate of more than two-thirds and who have completed more than 70 kilometers of morning running are eligible to take the physical fitness test.
Prerequisite curriculum	None
Curriculum objectives /expected learning outcomes	**Learning Outcomes:** Core Task of the Course: Help students master core knowledge and skills of physical exercise, develop the habit of voluntary exercise and lifelong physical activity awareness, and realize the coordinated development of physical fitness, psychological state and social adaptability. Specific objectives are as follows: **Knowledge:**

	1. Master the basic principles of fitness exercises and understand the fitness value and application scenarios of different sports events; 2. Clarify the physical fitness test indicators and evaluation standards, and grasp the key knowledge to improve physical fitness and physical quality; 3. Understand the connotation of sports culture and master the prevention and simple disposal methods of common sports injuries; 4. Clarify the core requirements of sportsmanship and understand the dialectical relationship between competition and cooperation in sports. **Skills:** 1. Proficiency in more than two fitness skills (including one-hand overhead shot) and ability to complete technical movements standardizedly; 2. Be able to evaluate personal health status using physical fitness test methods and formulate exercise directions based on the results; 3. Be able to independently compile feasible personal exercise plans and master basic skills for emotional regulation during sports; 4. Master team communication methods and possess basic skills for group mutual assistance and cooperative learning. **Ability:** 1. Be able to persist in physical exercise voluntarily (complete tasks such as morning running) and establish lifelong physical activity awareness; 2. Improve psychological state through physical activity, overcome obstacles, and develop a positive and optimistic attitude towards life; 3. Possess good physical fitness and sports ability, and be able to successfully pass the annual student physical fitness test; 4. Demonstrate good sportsmanship and team spirit in team sports, and correctly handle the relationship between competition and cooperation; 5. Have basic ability to appreciate sports culture, experience fun and a sense of success in sports, and form a healthy lifestyle.
Contents	**Theoretical Teaching (20 contact hours, 0 self-study hours)** **① Basic Theory of Physical Education (2 contact hours, 0 self-study hours)** Teaching Objectives: Help students understand the purposes and tasks of physical education in China, enhance their understanding of the human body and health as well as the demand for physical education in modern society; enable students to master knowledge about physical health and scientific fitness methods, and improve their self-care

	awareness; understand sports competition rules and refereeing methods, and improve appreciation ability. Main Content: a. Introduction to Physical Education: Functions of physical education; principles, contents and methods of lifelong physical education. b. Sports Competitions: Rules and refereeing methods. Key Teaching Points: Lifelong physical education, competition rules of various events. Difficult Teaching Points: How to understand and apply physical education and health knowledge and competition rules. Compulsory Part: **② Athletics (2 contact hours, 0 self-study hours)** Teaching Objectives: Enable students to understand and master the basic knowledge, basic skills and exercise methods of sprinting and middle and long-distance running; develop students' physical qualities such as speed and endurance. Main Content: a. Middle and long-distance running b. Physical fitness training Key Teaching Points: Improve and enhance the technical level of mid-run. Difficult Teaching Points: Master the correct breathing method for middle and long-distance running. **③ Basketball (4 contact hours, 0 self-study hours)** Teaching Objectives: Enable students to master the basic skills of basketball; develop physical qualities such as speed, agility and coordination, and enhance physical fitness; cultivate the collectivist spirit of unity and cooperation and the competitive awareness of tenacious struggle. Main Content: a. Movement b. Passing and catching c. Shooting d. Dribbling e. Physical fitness training Key Teaching Points: Master the basic skills of passing, catching, shooting and dribbling in basketball. Difficult Teaching Points: Mastery of basketball shooting technology. **④ Football (4 contact hours, 0 self-study hours)** Teaching Objectives: Enable students to master the basic skills of football; develop physical qualities such as speed, agility, strength and endurance, and enhance physical fitness. Main Content: a. Juggling b. Kicking c. Controlling d. Heading e. Dribbling f. Physical fitness training

	Key Teaching Points: Master the basic skills of kicking and dribbling. Difficult Teaching Points: Integration of physical fitness and technical skills. **⑤ Volleyball (2 contact hours, 0 self-study hours)** Teaching Objectives: Enable students to master skills such as passing and setting in volleyball, understand competition rules and refereeing methods, and improve the ability to appreciate high-level competitions; develop physical qualities such as jumping, coordination and speed, and enhance physical fitness. Main Content: a. Ready position and footwork movement b. Setting c. Passing d. Serving e. Physical fitness training Key Teaching Points: Master the basic skills of setting and passing in volleyball. Difficult Teaching Points: Coordination between footwork movement and technical actions. Elective Courses: **⑥ Aerobics (2 contact hours, 0 self-study hours)** Teaching Objectives: Enable students to master the basic steps and complete sets of aerobics movements; understand scientific methods of physical exercise and enhance students' physical fitness; develop physical qualities such as agility, strength and coordination. Teaching Content: a. Basic posture of aerobics b. Basic steps and techniques of aerobics c. Popular aerobics (Levels 1, 2, 3) d. Aerobic endurance training Key Teaching Points: Basic steps of aerobics. Difficult Teaching Points: Movement intensity and sense of rhythm. **⑦ Wushu (Martial Arts) (2 contact hours, 0 self-study hours)** Teaching Objectives: Through learning, enable students to master basic Wushu skills and possess certain self-defense capabilities; understand the exercise value of Wushu; develop physical qualities such as strength, agility and coordination. Teaching Content: a. Hand shapes: Fist, palm, hook b. Hand techniques: Thrust punch, frame punch, push palm, bright palm c. Stances: Bow stance, horse-riding stance, empty stance, crouch stance, resting stance d. Footwork: Strike step, pad step, arc step e. Combined training of stances and footwork f. Wushu routines: Primary Changquan (Long Fist) g. 24-form simplified Tai Chi Chuan h. Sanda (Free Combat) i. Physical fitness training

	Key Teaching Points: Hand shapes, hand techniques, stances and footwork. Difficult Teaching Points: Combination of hand shapes, hand techniques, stances and footwork. **⑧ Badminton (2 contact hours, 0 self-study hours)** Teaching Objectives: Through learning, enable students to master basic technical movements and apply them in competitions, laying a foundation for lifelong exercise. Teaching Content: a. Grip b. Serving c. Backcourt techniques d. Net techniques Key Teaching Points: Grip, backcourt clear shot technique, footwork movement Difficult Teaching Points: Footwork movement, backhand clear shot from the backcourt **Practical Teaching (12 contact hours, 0 self-study hours)** **⑨ Morning Running (12 contact hours, 0 self-study hours)** Teaching Objectives: Through morning running, cultivate college students' healthy concept of loving sports and advocating physical activity, form good exercise habits, and continuously improve students' physical fitness and will quality. Implementation Plan: Time: Weeks 5 to 16, 6:30-7:15 a.m. every Tuesday to Friday (Flag-raising ceremony on Monday; make up independently in case of rain) Venue: West Track and Field Stadium, campus roads, and basketball courts of the university. Organization: The Student Affairs Office of each secondary college is responsible for overall coordination and organization, and arranges 1-2 counselors or class teachers every day; students participating in morning running gather at the football field of the East Track and Field Stadium in administrative classes and then disperse to run in different areas; 9-10 physical education teachers are arranged every day to assist in organization and technical instruction, and sports apps are used to monitor attendance, distance and speed of morning running; the final assessment is comprehensively evaluated by the School of Physical Education. Content and Requirements: Each morning run shall be no less than 2 kilometers at a speed of no less than 8 km/h.
Study and examination requirements and forms of examination	1. Attendance Rate (10%): Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Morning Running (30%): Total distance of morning running. 3. Final Assessment (60%): Final physical fitness test.
Media employed	Multimedia computers, projectors, Sports World APP

Reading list	1. Textbooks [1] J. Bai, College Physical Education: Theory and Practice Tutorial, Beijing: Ethnic Publishing House, 2015. 2. Reference Books [1] Ministry of Education of the People's Republic of China, Physical Education and Health Curriculum Standards (Compulsory Education), Beijing: Beijing Normal University Press, 2022.

"University Physical Education and Health (1)"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
Basic Theory of Physical Education	(1) Introduction to Physical Education: Functions of physical education; principles, contents and methods of lifelong physical education; (2) Sports Competitions: Core competition rules and basic refereeing methods of mainstream sports such as basketball, football and volleyball; (3) Ideological and Political Points: Combine the concept of lifelong physical education to guide students to establish a healthy lifestyle; cultivate students' sense of rules and fair competition through the study of competition rules;	2	—	—	—
Athletics	(1) Middle and Long-Distance Running: Technical links of middle and long-distance running; breathing methods; correction of common wrong movements;	2	—	—	—

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	(2) Physical Fitness Training: Special training methods for endurance, speed and coordination; (3) Ideological and Political Points: Cultivate students' perseverance, tenacious will and ability to overcome fatigue and difficulties in sports through endurance training of middle and long-distance running;				
Basketball	(1) Movement Techniques: Basic movement actions such as sliding steps, striding steps and sudden stops, used for position adjustment in offense and defense; (2) Passing and Catching Techniques: Two-hand chest pass, one-hand shoulder pass, two-hand chest catch, focusing on training passing accuracy and catching stability; (3) Shooting Techniques: One-hand overhead shot, standing shooting practice; (4) Dribbling Techniques: High and low dribbling, change-of-direction dribbling, training ball sense and dribbling stability; (5) Ideological and Political Points: Cultivate the collectivist spirit of unity and cooperation through team passing, catching and coordination training, and strengthen the competitive awareness of tenacious struggle in confrontation practice;	4	—	—	—
Football	(1) Basic Techniques: Juggling, kicking, controlling, heading, dribbling; (2) Physical Fitness Training: Speed training and agility training for football; (3) Ideological and Political Points: Cultivate the collectivist spirit in team coordination training, and strengthen the fighting spirit by overcoming mistakes in technical practice;	4	—	—	—
Volleyball	(1) Ready Position and Footwork Movement: Half-squat ready position, side step	2	—	—	—

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	movement, cross step movement; (2) Setting Techniques: Two-hand front setting, receiving and setting practice; (3) Passing Techniques: Two-hand front passing, basic setting practice; (4) Serving Techniques: Front underhand serving; (5) Physical Fitness Training: Jumping training and coordination training for volleyball; (6) Ideological and Political Points: Cultivate team cooperation ability through volleyball passing and setting coordination, and foster the spirit of not giving up in multi-rally practice;				
Aerobics	(1) Basic Posture: Standing posture, sitting posture, walking posture; (2) Basic Steps: Action essentials and rhythm control of basic steps such as marching, jumping jacks, knee lifts and lunges;	2	—	—	—
Wushu	(1) Hand Shapes and Hand Techniques: Fist, palm, hook; Thrust punch, frame punch, push palm, bright palm; (2) Stances and Footwork: Essentials of bow stance, horse-riding stance, empty stance, crouch stance, resting stance; movement essentials of strike step, pad step and arc step; (3) Combined Training: Simple combination of hand shapes and stances;	2	—	—	—
Badminton	(1) Grip: Postures and switching of forehand grip and backhand grip; (2) Serving: Forehand clear shot; (3) Backcourt Techniques: Basics of forehand backcourt clear shot and backhand backcourt clear shot;	2	—	—	—

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	(4) Net Techniques: Basic actions of net drop shot and net push shot; (5) Footwork Movement: Basic badminton footwork for quick positioning to receive the ball;				
Subtotal (Theoretical Teaching)		20	0		
Practical Teaching					
Morning Running	(1) Training Requirements: Each morning run shall be no less than 2 kilometers at a speed of no less than 8 km/h; record attendance; (2) Coordinated by the Student Affairs Office of each secondary college; (3) Ideological and Political Points: Cultivate students' regular work and rest and the habit of persistent exercise through long-term morning running, and temper their perseverance and ability to overcome difficulties in getting up early and long-distance running;	12	—	—	—
Subtotal (Practical Teaching)		12	0		
Total		32	0	**Total Hours = 32 class hours**	
Credit points (ECTS)		1.1			

University Physical Education and Health (2)

Competence field	General Education
Curriculum designation	University Physical Education and Health (2)
Curriculum code	9103811020
Semester(s) in which the curriculum is taught	2nd Semester
Person responsible for the curriculum	Yueshan Ou
Lecturer	Yueshan Ou, Lihong Chen, Yang He, Xufeng Zhang, Le Li
Language	Chinese
The relationship between the curriculum and the major	Physical education is one of the basic courses in the teaching plan of institutions of higher education, the central link of physical education work in colleges and universities, and the main approach to fulfill the tasks of physical education in higher education. Through a reasonable physical education teaching process and scientific physical exercise process, students will enhance their sports awareness, improve their sports ability, develop the habit of physical exercise, receive good ideological and moral education, and become physically strong builders and successors of the socialist cause. It lays a solid physical foundation for future career development in the field of Electronic Information Engineering.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Methods: Theoretical Teaching + Practical Teaching Teaching Hours (Contact Hours): 32 class hours Including: Theoretical Teaching: 20 hours Practical Teaching: 12 hours Class Size: Approximately 160 students in four classes
Workload	Total Workload = 32 class hours; Contact Hours = 32 hours; Self-study Hours = 0 hours;
Credit points (ECTS)	1.1
Requirements according to the examination regulations	Only students with an attendance rate of more than two-thirds and who have completed more than 70 kilometers of morning running are eligible to take the physical fitness test.
Prerequisite curriculum	None
Curriculum objectives /expected learning outcomes	**Learning Outcomes:** Core Task of the Course: Deepen the understanding of sports and health, improve sports skills and exercise ability, strengthen lifelong physical activity awareness, and promote the development of physical and mental health and social adaptability. **Knowledge:** 1. Master the core principles of physical exercise and the impact of

	sports on physical and mental health; 2. Clarify the physical fitness test standards and scientific methods for improving physical fitness; 3. Understand the characteristics of specialized sports and the prevention and disposal of common sports injuries; 4. Clarify the connotation of sportsmanship and the importance of team cooperation. **Skills:** 1. Proficiency in more than two fitness skills (including one-hand overhead shot) with standardized movements; 2. Be able to evaluate health status using physical fitness tests and formulate personalized exercise plans; 3. Master emotional regulation skills during sports and basic team communication methods. **Ability:** 1. Be able to voluntarily complete exercise tasks such as morning running and establish lifelong physical activity awareness; 2. Improve psychological state through sports and experience the fun and sense of success in sports; 3. Possess good physical fitness and be able to successfully pass the annual student physical fitness test;
Contents	**Theoretical Teaching (20 contact hours, 0 self-study hours)** **① Basic Theory of Physical Education (2 contact hours, 0 self-study hours)** Teaching Objectives: Help students understand the purposes and tasks of physical education in China, enhance their understanding of the human body and health as well as the demand for physical education in modern society; enable students to master knowledge about physical health and scientific fitness methods, and improve their self-care awareness; understand sports competition rules and refereeing methods, and improve appreciation ability. Main Content: a. Introduction to Physical Education: Functions of physical education; principles, contents and methods of lifelong physical education. b. Sports Competitions: Rules and refereeing methods. Key Teaching Points: Lifelong physical education, competition rules of various events. Difficult Teaching Points: How to understand and apply physical education and health knowledge and competition rules. Compulsory Part: **② Athletics (2 contact hours, 0 self-study hours)** Teaching Objectives: Enable students to understand and master the

	basic knowledge, basic skills and exercise methods of sprinting and middle and long-distance running; develop students' physical qualities such as speed and endurance. Main Content: a. Middle and long-distance running b. Physical fitness training Key Teaching Points: Improve and enhance the technical level of mid-run. Difficult Teaching Points: Master the correct breathing method for middle and long-distance running. **③ Basketball (4 contact hours, 0 self-study hours)** Teaching Objectives: Enable students to master the basic skills of basketball; develop physical qualities such as speed, agility and coordination, and enhance physical fitness; cultivate the collectivist spirit of unity and cooperation and the competitive awareness of tenacious struggle. Main Content: a. Movement b. Passing and catching c. Shooting d. Dribbling e. Physical fitness training Key Teaching Points: Master the basic skills of passing, catching, shooting and dribbling in basketball. Difficult Teaching Points: Mastery of basketball shooting technology. **④ Football (4 contact hours, 0 self-study hours)** Teaching Objectives: Enable students to master the basic skills of football; develop physical qualities such as speed, agility, strength and endurance, and enhance physical fitness. Main Content: a. Juggling b. Kicking c. Controlling d. Heading e. Dribbling f. Physical fitness training Key Teaching Points: Master the basic skills of kicking and dribbling. Difficult Teaching Points: Integration of physical fitness and technical skills. **⑤ Volleyball (2 contact hours, 0 self-study hours)** Teaching Objectives: Enable students to master skills such as passing and setting in volleyball, understand competition rules and refereeing methods, and improve the ability to appreciate high-level competitions; develop physical qualities such as jumping, coordination and speed, and enhance physical fitness. Main Content: a. Ready position and footwork movement b. Setting c. Passing d. Serving e. Physical fitness training

	Key Teaching Points: Master the basic skills of setting and passing in volleyball. Difficult Teaching Points: Coordination between footwork movement and technical actions. Elective Courses: **⑥ Aerobics (2 contact hours, 0 self-study hours)** Teaching Objectives: Enable students to master the basic steps and complete sets of aerobics movements; understand scientific methods of physical exercise and enhance students' physical fitness; develop physical qualities such as agility, strength and coordination. Teaching Content: a. Basic posture of aerobics b. Basic steps and techniques of aerobics c. Popular aerobics (Levels 1, 2, 3) d. Aerobic endurance training Key Teaching Points: Basic steps of aerobics. Difficult Teaching Points: Movement intensity and sense of rhythm. **⑦ Wushu (Martial Arts) (2 contact hours, 0 self-study hours)** Teaching Objectives: Through learning, enable students to master basic Wushu skills and possess certain self-defense capabilities; understand the exercise value of Wushu; develop physical qualities such as strength, agility and coordination. Teaching Content: a. Hand shapes: Fist, palm, hook b. Hand techniques: Thrust punch, frame punch, push palm, bright palm c. Stances: Bow stance, horse-riding stance, empty stance, crouch stance, resting stance d. Footwork: Strike step, pad step, arc step e. Combined training of stances and footwork f. Wushu routines: Primary Changquan (Long Fist) g. 24-form simplified Tai Chi Chuan h. Sanda (Free Combat) i. Physical fitness training Key Teaching Points: Hand shapes, hand techniques, stances and footwork. Difficult Teaching Points: Combination of hand shapes, hand techniques, stances and footwork. **⑧ Badminton (2 contact hours, 0 self-study hours)** Teaching Objectives: Through learning, enable students to master basic technical movements and apply them in competitions, laying a foundation for lifelong exercise. Teaching Content: a. Grip b. Serving c. Backcourt techniques d. Net techniques Key Teaching Points: Grip, backcourt clear shot technique, footwork movement Difficult Teaching Points: Footwork movement, backhand clear shot from the backcourt

	Practical Teaching (12 contact hours, 0 self-study hours) **⑨ Morning Running (12 contact hours, 0 self-study hours)** Teaching Objectives: Through morning running, cultivate college students' healthy concept of loving sports and advocating physical activity, form good exercise habits, and continuously improve students' physical fitness and will quality. Implementation Plan: Time: Weeks 5 to 16, 6:30-7:15 a.m. every Tuesday to Friday (Flag-raising ceremony on Monday; make up independently in case of rain) Venue: West Track and Field Stadium, campus roads, and basketball courts of the university. Organization: The Student Affairs Office of each secondary college is responsible for overall coordination and organization, and arranges 1-2 counselors or class teachers every day; students participating in morning running gather at the football field of the East Track and Field Stadium in administrative classes and then disperse to run in different areas; 9-10 physical education teachers are arranged every day to assist in organization and technical instruction, and sports apps are used to monitor attendance, distance and speed of morning running; the final assessment is comprehensively evaluated by the School of Physical Education. Content and Requirements: Each morning run shall be no less than 2 kilometers at a speed of no less than 8 km/h.
Study and examination requirements and forms of examination	1. Attendance Rate (10%): Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Morning Running (30%): Total distance of morning running. 3. Final Assessment (60%): Final physical fitness test.
Media employed	Multimedia computers, projectors, Sports World APP
Reading list	1. Textbooks [1] J. Bai, College Physical Education: Theory and Practice Tutorial, Beijing: Ethnic Publishing House, 2015. 2. Reference Books [1] Ministry of Education of the People's Republic of China, Physical Education and Health Curriculum Standards (Compulsory Education), Beijing: Beijing Normal University Press, 2022.

"University Physical Education and Health (2)"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
Basic Theory of Physical Education	(1) Introduction to Physical Education: In-depth understanding of the functions of physical education; advanced methods of lifelong physical education; (2) Sports Competitions: Expansion of competition rules for mainstream events; skills for appreciating sports events; (3) Ideological and Political Points: Combine "lifelong physical education and career development" to guide students to recognize the supporting role of a healthy physique for long-term work in the field of Electronic Information Engineering; cultivate a rational attitude towards winning and losing through sports event appreciation and strengthen the sense of rules;	2	—	—	—
Athletics	(1) Middle and Long-Distance Running: Advanced techniques; running strategies in	2	—	—	—

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	different scenarios; (2) Physical Fitness Training: Endurance enhancement, speed and explosive power, core strength, and improvement of body control ability; (3) Ideological and Political Points: Through the endurance challenge of middle and long-distance running, cultivate students' will quality of facing difficulties and perseverance, and strengthen the self-discipline awareness to "overcome inertia";				
Basketball	(1) Technical Advancement: Passing and catching (one-hand behind-the-back pass), shooting (standing jump one-hand overhead shot, running one-hand layup), dribbling (crotch dribbling, behind-the-back dribbling); (2) Basic Tactics: Personal defensive tactics (sliding step positioning, judgment of stealing timing), basic team cooperation (give-and-go, screen cooperation); (3) Physical Fitness Training: Basketball-specific strength, agility and coordination;	4	—	—	—
Football	(1) Technical Advancement: Kicking, controlling, dribbling; (2) Basic Tactics: Personal offensive tactics (judgment of dribbling breakthrough timing), basic team cooperation; (3) Physical Fitness Training: Football-specific strength (leg explosive power training: frog jumps), endurance (3000-meter run);	4	—	—	—
Volleyball	(1) Technical Advancement: Setting (side setting, back setting), passing (back pass, side pass), serving (front overhand serving); (2) Basic Tactics: Personal defensive tactics (blocking posture, moving positioning), basic team cooperation ("first pass + second pass + spike" offensive cooperation); (3) Physical Fitness Training: Volleyball-specific jumping ability, core strength (waist	2	—	—	—

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	and abdomen training: sit-ups), arm strength;				
Aerobics	(1) Technical Advancement: Complex steps (heel kick jump, leg kick jump), step combination (8-bar step sequence integrated with arm movements); (2) Complete Sets of Movements: Popular Aerobics Level 3 (6-8 bars), training movement continuity and expressiveness; (3) Aerobic Endurance: 4-minute continuous aerobics practice, adjusting exercise intensity with heart rate monitoring;	2	—	—	—
Wushu	(1) Technical Advancement: Combined hand techniques (continuous movements of thrust punch + push palm + bright palm), combined stances (bow stance thrust punch + horse-riding stance frame punch + empty stance bright palm); (2) Routine Deepening: Primary Changquan (5-8 movements), 24-form simplified Tai Chi Chuan (7-12 movements), focusing on movement charm and breathing coordination; (3) Self-defense Skills: Basic Sanda movements (straight punch, block), training reaction speed and self-defense application ability;	2	—	—	—
Badminton	(1) Technical Advancement: Serving (backhand net drop shot), backcourt techniques (forehand smash, backhand drop shot), net techniques (net smash, cross-court net shot); (2) Basic Tactics: Personal tactics (attack after serving, receiving position), basic doubles cooperation (front and backcourt positioning, rotation and supplementary positioning);	2	—	—	—
Subtotal (Theoretical Teaching)		20	0		
Practical Teaching					

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Morning Running	(1) Training Requirements: Each morning run shall be no less than 2 kilometers at a speed of no less than 8 km/h; record attendance; (2) Coordinated by the Student Affairs Office of each secondary college;	12	—	—	—
Subtotal (Practical Teaching)		12	0		
Total		32	0	**Total Hours = 32 hours**	
Credit points (ECTS)		1.1			

University Physical Education and Health (3)

Competence field	General Education
Curriculum designation	University Physical Education and Health (3)
Curriculum code	9103811030
Semester(s) in which the curriculum is taught	3rd Semester
Person responsible for the curriculum	Ou Liu
Lecturer	Ou Liu, Haiyan Gong, Weiping Zeng, Zhi Peng, Juan Liu
Language	Chinese
The relationship between the curriculum and the major	Physical education is one of the basic courses in the teaching plan of institutions of higher education, the central link of physical education work in colleges and universities, and the main approach to fulfill the tasks of physical education in higher education. Through a reasonable physical education teaching process and scientific physical exercise process, students will enhance their sports awareness, improve their sports ability, develop the habit of physical exercise, receive good ideological and moral education, and become physically strong builders and successors of the socialist cause. It lays a solid physical foundation for future career development in the field of Electronic Information Engineering.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Methods: Theoretical Teaching + Practical Teaching Teaching Hours (Contact Hours): 20 hours Including: Theoretical Teaching: 20 hours Class Size: Approximately 160 students in four classes
Workload	Total Workload = 20 class hours; Contact Hours = 20 hours; Self-study Hours = 0 hours;
Credit points (ECTS)	0.7
Requirements according to the examination regulations	Only students with an attendance rate of more than two-thirds and who have completed more than 70 kilometers of morning running are eligible to take the physical fitness test.
Prerequisite curriculum	None
Curriculum objectives /expected learning outcomes	**Learning Outcomes:** Core Task of the Course: Deepen the application ability of sports and health, improve the proficiency of sports skills, strengthen the literacy of independent exercise and team cooperation, and consolidate the concept of lifelong physical education. **Knowledge:** 1. Master the principles of advanced training for sports skills and targeted methods for improving physical fitness;

	2. Clarify the in-depth significance and optimization direction of core physical fitness indicators; 3. Understand the basic tactics of specialized sports and the cooperation logic of learning communities; 4. Clarify the practical requirements of sports competition etiquette and sportsmanship. **Skills:** 1. Proficiency in more than two fitness skills and preliminary mastery of single-item sports technology; 2. Be able to formulate and optimize personalized exercise plans based on physical conditions; 3. Master efficient communication skills and mutual assistance and cooperation methods in team sports. **Ability:** 1. Be able to independently adhere to regular exercise and firmly develop the habit of lifelong exercise; 2. Regulate emotions through sports and maintain a healthy psychology and self-confidence; 3. Meet the physical fitness standards and successfully complete the annual student physical fitness test; 4. Form a healthy lifestyle and possess basic sports aesthetics and adaptability;
Contents	**Theoretical Teaching (20 contact hours, 0 self-study hours)** **① Basketball (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Movement b. Passing and catching c. Shooting d. Dribbling e. Holding ball breakthrough f. Personal defense g. Rebounding h. Basic tactics i. Introduction to game methods and rules j. Physical fitness training 2. Teaching Requirements Students should master the general techniques and tactics of basketball, understand competition rules and refereeing methods; develop physical qualities such as speed, agility and coordination, and enhance physical fitness. 3. Key Teaching Points

	Master the basic skills of passing, catching, shooting and dribbling in basketball. 4. Difficult Teaching Points Application of basketball tactics. **② Football (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Juggling b. Kicking c. Controlling d. Heading e. Dribbling f. Tackling g. Throw-in h. Basic tactics i. Introduction to venues, equipment and competition rules j. Physical fitness training 2. Teaching Requirements Students should master the general techniques and tactics of football, understand competition rules and refereeing methods; develop physical qualities such as speed, agility, strength and endurance, and enhance physical fitness. 3. Key Teaching Points Master the basic skills of kicking and dribbling. 4. Difficult Teaching Points Application of basic tactics. **③ Volleyball (2 contact hours, 0 self-study hours)** 1. Teaching Content Ready position and footwork movement a. Setting b. Passing c. Serving d. Spiking e. Blocking f. Basic tactics g. Brief introduction to games and rules h. Physical fitness training 2. Teaching Requirements Master the passing, setting and other techniques and basic tactics of

	volleyball, understand competition rules and refereeing methods, and improve the ability to appreciate high-level competitions; develop physical qualities such as jumping, coordination and speed, and enhance physical fitness. 3. Key Teaching Points Master the basic skills of setting and passing in volleyball 4. Difficult Teaching Points Learning and application of basic tactics. **④ Tennis (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Grip method b. Forehand stroke c. Backhand stroke d. Serving e. Volley f. Lob g. Smash h. Footwork i. Basic tactics j. Introduction to venues, equipment and rules k. Physical fitness training 2. Teaching Requirements Students should initially master the main techniques, basic tactics and practice methods of tennis; improve students' physical qualities such as speed, explosive power and agility; understand the basic rules and refereeing methods of tennis competitions and improve the appreciation level. 3. Key Teaching Points Forehand stroke, backhand stroke, serving 4. Difficult Teaching Points Cultivation of ball control ability. **⑤ Table Tennis (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Grip method b. Basic stance and posture c. Basic footwork d. Serving e. Receiving serve

	f. Block g. Attack h. Chop i. Basic tactics j. Introduction to rules k. Physical fitness training 2. Teaching Requirements Students should basically master table tennis techniques; improve physical qualities such as agility, speed and explosive power; develop psychological qualities such as judgment, attention and reaction; understand the competition rules and refereeing methods of table tennis and be able to perform general refereeing work. 3. Key Teaching Points Master the serving and receiving skills. 4. Difficult Teaching Points How to improve the quality of serving and receiving. **⑥ Badminton (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Serving method b. Receiving method c. Hitting method d. Ball path e. Tactical application f. Strength quality 2. Teaching Requirements Master the basic techniques and tactics of badminton; understand the competition rules and refereeing work of badminton; develop sensitivity and coordination; improve physical health. 3. Key Teaching Points Master the serving and receiving skills. 4. Difficult Teaching Points How to improve the quality of serving and receiving. **⑦ Aerobics (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Basic posture of aerobics b. Basic steps and techniques of aerobics c. Popular aerobics (Levels 1, 2, 3) d. Aerobic endurance training

	2. Teaching Requirements Students should master the basic steps and complete sets of aerobics movements; understand scientific methods of physical exercise and enhance students' physical fitness; develop physical qualities such as agility, strength and coordination. 3. Key Teaching Points Basic steps of aerobics. 4. Difficult Teaching Points Movement intensity and sense of rhythm. **⑧ Wushu (Martial Arts) (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Hand shapes: Fist, palm, hook b. Hand techniques: Thrust punch, frame punch, push palm, bright palm c. Stances: Bow stance, horse-riding stance, empty stance, crouch stance, resting stance d. Footwork: Strike step, pad step, arc step e. Combined training of stances and footwork f. Wushu routines: Third Route Changquan (Long Fist) g. Wushu routines: 24-form simplified Tai Chi Chuan h. Sanda (Free Combat) i. Physical fitness training 2. Teaching Requirements Master basic Wushu skills and possess certain self-defense capabilities; understand the exercise value of Wushu; develop physical qualities such as strength, agility and coordination. 3. Key Teaching Points Hand shapes, hand techniques, stances and footwork. 4. Difficult Teaching Points Combination of hand shapes, hand techniques, stances and footwork. **⑨ Sports Dance (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Basic skills and physical training of ballroom dance b. Slow Foxtrot, Medium Foxtrot c. Slow Waltz, Medium Waltz, Quick Waltz d. Physical fitness training 2. Teaching Requirements Master basic movements; learn four types of dance steps; enrich

	extracurricular activities; improve personal humanistic quality and physical fitness. 3. Key Teaching Points Basic skills and physical training 4. Difficult Teaching Points Movement connection and coordination. ⑩ **Yoga (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Theoretical knowledge: Overview of yoga; common sense of yoga fitness requirements; b. Basic techniques A. Yoga meditation and related practices, exercises for various joint parts, individual postures, combined postures, special qualities B. Fitness content. Learn warm-up postures of fitness yoga; learn three sitting postures of fitness yoga; learn fitness yoga postures suitable for students; learn fitness yoga relaxation techniques. 2. Teaching Requirements Students should understand yoga theoretical knowledge and master basic yoga asanas; relieve stress and cultivate a peaceful state of mind through yoga practice, and experience the joy of success. 3. Key Teaching Points Unity of mind and body, synchronization of breathing and meditation. 4. Difficult Teaching Points Clarify the mechanism of each movement, and master the balanced development of upper and lower body, left and right sides, and internal and external coordination.
Study and examination requirements and forms of examination	1. Attendance Rate (40%): Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Final Assessment (60%): Final physical fitness test.
Media employed	Multimedia computers, projectors, Sports World APP

Reading list	1. Textbooks [1] J. Bai, College Physical Education: Theory and Practice Tutorial, Beijing: Ethnic Publishing House, 2015. 2. Reference Books [1] Ministry of Education of the People's Republic of China, Physical Education and Health Curriculum Standards (Compulsory Education), Beijing: Beijing Normal University Press, 2022.

"University Physical Education and Health (3)"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
Basketball	Technical Content: Movement (advanced sliding steps, cross steps); passing and catching (two-hand chest bounce pass); shooting (standing jump one-hand overhead shot, running layup); dribbling (crotch dribbling, behind-the-back dribbling); holding ball breakthrough (cross step breakthrough); personal defense (positioning, stealing); rebounding;	2	—	—	—
Football	Technical Content: Juggling (advanced inside-of-foot juggling, thigh juggling); kicking (inside-of-instep kicking, outside-of-instep kicking); controlling (outside-of-instep controlling, thigh controlling for high balls); heading; dribbling (sudden stop and change-of-direction dribbling); tackling (frontal tackling, side tackling); throw-in;	2	—	—	—
Volleyball	Technical Content: Ready position and footwork movement; setting; passing (back pass, side pass); serving; spiking (basic front spiking); blocking (single-person blocking	2	—	—	—

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	posture, moving positioning);				
Tennis	Technical Content: Grip method; forehand stroke; backhand stroke; serving (flat serve, basic topspin serve); volley (forehand volley, backhand volley); lob (defensive lob, offensive lob); smash (standing smash); footwork (sliding steps, cross steps);	2	—	—	—
Table Tennis	Technical Content: Grip method (penhold grip); basic stance and posture (close-to-table stance, mid-table stance); basic footwork (single step, striding step); serving; receiving serve (block receiving); block (quick block); attack (forehand quick attack, backhand quick attack); chop (forehand chop, backhand chop);	2	—	—	—
Badminton	Technical Content: Serving method (forehand clear shot, backhand net drop shot); receiving method (forehand smash return); hitting method (forehand smash, backhand drop shot); ball path (straight ball, diagonal ball);	2	—	—	—
Aerobics	Technical Content: Basic posture (advanced standing posture, sitting posture, walking posture to enhance physical beauty); basic steps (heel kick jump, leg kick jump); popular aerobics (complete sets of movements for Levels 1, 2, 3, 6-8 bars);	2	—	—	—
Wushu	Technical Content: Hand shapes (fist, palm); hand techniques (thrust punch, frame punch, push palm); stances (bow stance, horse-riding stance);	2	—	—	—
Sports Dance	Technical Content: Basic skills of ballroom dance (standing posture, holding posture to enhance physical posture); physical training (stretching, shaping exercises to improve physical coordination); dance step learning;	2	—	—	—
Yoga	Theoretical Knowledge: Overview of yoga (origin, development, classification); yoga fitness requirements (practice time, breathing coordination, safety precautions);	2	—	—	—

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Subtotal (Theoretical Teaching)		20	0		
Practical Teaching					
—	—	—	—	—	—
Subtotal (Practical Teaching)		0	0		
Total		20	0	**Total Hours = 20 hours**	
Credit points (ECTS)		0.7			

University Physical Education and Health (4)

Competence field	General Education
Curriculum designation	University Physical Education and Health (4)
Curriculum code	9103811040
Semester(s) in which the curriculum is taught	4th Semester
Person responsible for the curriculum	Ou Liu
Lecturer	Ou Liu, Haiyan Gong, Weiping Zeng, Zhi Peng, Juan Liu
Language	Chinese
The relationship between the curriculum and the major	Physical education is one of the basic courses in the teaching plan of institutions of higher education, the central link of physical education work in colleges and universities, and the main approach to fulfill the tasks of physical education in higher education. Through a reasonable physical education teaching process and scientific physical exercise process, students will enhance their sports awareness, improve their sports ability, develop the habit of physical exercise, receive good ideological and moral education, and become physically strong builders and successors of the socialist cause. It lays a solid physical foundation for future career development in the field of Electronic Information Engineering.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Methods: Theoretical Teaching + Practical Teaching Teaching Hours (Contact Hours): 20 class hours Including: Theoretical Teaching: 20 hours Class Size: Approximately 160 students in four classes
Workload	Total Workload = 20 class hours; Contact Hours = 20 hours; Self-study Hours = 0 hours;
Credit points (ECTS)	0.7
Requirements according to the examination regulations	Only students with an attendance rate of more than two-thirds and who have completed more than 70 kilometers of morning running are eligible to take the physical fitness test.
Prerequisite curriculum	None
Curriculum objectives /expected learning	**Learning Outcomes:** Core Task of the Course: Solidify the habit of physical exercise, deepen the application of sports skills, improve comprehensive sports literacy, and

outcomes	lay a solid foundation for lifelong physical education practice. **Knowledge:** 1. Master the core logic of optimization and innovative application of sports skills; 2. Clarify the methods for long-term maintenance of physical fitness and key points of health risk prevention and control; 3. Understand the inheritance value of sports culture and the organizational foundation of sports competitions; 4. Clarify the extended significance of sportsmanship in social life. **Skills:** 1. Proficiency in applying more than two fitness skills and flexible use of single-item technology according to scenarios; 2. Be able to optimize personal exercise plans and master emergency disposal skills for common sports injuries; 3. Possess tactical coordination ability and efficient communication skills in team sports. **Ability:** 1. Be able to independently plan lifelong exercise programs and integrate physical exercise into daily life; 2. Maintain stable physical fitness standards and complete the annual physical fitness test; 3. Form a mature and healthy lifestyle and be able to encourage others to participate in physical exercise.
Contents	**Theoretical Teaching (20 contact hours, 0 self-study hours)** ① **Basketball (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Movement b. Passing and catching c. Shooting d. Dribbling e. Holding ball breakthrough f. Personal defense g. Rebounding h. Basic tactics i. Introduction to game methods and rules j. Physical fitness training 2. Teaching Requirements Students should master the general techniques and tactics of basketball, understand competition rules and refereeing methods; develop physical qualities such as speed, agility and coordination, and enhance physical fitness.

	3. Key Teaching Points Master the basic skills of passing, catching, shooting and dribbling in basketball. 4. Difficult Teaching Points Application of basketball tactics. ② **Football (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Juggling b. Kicking c. Controlling d. Heading e. Dribbling f. Tackling g. Throw-in h. Basic tactics i. Introduction to venues, equipment and competition rules j. Physical fitness training 2. Teaching Requirements Students should master the general techniques and tactics of football, understand competition rules and refereeing methods; develop physical qualities such as speed, agility, strength and endurance, and enhance physical fitness. 3. Key Teaching Points Master the basic skills of kicking and dribbling. 4. Difficult Teaching Points Application of basic tactics. ③ **Volleyball (2 contact hours, 0 self-study hours)** 1. Teaching Content Ready position and footwork movement a. Setting b. Passing c. Serving d. Spiking e. Blocking f. Basic tactics g. Brief introduction to games and rules h. Physical fitness training 2. Teaching Requirements

	Master the passing, setting and other techniques and basic tactics of volleyball, understand competition rules and refereeing methods, and improve the ability to appreciate high-level competitions; develop physical qualities such as jumping, coordination and speed, and enhance physical fitness. 3. Key Teaching Points Master the basic skills of setting and passing in volleyball 4. Difficult Teaching Points Learning and application of basic tactics. **④ Tennis (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Grip method b. Forehand stroke c. Backhand stroke d. Serving e. Volley f. Lob g. Smash h. Footwork i. Basic tactics j. Introduction to venues, equipment and rules k. Physical fitness training 2. Teaching Requirements Students should initially master the main techniques, basic tactics and practice methods of tennis; improve students' physical qualities such as speed, explosive power and agility; understand the basic rules and refereeing methods of tennis competitions and improve the appreciation level. 3. Key Teaching Points Forehand stroke, backhand stroke, serving 4. Difficult Teaching Points Cultivation of ball control ability. **⑤ Table Tennis (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Grip method b. Basic stance and posture c. Basic footwork d. Serving

	e. Receiving serve f. Block g. Attack h. Chop i. Basic tactics j. Introduction to rules k. Physical fitness training 2. Teaching Requirements Students should basically master table tennis techniques; improve physical qualities such as agility, speed and explosive power; develop psychological qualities such as judgment, attention and reaction; understand the competition rules and refereeing methods of table tennis and be able to perform general refereeing work. 3. Key Teaching Points Master the serving and receiving skills. 4. Difficult Teaching Points How to improve the quality of serving and receiving. **⑥ Badminton (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Serving method b. Receiving method c. Hitting method d. Ball path e. Tactical application f. Strength quality 2. Teaching Requirements Master the basic techniques and tactics of badminton; understand the competition rules and refereeing work of badminton; develop sensitivity and coordination; improve physical health. 3. Key Teaching Points Master the serving and receiving skills. 4. Difficult Teaching Points How to improve the quality of serving and receiving. **⑦ Aerobics (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Basic posture of aerobics b. Basic steps and techniques of aerobics c. Popular aerobics (Levels 1, 2, 3)

	d. Aerobic endurance training 2. Teaching Requirements Students should master the basic steps and complete sets of aerobics movements; understand scientific methods of physical exercise and enhance students' physical fitness; develop physical qualities such as agility, strength and coordination. 3. Key Teaching Points Basic steps of aerobics. 4. Difficult Teaching Points Movement intensity and sense of rhythm. **⑧ Wushu (Martial Arts) (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Hand shapes: Fist, palm, hook b. Hand techniques: Thrust punch, frame punch, push palm, bright palm c. Stances: Bow stance, horse-riding stance, empty stance, crouch stance, resting stance d. Footwork: Strike step, pad step, arc step e. Combined training of stances and footwork f. Wushu routines: Third Route Changquan (Long Fist) g. Wushu routines: 24-form simplified Tai Chi Chuan h. Sanda (Free Combat) i. Physical fitness training 2. Teaching Requirements Master basic Wushu skills and possess certain self-defense capabilities; understand the exercise value of Wushu; develop physical qualities such as strength, agility and coordination. 3. Key Teaching Points Hand shapes, hand techniques, stances and footwork. 4. Difficult Teaching Points Combination of hand shapes, hand techniques, stances and footwork. **⑨ Sports Dance (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Basic skills and physical training of ballroom dance b. Slow Foxtrot, Medium Foxtrot c. Slow Waltz, Medium Waltz, Quick Waltz d. Physical fitness training 2. Teaching Requirements

	Master basic movements; learn four types of dance steps; enrich extracurricular activities; improve personal humanistic quality and physical fitness. 3. Key Teaching Points Basic skills and physical training 4. Difficult Teaching Points Movement connection and coordination. **⑩ Yoga (2 contact hours, 0 self-study hours)** 1. Teaching Content a. Theoretical knowledge: Overview of yoga; common sense of yoga fitness requirements; b. Basic techniques A. Yoga meditation and related practices, exercises for various joint parts, individual postures, combined postures, special qualities B. Fitness content. Learn warm-up postures of fitness yoga; learn three sitting postures of fitness yoga; learn fitness yoga postures suitable for students; learn fitness yoga relaxation techniques. 2. Teaching Requirements Students should understand yoga theoretical knowledge and master basic yoga asanas; relieve stress and cultivate a peaceful state of mind through yoga practice, and experience the joy of success. 3. Key Teaching Points Unity of mind and body, synchronization of breathing and meditation. 4. Difficult Teaching Points Clarify the mechanism of each movement, and master the balanced development of upper and lower body, left and right sides, and internal and external coordination.
Study and examination requirements and forms of examination	1. Attendance Rate (40%): Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Final Assessment (60%): Final physical fitness test.
Media employed	Multimedia computers, projectors, Sports World APP

Reading list	1. Textbooks [1] J. Bai, College Physical Education: Theory and Practice Tutorial, Beijing: Ethnic Publishing House, 2015. 2. Reference Books [1] Ministry of Education of the People's Republic of China, Physical Education and Health Curriculum Standards (Compulsory Education), Beijing: Beijing Normal University Press, 2022.

"University Physical Education and Health (4)"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
Basketball	Technical Content: Movement (sliding steps); passing and catching; shooting (standing jump one-hand overhead shot); dribbling (crotch dribbling, behind-the-back dribbling); holding ball breakthrough (cross step breakthrough, forward step breakthrough); personal defense; rebounding;	2	—	—	—
Football	Technical Content: Juggling (advanced inside-of-foot juggling, thigh juggling); kicking; controlling (outside-of-instep controlling); heading; dribbling (sudden stop and change-of-direction dribbling); tackling (frontal tackling, side tackling); throw-in;	2	—	—	—
Volleyball	Technical Content: Ready position and footwork movement (half-squat ready position); setting (side setting, back setting); passing; serving; spiking; blocking;	2	—	—	—
Tennis	Technical Content: Grip method; forehand stroke; backhand stroke; serving; volley;	2	—	—	—

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	lob; smash (standing smash, moving smash); footwork (sliding steps, cross steps);				
Table Tennis	Technical Content: Grip method (penhold grip, shakehand grip); basic stance and posture; basic footwork (single step, striding step, side step); serving; receiving serve; block (quick block, power block); attack; chop;	2	—	—	—
Badminton	Technical Content: Serving method (forehand clear shot, backhand net drop shot); receiving method (forehand smash return, backhand drop shot return); hitting method; ball path (straight ball, diagonal ball);	2	—	—	—
Aerobics	Technical Content: Basic posture (advanced standing posture, sitting posture, walking posture); basic steps (combination of heel kick jump, leg kick jump, knee lift jump); popular aerobics (complete sets of movements for Levels 1, 2, 3, 6-8 bars);	2	—	—	—
Wushu	Technical Content: Hand shapes (fist, palm); hand techniques (thrust punch, frame punch, push palm); stances (bow stance, horse-riding stance, empty stance);	2	—	—	—
Sports Dance	Technical Content: Basic skills of ballroom dance; physical training (stretching, shaping exercises); dance step learning;	2	—	—	—
Yoga	Theoretical Knowledge: Overview of yoga (origin, development, classification); yoga fitness requirements (practice time, breathing coordination, safety precautions);	2	—	—	—
Subtotal (Theoretical Teaching)		20	0		
Practical Teaching					
—	—	—	—	—	—

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Subtotal (Practical Teaching)		0	0		
Total		20	0	**Total Hours = 20 hours**	
Credit points (ECTS)		0.7			

Introduction to Artificial Intelligence

Competence field	General Education
Curriculum designation	Introduction to Artificial Intelligence
Curriculum code	9063111011
Semester(s) in which the curriculum is taught	1st Semester
Person responsible for the curriculum	Yonghong Wang
Lecturer	Cuihong zhou, Saiqiu Gou
Language	Chinese
The relationship between the curriculum and the major	"Introduction to Artificial Intelligence" is one of the basic courses for electronic information engineering. This course covers the basic theories and core concepts of computers, the development, classification and working principles of computers, as well as the basic theories and protection technologies of network security. Students should have a systematic grasp of the definition, development context, key technologies (such as machine learning, natural language processing) and typical application scenarios of artificial intelligence. Students should be proficient in using office software such as Word 2016, Excel 2016, PowerPoint 2016 to complete efficient typesetting, data processing and presentation design. Students should understand the core architecture, working principles and practical application methods of large models, be aware of their technical limitations and the competitiveness of optimization directions, and lay a solid foundation for future career development in the field of electronic information engineering.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + practice Teaching hours (Contact hours): 24 hours Among them: Theoretical instruction: 12 hours Laboratory/practical teaching: 12 hours Class size: 2 classes with approximately 85 students
Workload	Total workload =40 class hours; Contact hours = 24 hours; Self-study hours =16 hours;
Credit points (ECTS)	1.3
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	none
Curriculum objectives /expected learning outcomes	**Knowledge:** 1. Fundamentals of computer systems: including the history

	of computer development, classification, and the composition of hardware and software systems. 2. Data representation Basics: Understanding the representation of data in a computer, such as number system conversion, character encoding (like ASCII, Chinese character encoding), and complement operations. 3. Introduction to Artificial Intelligence: Master the definition, development history, key technologies (such as machine learning, natural language processing) and typical application scenarios of artificial intelligence. 4. Fundamentals of Large Models: Understand the basic working principles, typical architectural design ideas and application methods of large models (such as large language models). 5. Network Security and Ethics: Understand the basic concepts of network security, common forms of intrusion, basic encryption techniques and protection measures, and understand the ethical boundaries of data privacy regulations and technology applications. **Skills:** 1. Operating System management: Master the basic operations of Windows 10, file resource management, personalization Settings and the use of built-in tools, and be able to independently complete system configuration and file management tasks. 2. Office Software Application: Master the use of Word 2016 for document editing and efficient typesetting, Excel 2016 for basic data processing and analysis, PowerPoint 2016 for presentation, and develop basic office automation capabilities. 3. Intelligent office tools application: Master the basic skills of using artificial intelligence technology to assist in office work, such as intelligent document generation, intelligent table processing, intelligent slide generation, etc. **Ability:** 1. Office automation problem-solving skills: The ability to integrate knowledge of operating systems and office software to efficiently and standardly complete complex document, data, and presentation processing tasks. 2. Technology integration and innovative application skills: Have the awareness and initial ability to combine AI tools with traditional office scenarios, and be able to use AI to enhance office efficiency and quality. 3. Security protection and compliance practice: Strengthen cybersecurity awareness in practical operations, be able to take

	basic protective measures to protect information systems and data security, and comply with relevant data privacy regulations. 4. Science and technology ethics and social responsibility awareness: Establish an ethical sense of responsibility in the application of information technology, be able to view and rationally use technologies such as AI dialectically, avoid abuse, and possess an initial ability to judge the value of technology.
Contents	**Theoretical instruction (12 contact hours, 8 self-study hours)** Chapter 1: Computer Basics (2 **contact hours, 1 self-study hour**) 1.1 Development and Classification of computers 1.2 Computer Systems 1.3 Representation of data in a computer 1.4 Network Security and protection Chapter 2: Windows 10 Operating System (2 **contact hours, 1 self-study hour**) 2.1 Basic Windows 10 Operations 2.2 Windows 10 File Management 2.3 Windows 10 Personalization Settings 2.4 Windows 10 Accessories and Tools Chapter 6: Fundamentals of Artificial Intelligence (2 **contact hours, 2 self-study hours**) 6.1 Overview of Artificial Intelligence 6.2 Key technologies of Artificial intelligence 6.3 Applications of Artificial Intelligence 6.4 AI Security and Ethics Chapter 7: Large Models (2 **contact hours, 2 self-study hours**) 7.1 Overview of Large Models 7.2 Large Model Prompt words 7.3 Important large Model architectures Chapter 8: Applications of AI in the Office (4 **contact hours, 2 self-study hours**) 8.1 Document Intelligent processing 8.2 Intelligent table creation and processing 8.3 Smart Slide Generation **Practical teaching (12 contact hours, 8 self-study hours)** Chapter 2: Windows 10 Operating System (2 **contact hours, 1 self-study hour**) 2.1 Basic Windows 10 Operations 2.2 Windows 10 File Management 2.3 Windows 10 Personalization Settings 2.4 Windows 10 Accessories and Tools Chapter 3: Word 2016 Word Processing Software (**4 Exposure hours**, **2 Self-study hours**) 3.1 The working environment of Word 2016

	3.2 Basic operations for creating a document 3.3 Document Formatting 3.4 Making Tables 3.5 Insert Objects 3.6 Efficient Typesetting 3.7 Document Printing Chapter 4: Excel 2016 Spreadsheet Making (4 **contact hours, 4 self-study hours**) 4.1 Work Environment for Excel 2016 4.2 Basic Operations of Excel 2016 4.3 Making Charts 4.4 Data Management and Analysis 4.5 Print worksheets Chapter 5: PowerPoint 2016 Presentation (2 **contact hours, 1 self-study hour**) 5.1 PowerPoint 2016 Work Environment 5.2 Create a multimedia presentation 5.3 Customize the visual effects of your presentation 5.4 Set the playback effect of the presentation 5.5 Print and output the presentation
Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Computer-based (30%) : Computer-based test. 3. Final assessment (60%) : final exam.
Media employed	Multimedia computers, projectors, office software, artificial intelligence tools
Reading list	1. Textbooks [1]J. Jiang, X. Zhou, Y. Zhu et al., College Computers and Artificial Intelligence, 6th ed., Beijing: Beijing University of Posts and Telecommunications Press, 2025. 2. Reference book [1] Z. Mo, University Computer Science, 2nd ed., Beijing: Beijing University of Posts and Telecommunications Press, 2022. [2] Y. Wang, University Computer Science Practice Tutorial, 2nd ed., Beijing: Beijing University of Posts and Telecommunications Press, 2022. [3] J. Jiang and L. Zhang, University Computer Science, 6th ed., rev. ed., Beijing: Beijing University of Posts and Telecommunications Press, 2023. [4] X. Jia, X. Tong, and G. Gu, University Computer Science (Windows 10 & Office 2019) (Micro-Course & Ideological and Political Education Edition), Beijing: Beijing University of Posts and Telecommunications Press, 2024.

“Introduction to Artificial Intelligence” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Computer Basics	1. Development and Classification of computers 2. Computer systems; 3. Representation of data in computers; 4. Network Security and protection.	2	1	1.Preview before class: Understanding binary to decimal conversion rules; 2.After-class exercises.	1. Exercise correction
2 Windows 10 operating system	1. Basic Windows 10 operations; 2. Windows 10 File Management; 3. Windows 10 Personalization Settings; 4. Windows 10 Accessories and Tools.	2	1	1. Pre-class Preview: Understanding Windows 10 concepts and core features: File management, etc. 2. After-class exercises.	1. Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
6 Fundamentals of Artificial Intelligence	1. Overview of AI; 2. Key technologies of artificial intelligence; 3. Application of Artificial Intelligence; 4. AI Security and Ethics.	2	2	1. Preview Key technologies of AI: Deep learning: CNN (images), RNN/LSTM (Time series data), Transformer (NLP). Reinforcement learning: Q-learning, AlphaGo's Monte Carlo Tree search. Transfer learning: Fine-tuning applications for pre-trained models like BERT; 2. After-class assignments: Corresponding exercises.	1. Exercise correction.
7 Models	1. Overview of Large Models 2. Large model prompt words 3. Important large model architectures	2	2	1. Pre-class Preview: How Large Models Work and Design and Application of Large Model Prompts; 2. After-class exercises.	1. Exercise correction.
8 Applications of AI in the Office	1. Intelligent document processing 2. Table smart creation and processing 3. Slide Smart generation	4	2	1. Preview before class: Smart processing of documents, tables, slides; 2. After-class exercises.	1. Exercise correction.
(Theory Teaching) Tips		12	8		

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical teaching					
Chapter 2 Windows 10 Operating System (2 class hours)	1. Basic Windows 10 operations; 2. Windows 10 File Management; 3. Windows 10 Personalization Settings; 4. Windows 10 Accessories and Tools.	2	1	1. Windows 10 File Management 2. File Explorer	1. Perform corresponding self-study operations on your own computer.
Chapter 3 Word 2016 Word Processing Software (4 hours)	1. The working environment of Word 2016 2. Basic operations for creating a document 3. Document Formatting 4. Making Tables 5. Insert Objects 6. Efficient Typesetting 7. Document Printing	4	2	1.The working environment of Word 2016 2. Basic operations for creating a document 3. Document Formatting 4. Making Tables 5. Insert Objects 6. Efficient Typesetting 7 Document Printing	1.Complete the corresponding self-study content operations on your own computer.
Chapter 4 Excel 2016 Spreadsheet Making (4 hours)	1. Work Environment for Excel 2016 2. Basic Operations of Excel 2016 3. Making Charts 4. Data Management and Analysis 5. Print worksheets	4	4	1. Work environment for Excel 2016 2. Basic Operations of Excel 2016 3. Make Charts 4. Data Management and Analysis 5. Print worksheets	1. Complete the corresponding self-study operations on your own computer.
Chapter 5 PowerPoint 2016 Presentation (2	1. PowerPoint 2016 Work Environment 2. Create a multimedia presentation 3. Customize the visual effects of your	2	1	1. Work environment for PowerPoint 2016 2. Create a multimedia presentation	1. Complete the corresponding self-study content

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
hours)	presentation 4. Set the playback effect of the presentation 5. Print and output the presentation			3. Customize the visual effects of your presentation 4. Set the playback effect of the presentation 5. Print and output the presentation	operations on your own computer.
A small plan for practical teaching		12	8		
Total		24	16	Total hours =40 hours	
Credits (ECTS)		1.3			

Career Development and Employment Guidance for College Students (1)

Competence field	General Education
Curriculum designation	Career Development and Employment Guidance for College Students (1)
Curriculum code	9151311010
Semester(s) in which the curriculum is taught	1th Semester
Person responsible for the curriculum	Yongjun Hu
Lecturer	Wei Wang, Huan Duan
Language	Chinese
The relationship between the curriculum and the major	"Career Development and Employment Guidance for College Students (1)" emphasizes both the importance of career in life development and the overall and lifelong development of students. Mainly by stimulating college students' self-awareness of career development, establishing a correct employment outlook, and encouraging college students to rationally plan their phased development plans by choosing ways and methods that suit them; A compulsory public course that provides training and guidance on certification, postgraduate entrance examination, grade examination, and civil service examination to help college students further clarify their development goals during their university study period and strive to consciously improve their employability and career management skills in the learning process.
Teaching methods, number of teaching hours	Target students: Students majoring in electronic information Engineering Teaching method: Theoretical teaching + practical teaching Teaching hours (Contact hours): 20 hours Among them: Theoretical instruction: 8 hours Practical teaching: 12 hours Class size: 4 classes with approximately 160 students
Workload	Total workload = 30 class hours; Contact hours = 20 hours; Self-study hours = 10 hours;
Credit points (ECTS)	1.0
Requirements according to the examination regulations	Students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds.
Prerequisite curriculum	Ideological and Moral Cultivation and Legal Basis, Mental Health Education for College Students
Curriculum objectives /expected learning outcomes	**Student outcomes:** The main task of this course is to enable college students to achieve the following goals in terms of attitude, knowledge and skills through the course teaching. The specific objectives include: **Knowledge:**

	1. Emphasize the importance of career in life development, while also focusing on the all-round and lifelong development of students. 2. Stimulate the self-awareness of career development among college students, enable them to establish a correct employment outlook, and encourage them to rationally plan their phased development plans by choosing ways and methods that suit them. 3. A compulsory public course that provides training and guidance for certification, postgraduate entrance examination, grade examination, and civil service examination, enabling college students to further clarify their development goals during their university study period and strive to consciously improve their employability and career management ability in the learning process. **Skills:** 1. Understand the relationship between career and overall development as well as lifelong development, and establish a correct employment outlook. 2. Have an autonomous awareness of career development and be able to plan your own development plan reasonably. 3. Master the relevant knowledge of certification, postgraduate entrance examination, grade examination and civil service examination, be able to clearly define the development goals at each stage of one's own development, and improve employability and career management ability. **Ability:** 1. College students develop an autonomous awareness of career development, establish a positive and correct outlook on life, values and employment concepts, combine personal development with national needs and social development, establish the concept and awareness of career, and be willing to actively make positive efforts for personal career development and social development. 2. Have a basic understanding of the stage characteristics of career development, have a relatively clear understanding of one's own characteristics, the characteristics of the occupation and the social environment through methods such as the Holland Occupational Interest test, understand the employment situation and policies and regulations, master basic labor market information, relevant occupational classification and other basic knowledge. 3. Have a basic understanding of the acquisition of professional qualification certificates related to the major, the selection of postgraduate majors, directions and schools, as well as the preparation for the exams, and relevant knowledge about CET-4 and CET-6, civil service examinations, and selected cadres.
Contents	**Theoretical instruction (8 contact hours, 4 self-study hours)** **Lecture 1: Introduction to Career Planning and Awakening of Career Awareness** 1. Course Introduction: The importance of career development to life.

	2. Introduce the theory of career development stages (such as Schuber's career development stages). 3. Establish correct views on employment, life and values, and explore the relationship between personal development and national needs and social development. **Lecture 2: Self-awareness: Exploring Interests and Character** 1. Detailed Explanation and Application of Holland's Occupational Interest Theory. 2. Introduction to other personality assessment tools such as MBTI. 3. Guide students to understand the connection between self-traits and future career choices. **Lecture 3: Professional World and Environmental Awareness** 1. Occupational Classification and an analysis of the current state of the labor market. 2. Interpretation of the latest employment situation at the national and local levels and key industrial policies. 3. Basic knowledge of employment rights protection and typical risk cases. **Lecture 4: Path Selection and Preparation during College** 1. A systematic introduction to professional qualifications related to the major. 2. The overall process of the postgraduate entrance examination, strategies for choosing majors and institutions. 3. Overview of basic knowledge for the civil service examination/selected student, CET-4 and CET-6, etc. **Practical teaching (12 contact hours, 6 self-study hours)** **Practice 1: Deep Self-Exploration Workshop:** Career Library Exploration and Analysis Based on Holland Code. Learn to use tools such as the Career Decision Balance Sheet to make rational evaluations of multiple development options. **Practice 2: Career Information Research and interviews with people; :** Select a target occupation or industry for in-depth research. Effectively gather information and conduct interviews with career figures. **Practice 3: Academic and Career Planning:** Develop a phased development plan for your college years, clearly defining specific goals and action plans in areas such as certification, postgraduate entrance examination, and internships. **Practice 4: Mock Interviews and Resume Writing:** Resume writing skills, common interview questions and response strategies.

Study and examination requirements and forms of examination	Forty percent of in-class tests are conducted through a combination of classroom attendance, classroom interaction, and participation in activities. For the major assignment, 60% submit career planning documents (both electronic and paper versions), and write learning reflections for postgraduate entrance examination, professional qualification examination, civil service examination, and grade examination experience exchange meetings.
Media employed	Multimedia computers, projectors
Reading list	1. Reference Books [1] Y. Hu. Career Development and Employment Guidance for College Students[M]. Changsha: Hunan University Press, 2025. [2] R. C. Lilledon. Career Development and Planning[M]. Beijing: Renmin University Press, China. [3] S. Jin. Career Counseling and Tutoring[M]. Beijing: Higher Education Press.

“Career Development and Employment Guidance for College Students (1)” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
Lecture 1: Introduction to Career Planning and Awakening of Career Awareness	1. Course Introduction: The importance of career development to life. 2. Introduce the theory of career development stages (such as Schuber's career development stages). 3. Establish correct views on employment, life and values, and explore the relationship between personal development and national needs and social development.	2	1	1. Read the summaries of policy documents such as the "Notice of the Ministry of Education on Doing a Good Job in Employment and Entrepreneurship for Graduates of National Regular Institutions of Higher Learning in 202X". 2. Think and write down "Why did I choose my current major?" And "What kind of person do I hope to be after graduating from college?" Preliminary answers to two questions.	Randomly share in class.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Lecture 2: Self-awareness: Exploring Interests and Character	1. Detailed Explanation and Application of Holland's Occupational Interest Theory. 2. Introduction to other personality assessment tools such as MBTI. 3. Guide students to understand the connection between self-traits and future career choices.	2	1	1. Search online for "National Occupational Classification Dictionary" or websites such as "51job" and "Zhaopin" to learn about job requirements for three occupations that interest you. 2. Preview the six types of Holland's occupational interest theory and their typical characteristics.	Classroom tests and video presentations
Lecture 3: Professional World and Environmental Awareness	1. Occupational Classification and an analysis of the current state of the labor market. 2. Interpretation of the latest employment situation at the national and local levels and key industrial policies. 3. Basic knowledge of employment rights protection and typical risk cases.	2	1	1. Log in to the school's career guidance center website, search for and read at least one policy notice related to postgraduate entrance examination or civil service examination. 2. Search for a typical case of a "college student being deceived in job hunting" and analyze the reasons for being deceived and the preventive measures.	1. Divide into groups to share and submit assignments 2. Share randomly in class.
Lecture 4: Path Selection and Preparation during College	1. A systematic introduction to professional qualifications related to the major. 2. The overall process of the postgraduate entrance examination, strategies for choosing majors and institutions. 3. Overview of basic knowledge for the civil service examination/selected student, CET-4 and CET-6, etc.	2	1	1. Check the list of valuable professional qualification certificates related to this major and their application requirements. 2. Initially consider 1-2 specific goals for your first year of university (such as passing CET-4, joining a club, etc.).	1. Questions in class 2. Video Submission
(Theoretical Instruction) Tips		8	4		

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical teaching					
Practice 1: Deep Self-Exploration Workshop	Explore and analyze the career library based on Holland Code. Learn to use tools such as career decision balance sheets to make rational evaluations of multiple development options.	3	1	1. Review the knowledge points of Holland's Theory in Theoretical Module 2. 2. Prepare an "achievement story" (something that gives you a sense of accomplishment) from your growth process and briefly record the process.	Share and submit assignments in groups
Practice 2: Career Information Research and interviews	Select a target occupation or industry for in-depth research. Effectively gather information and conduct interviews with career figures.	3	1	1. Divide the work into groups and collect detailed information about the target occupation (job content, requirements, salary, development, etc.) through channels such as the Internet and libraries. 2. Try to contact a practitioner in the field (a senior or through social networks) and prepare an interview outline.	
Practice 3: Writing Academic and Career Plans	Develop a phased development plan for your college years, specifying specific goals and action plans in areas such as certification, postgraduate entrance examination, internships, etc.	3	2	1. Review the development path of theoretical Module 4 and list 2-3 college development options that you are considering. 2. Preview how to use the "Decision Balance Sheet".	
Practice 4: Mock Interviews and Resume Writing	Resume writing skills, common interview questions and response strategies.	3	2	1. Complete the first draft of your personal phased Development plan. The content should integrate self-exploration, career world analysis and decision-making processes. 2. Revise and refine based on classroom feedback.	

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
(Practical Teaching) Tips		12	6		
Total		20	10	Total hours = 30 hours	
Credits (ECTS)		1.0			

Career Development and Employment Guidance for College Students (2)

Competence field	General Education
Curriculum designation	Career Development and Employment Guidance for College Students (2)
Curriculum code	9151311020
Semester(s) in which the curriculum is taught	6th Semester
Person responsible for the curriculum	Yongjun Hu
Lecturer	Wei Wang, Huan Duan
Language	Chinese
The relationship between the curriculum and the major	The course "Career Development and Employment Guidance for College Students (2)" mainly analyzes the current national employment situation and the employment situation of our school in recent years, combined with relevant employment policies of various levels of government, Let students understand the employment situation and policies and regulations, master basic labor market information, guide students to develop a good career attitude and psychological quality, guide students to fully recognize their own characteristics and potential, enhance self-confidence and overcome inferiority complex; Master resume-making and interview skills, master self-exploration skills, information search and management skills, career decision-making skills, job search skills, etc. Improve students' various general skills, including communication skills, problem-solving skills, self-management skills and interpersonal skills, etc. Face and participate in employment competition with a positive and healthy mindset and obtain a satisfactory job position.
Teaching methods, number of teaching hours	Target students: Students majoring in electronic information Engineering Teaching method: Theoretical teaching + practical teaching Teaching hours: 18 hours Teaching hours (Contact hours): 18 hours Among them: Theoretical instruction: 4 class hours Practical teaching: 14 hours Class size: 4 classes with approximately 160 students
Workload	Total workload = 30 class hours; Contact hours = 18 hours; Self-study hours = 12 hours;
Credit points (ECTS)	1.0
Requirements according to the examination regulations	Students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds.
Prerequisite curriculum	Ideological and Moral Cultivation and Legal Basis, Mental Health

	Education for College Students
Curriculum objectives /expected learning outcomes	**Student outcomes:** The main task of this course is to enable college students to achieve the following goals in job interviews through the course teaching. The specific objectives include: **Knowledge:** 1. Analyze the current national employment situation and the employment situation of our school in recent years, in combination with relevant employment policies of governments at all levels, let students understand the employment situation and policies and regulations, master basic labor market information, guide students to develop a good career attitude and psychological quality, guide students to fully recognize their own characteristics and potential, enhance self-confidence and overcome inferiority complex. 2. Master resume-making and interview skills, master self-exploration skills, information search and management skills, career decision-making skills, job-seeking skills, etc., improve students' various general skills, including communication skills, problem-solving skills, self-management skills and interpersonal skills, etc., face and participate in employment competition with a positive and healthy mindset, and obtain a satisfactory job position. **Skills:** 1. Be familiar with the current national employment situation and the employment situation of our school in recent years, understand the relevant employment policies of all levels of government, have basic labor market information, have a good attitude and psychological quality of career choice, recognize your own characteristics and potential, and be confident and passionate about employment. 2. Be able to create resumes, master interview skills, master self-exploration skills, information search and management skills, career decision-making skills, job search skills, etc. Master various general skills including communication skills, problem-solving skills, self-management skills and interpersonal skills, etc. Have a positive and healthy mindset to face and participate in employment competition. **Ability:** 1. Have a basic understanding of the employment situation of college students across the country in recent years, as well as the relevant employment policies issued by various departments and the government, establish a correct view of career choice, and determine employment goals. 2. Master self-exploration skills, information search and management skills, career decision-making skills, etc., and improve students' various general skills, including communication skills, problem-solving skills, self-management skills and interpersonal skills, etc.

	3. Have a basic understanding of the channels and methods for obtaining employment information and the employment process, master the methods of resume making and workplace etiquette, and achieve employment through interviews, etc.
Contents	**Theoretical instruction (4 contact hours, 4 self-study hours)** **Lecture 1: Employment Situation and Policy** Learn about the employment situation of college students across the country. The overall employment situation of our school in recent years and the employment situation of related majors. Employment policies issued by the state. Types and pathways of employment at the grassroots level, as well as school employment policies. **Lecture 2: Job Search Skills and Employment Procedures** 1. Self-exploration skills, information search and management skills, career decision-making skills, general skills, etc. 2. Relevant employment procedures. Resume making. Interview skills and job application etiquette. The function and application process of the reporting certificate. **Practical teaching (14 contact hours, 8 self-study hours)** **Practice 1: Resume Writing Workshop:** Students draft the core parts of their resume (educational background, internship experience, project experience, etc.) based on a real job request. **Practice 2: Interview Skills Practice (Part 1) - Single Interview:** Students work in pairs and take turns to practice questions and answers, focusing on self-introduction and 1-2 behavioral interview questions. **Practice 3: Interview Skills Practice (Part 2) - Group Interviews:** Simulated unstructured group discussions on real topics in groups. **Practice 4: Major Assignment Integration and Defense:** Students will integrate all the results of this semester (resume, cover letter, interview preparation notes, simulated recruitment reflections, etc.) into a "Personal Job Application Practice Material Package".
Study and examination requirements and forms of examination	Forty percent of in-class tests are conducted through a combination of classroom attendance, classroom interaction, and participation in activities. For the major assignment, 60% submit career planning documents (both electronic and paper versions), and write learning reflections for postgraduate entrance examination, professional qualification examination, civil service examination, and grade examination experience exchange meetings.
Media employed	Multimedia computers, projectors

Reading list	1. Reference Books [1] Y. Hu. Career Development and Employment Guidance for College Students[M]. Changsha: Hunan University Press, 2025. [2] R. C. Lilledon. Career Development and Planning[M]. Beijing: Renmin University Press, China. [3] S. Jin. Career Counseling and Tutoring[M]. Beijing: Higher Education Press.

“Career Development and Employment Guidance for College Students (2)” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
Lecture 1: Employment Situation and Policies	Learn about the employment situation of college students across the country. The overall employment situation of our school in recent years and the employment situation of related majors. Employment policies issued by the state. Types and pathways of employment at the grassroots level, as well as school employment policies.	2	2	1. Read the summary of the "Annual Employment Quality Report" issued by the school's employment guidance center before class. 2. Search for and learn about the latest employment preferential policy for college graduates in your province or city.	Share randomly in class.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Lecture 2: Job Skills and Employment Procedures	1. Self-exploration skills, information search and management skills, career decision-making skills, general skills, etc. 2. Relevant employment procedures. Resume making. Interview skills and job application etiquette. The function and application process of the reporting certificate.	2	2	1. Log in to the school's employment information website after class and record three recent job openings that match your major or interest. 2. Search for and read two excellent resume templates and one unqualified resume case before class. Preview the STAR (Situation, Task, Action, Result) rule and try to use it to conceive a personal experience story.	Show cases of unqualified resumes in class and have students identify problems in groups to test the previewing effect.
(Theoretical teaching) Tips		4	4		
Practical teaching					
Practice 1: Resume Writing Workshop	Students draft the core parts of their resume (educational background, internship experience, project experience, etc.) based on a real job request.	3	2	Complete a full resume (in both Chinese and English) for a specific position based on class feedback.	Divide into groups to share and submit assignments
Practice 2: Interview Skills in Practice (Part 1) - Single Interview	Students work in pairs and take turns to answer questions, focusing on self-introduction and 1-2 behavioral interview questions.	4	2	After class, compile a list of behavioral interview questions that you might be asked, and carefully prepare detailed drafts of at least three stories using the STAR rule.	
Practice 3: Interview Skills in Action	Form groups to simulate unstructured group discussions on real topics.	4	2	Watch a recorded video of a leaderless group discussion before class and think about the	

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
(Part 2) - Group Interviews				role that suits you	
Practice 4: Major Assignment Integration and Defense	Students will compile all the results of this semester (resumes, cover letters, interview preparation notes, mock recruitment reflections, etc.) into a "Personal Job Application Practice Material Package".	3	2	Finish the final version of the Personal Job Application Practice Material Package after class.	
(Practical Teaching) Tips		14	8		
Total		18	12	Total hours = 30 hours	
Credits (ECTS)		1.0			

Basics of Innovation and Entrepreneurship

Competence field	General Education
Curriculum designation	Basics of Innovation and Entrepreneurship
Curriculum code	9163311010
Semester(s) in which the curriculum is taught	2nd Semester
Person responsible for the curriculum	Dongchu Jiang
Lecturer	Dongchu Jiang, Gelan Yang, Zijia Guo, Xue Du, Yu Zhong, Huan Duan
Language	Chinese
The relationship between the curriculum and the major	The "Basics of Innovation and Entrepreneurship" course and the electronic information Engineering major are mutually empowering and symbiotic. The former breaks the single dimension of traditional technical learning in the major, guiding students from "understanding technology" to "understanding the application of technology in market demand" through demand-driven thinking, and builds a bridge from technical prototypes to product implementation, linking industrial resources and facilitating the alignment of professional technology with actual demand; The latter provides hard-core technical support for the former. Professional knowledge such as sensors and the Internet of Things is the foundation for the implementation of innovative ideas, and its advantages in technology-intensive fields enable innovation and entrepreneurship to focus on high-value-added tracks and avoid getting trapped in low-threshold red oceans. The two are deeply integrated in competitions such as the Challenge Cup. Professional technology is the core of the project, while innovation and entrepreneurship courses ensure the commercial implementation of the project and jointly cultivate compound talents.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + practice Teaching hours (Contact hours): 23 hours Among them: Theoretical instruction: 16 hours Laboratory/practical teaching: 7 hours Class size: approximately 40 students per class
Workload	Total workload = 52 class hours; Contact hours =23 hours; Self-study hours =29 hours
Credit points (ECTS)	1.7

Requirements according to the examination regulations	Students who attend less than one-third do not have regular grades.
Prerequisite curriculum	no
Curriculum objectives /expected learning outcomes	**Knowledge:** Through the study of this course, students will establish a scientific view of innovation and entrepreneurship, correctly understand the relationship between innovation and entrepreneurship and career development, recognize the basic connotation of innovation and entrepreneurship and the particularity of innovation and entrepreneurship activities; Master the basic knowledge needed to carry out innovation and entrepreneurship activities, and dialectically recognize and analyze the basic elements of entrepreneurship and business plans. **Skills:** Through this course, students will master the methods of integrating innovation and entrepreneurship resources and writing business plans, be familiar with the process and management of starting a new business, and acquire practical operational skills for establishing and initially managing a business. **Ability:** Through the study of this course, cultivate students' innovative spirit, stimulate their entrepreneurial awareness, and enhance their ability to innovate and start businesses; Enable students to actively adapt to the demands of national economic and social development and personal all-round development, consciously follow the laws of entrepreneurship, actively engage in innovation and entrepreneurship practice, and enhance the comprehensive quality and ability to integrate knowledge and skills to solve practical problems.
Contents	**Theoretical instruction (16 contact hours, 14 self-study hours)** Chapter 1 Course Overview and Awareness of Innovation and Entrepreneurship (2 contact hours, 1 self-study hour) 1. Course positioning, teaching objectives and assessment methods, clear learning path; 2. The concepts, connotations and connections of innovation and entrepreneurship; 3. Trends in innovation and entrepreneurship at home and abroad (focusing on the national innovation-driven development strategy, university entrepreneurship support policies, and related national competitions); 4. The value of college students' innovation and

	entrepreneurship (personal growth, social contribution, national strategic level). Chapter 2: Innovative Thinking and Innovative Methods (2 Contact hours, 1 Self-study hour) 1. Core types of innovative thinking: divergent thinking, reverse thinking, associative thinking; 2. Practical innovation methods: Brainstorming, analogical innovation, TRIZ innovation; 3. Innovative thinking and method integration practice. Chapter 3: Entrepreneurial Opportunities, Entrepreneurial Teams and Entrepreneurial Resources (2 contact hours, 2 self-study hours) 1. Entrepreneurial Opportunities: Sources (Market demand, technological breakthroughs, policy dividends), Identification Methods (Observation method, research method, user interview method) 2. Startup Team: Formation principles (Complementary skills, common goals, shared responsibility), Core role positioning (Leader, technical, marketing, finance), Teamwork skills (communication mechanism, conflict resolution) 3 Startup Resources: Types (Capital, technology, connections, venues), Access channels (university incubators, startup funds, university-enterprise cooperation platforms) Chapter 4: Discovering and Screening Startup Projects (2 contact hours, 2 self-study hours) 1. Entrepreneurial project discovery path: Based on four aspects, approach from interests and specialties, professional fields, social pain points, policy directions (such as rural revitalization, green environmental protection fields); 2. Core indicators for project screening: Value orientation (economic and social value), innovation (technical path, business model, application scenarios, etc.); Market potential (user size, growth trend), profitability feasibility (cost structure, revenue model), competitive advantage (differentiation highlights, barriers), risk controllability (policy risk, market risk); 3. Screening and analysis: Project Evaluation Form (Quantified scoring criteria) 4. Practical Training: Dig out 2-3 preliminary projects in groups and complete the screening using the evaluation form.

	Chapter 5: Preparing a Business Plan (2 contact hours, 2 self-study hours) 1. Core Structure of the business Plan: Executive Summary (project highlights, team strengths, objectives), Market Analysis (industry status, target users, competitive landscape), Product/service introduction (features, differentiation), Marketing Strategy (channels, pricing, promotion), Financial Planning (cost, revenue, profit forecast); 2. Writing skills for each module: Conciseness of the executive summary, data support for market analysis (citing authoritative reports), rationality of financial planning (cost estimation logic); 3. Template Reference and Pitfall Avoidance Guide: Display excellent plan segments and point out common mistakes (such as data ambiguity and logical breaks). Chapter 6: Innovation and Entrepreneurship Competition and Case Analysis (2 contact hours, 2 Self-study hours) 1. Introduction to Mainstream innovation and entrepreneurship competitions: China International College Students' Innovation and Entrepreneurship Competition, Challenge Cup and Golden Seed Cup College Students' Entrepreneurship Competition, etc. 2. Analysis of Competition Award-winning cases: Breaking down from three dimensions - project topic selection, scheme design, project presentation (such as the differentiated highlights of gold award-winning projects, defense logic); 3. Competition preparation strategies: Project refinement (focusing on pain points), material optimization (highlighting data), defense skills (time control, question response); 4. Experience Sharing: Invite previous participants to share their experience of preparing for the competition and avoiding pitfalls. Chapter 7: Startup Project Presentation and Peer Review (4 contact hours, 4 Self-study hours) 1. Presentation Preparation: PPT optimization skills (highlighting key points, visually concise), presentation script design (logical coherence, highlighting in advance), Time control training (8 minutes per group); 2. Group presentation: Each group presents the entrepreneurial project in sequence (including the core content of the plan, project advantages, and implementation plan);

	3. Multi-dimensional peer review: Develop peer review forms (project innovation, feasibility, presentation effect, team collaboration); Peer review, group peer review combined with teacher rating; 4. Review summary: Review each group (affirm the highlights, point out the directions for improvement), sort out common problems and suggestions for improvement; Each group will develop an optimization plan for the project based on the comments. **Practical teaching (7 contact hours, 15 self-study hours)** 1. Research around the campus (1 contact hour, 2 self-study hours) Through field observation and information collection, understand the basic methods of market research, systematically recognize the real scenarios and particularities of innovation and entrepreneurship activities, and learn to identify and analyze potential market pain points and entrepreneurial opportunities around the campus. 2. 100 Yuan Entrepreneurship Practice (2 contact hours, 5 self-study hours) Master the complete operation process of micro-entrepreneurship, including practical skills such as start-up capital planning, simple business model design, resource integration and transaction record, and become familiar with the process of starting and managing a new enterprise from zero to one through practice. 3. Prepare a business Plan (4 contact hours, 8 self-study hours) Systematically train and master the standard method of writing a business plan, and be able to complete a structured and logically clear business plan text based on elements such as overview, market analysis, product/service design, team execution plan, business model construction and financial forecasting.
Study and examination requirements and forms of examination	The final evaluation result adopts a five-level system. Combine the process evaluation and the final evaluation (4:6), retain the original data of the process evaluation, and adjust each specialty according to its own specialty characteristics. Grading system (five-level system) Total score = (Class performance + designated resources learning + after-class assignments) *30%+ Project presentation (formative assessment) ×30%+ final business plan score (summative assessment) ×40%

Media employed	Web or online resources such as designated web resources, Rain Classroom, Smart Tree, Xuetangyun, etc
Reading list	1. Textbooks [1] D. Jiang et al., Basics of Innovation and Entrepreneurship for College Students, Chengdou: University of Electronic Science and Technology Press, 2021. 2. Reference book [1] National College Student Entrepreneurship Service Network, “Homepage,” [Online]. Available: https://cy.ncss.cn/. [2] The Official Website of "Challenge Cup" College Student Entrepreneurship Competition, “Homepage,” [Online]. Available: https://www.tiaozhanbei.net/. [3] The Official Website of "Golden Seed Cup" Competition, “Homepage,” [Online]. Available: https://hnjzz.hunan-data.com/#/dashboard/home. [4] Y. Zhang, H. Xue, H. Chen, and H. Li, Entrepreneurship Foundation, 5th ed., Beijing: China Machine Press, 2020. [5] L. Guo, Trans., Entrepreneurship in Action is Greater than Everything, Beijing: Peking University Press, 2017. [6] Y. Meng, Entrepreneurial Thinking: From Idea to Venture, Changsha: Hunan Education Press, 2019.

“Basics of Innovation and Entrepreneurship” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Course Overview and awareness of innovation and entrepreneurship	1. Course positioning, teaching objectives and assessment methods, clear learning path; 2. The concepts, connotations and connections of innovation and entrepreneurship; 3. Trends in innovation and entrepreneurship at home and abroad (focusing on the national innovation-driven development strategy, university entrepreneurship support policies, and related national competitions); 4. The value of college students' innovation and entrepreneurship (personal growth, social contribution, national strategic level).	2	1	1. Content of entrepreneurship support policies in colleges and universities; (0.5 class hours) 2. Detailed information about national events (0.5 credits)	1. Review relevant policy documents, reports and designated online resources.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Innovative thinking and innovative methods	1. Core types of innovative thinking: divergent thinking, reverse thinking, and associative thinking; 2. Practical innovation methods: Brainstorming, analogical innovation, TRIZ innovation; 3. Innovative thinking and method integration practice.	2	1	1. Preview the textbook and consult other relevant resources. (0.3 class hours) 2. Watch typical cases of innovative thinking on the learning platform. (0.3 class hours) 3. Come up with innovative solutions to pain points on campus or in life. (0.4 class hours)	1. The learning platform automatically records video viewing progress. 2. Evaluate innovative solutions.
3. Startup opportunities, startup teams, and startup resources	1. Startup opportunities: Sources (market demand, technological breakthroughs, policy dividends), Identification methods (observation method, research method, user interview method) 2. Startup Team: Formation principles (Complementary skills, common goals, shared responsibility), Core role positioning (Leader, technical, marketing, finance), Teamwork skills (communication mechanism, conflict resolution) 3 Startup Resources: Types (Capital, technology, connections, venues), Access channels (university incubators, startup funds,	2	2	1. Preview before class: Preview the relevant chapters of the textbook and the designated online resource videos or teaching PPTS. (1 class hour) 2. After-class assignment: Integrated Practice: In combination with opportunity identification, simulate forming a "minimum	1. The designated web resource platform automatically records video viewing progress. 2. Specify the web resource platform to view the creation results of the startup team.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	university-enterprise cooperation platforms)			startup team" and planning resources. (1 class hour)	
4. Explore and screen entrepreneurial projects	1. Entrepreneurial project discovery path: Based on four aspects, approach from interests and specialties, professional fields, social pain points, policy directions (such as rural revitalization, green environmental protection fields); 2 Core indicators for project screening: Value orientation (economic and social value), innovation (technical path, business model, application scenarios, etc.); Market potential (user size, growth trend), profitability feasibility (cost structure, revenue model), competitive advantage (differentiation highlights, barriers), risk controllability (policy risk, market risk); 3 Screening and analysis: Project Evaluation Form (Quantified scoring criteria)	2	2	1. Preview before class: Preview the relevant chapters of the textbook and the designated online resource videos or teaching PPTS. (1 class hour) 2. After-class assignment: Complete the initial plan selection of the entrepreneurial project and submit it to the designated online resource platform. (1 class hour)	1. Specify a web resource platform to automatically record video or courseware viewing progress. 2. View the initial plan of the startup project on the designated web resource platform.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
5 Prepare a business plan	1. Core Structure of the business plan: Executive summary (project highlights, team strengths, goals), Market analysis (industry status, target users, competitive landscape), product/service introduction (features, differentiation), Marketing strategy (channels, pricing, promotion), Financial planning (cost, revenue, profit forecast); 2. Writing skills for each module: Conciseness of the executive summary, data support for market analysis (citing authoritative reports), rationality of financial planning (cost estimation logic); 3. Template Reference and Pitfall Avoidance Guide: Show excellent plan snippets and point out common mistakes (such as data ambiguity, logical breaks).	2	2	1. Preview before class: Preview the relevant chapters of the textbook and the designated online resource videos or lecture PPTS. (1 class hour) 2. Practical tasks: Work in groups to build the framework of the business plan (with a focus on filling in the executive summary and market analysis). (1 class hour)	1. Specify a web resource platform to automatically record video or courseware viewing progress. 2. Designate a web resource platform to view the results of building a business plan framework
6. Innovation and entrepreneurship competitions and case studies	1. Introduction to mainstream innovation and entrepreneurship competitions: China International College Students Innovation and Entrepreneurship Competition, "Challenge Cup" and "Golden Seed" Cup College Students' Entrepreneurship Competition, etc. 2. Analysis of Competition Award-winning cases: Breaking down from three dimensions -	2	2	1. Preview before class: Preview the relevant chapters of the textbook and the designated online resource videos or teaching PPTS. (0.6 class hours)	1. The designated online resource platform automatically records the viewing results of videos, courseware, or related files.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	project topic selection, scheme design, project presentation (such as the differentiated highlights of gold award-winning projects, defense logic); 3. Competition preparation strategies: Project refinement (focusing on pain points), material optimization (highlighting data), defense skills (time control, question response); 4. Experience Sharing: Invite previous participants to share their experience of preparing for the competition and avoiding pitfalls			2. Designate a network resource platform to view detailed information about the event such as event location, track Settings, and judging criteria, etc. (0.6 class hours) 3. Viewing previous outstanding award-winning works on designated online resource platforms (0.8 hours)	
7. Startup project presentation and peer review	1. Presentation Preparation: PPT optimization skills (highlight key points, visually concise), presentation script design (logical coherence, highlight in advance), Time control training (8 minutes per group); 2. Group presentation: Each group presents the entrepreneurial project in sequence (including the core content of the plan, project advantages, and implementation plan); 3. Multi-dimensional peer review: Develop peer	4	4	1. Before the class, each team completed the writing of the project plan and the presentation ppt; (2 hours) 2. Each team completes the roadshow rehearsal before class. (1 class hour) 3. After class, each group will develop project optimization plans based on	1. The results of the business plans and PPTS written by each project team 2. Review the project optimization plans in the designated network resources. 3. View the results submitted on the China International College Students

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	review forms (project innovation, feasibility, presentation effect, team collaboration); Peer review, group peer review combined with teacher rating; 4. Review summary: Review each group (affirm the highlights, point out the directions for improvement), sort out common problems and suggestions for improvement; Each group will develop an optimization plan for the project based on the comments.			the comments and submit them to the designated online resource platform and the China International College Students Innovation Competition platform. (1 class hour)	Innovation Competition Platform. 4. Summarize the final results of each project group in the designated online resource platform.
(Theoretical teaching) Subcount		16	14		
Practical teaching					
1. Research around the campus		1	2	Conduct research around the campus to find creative ideas; Dig out entrepreneurial projects.	Submit creative or entrepreneurial ideas in online learning platforms
2. A 100-yuan startup practice		2	5	Start with 100 yuan and simulate starting a business	Submit your demo startup on an online learning platform Plan, pictures of the startup process, or related video materials Start-up cash flow.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
3. Prepare a business plan		4	8	Complete the overview and market in accordance with the elements of a business plan Pain points, market analysis, product/service, team and The writing of execution plans, business models and financial forecasts, etc.	Submit your business plan on the online learning platform designated by your teacher and on the China International College Students Innovation Competition platform.
(Practical teaching) Small plan		7	15		
Total		23	29	52 class hours in total	
Credits (ECTS)		1.7			

Module Descriptions - Foreign language

College English (1)

Competence field	Foreign language
Curriculum designation	College English (1)
Curriculum code	9054111011
Semester(s) in which the curriculum is taught	1th Semester
Person responsible for the curriculum	Xiangyou Liu
Lecturer	Pingping Liu, Jun Tian, Xiuzhen Xu, Li Liu
Language	English
The relationship between the curriculum and the major	As a public basic course for non-English major undergraduate students, “College English (1)” is a comprehensive teaching system guided by foreign language teaching theories. Its core content covers English linguistic knowledge, practical skills, cross-cultural communication, and learning strategies, integrating offline teaching with various online platforms as well as multiple teaching modes and methods. Through teachers' "concise and in-depth lectures" and students' "extensive practice (including autonomous learning)", the course aims to help students rapidly expand their vocabulary, gradually standardize their pronunciation and intonation, and significantly improve their comprehensive English application abilities in listening, speaking, reading, writing, and translating. It also enhances students' overall cultural literacy and cross-cultural communication competence, fosters their humanistic qualities and comprehensive capabilities, and guides them to establish correct values. By integrating value shaping, knowledge impartment, and competence development, the course fulfills the goals of moral education and ideological and political education, ultimately cultivating inter-disciplinary talents who meet the requirements of socialist economic development with Chinese characteristics in the new era and international exchanges in the field of electronic information engineering.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Method: Theoretical Teaching Teaching hours (Contact hours): 48 hours Including: Theoretical Teaching: 48 hours Class Size: 4 classes with approximately 160 students
Workload	Total Workload = 108 hours Contact Hours = 48 hours Self-Study Hours = 60 hours

Credit points (ECTS)	3.6
Requirements according to the examination regulations	Only students with an attendance rate of over two-thirds and a homework completion rate of over two-thirds are eligible to take the exam.
Prerequisite curriculum	Senior High School English
Curriculum objectives /expected learning outcomes	**Learning Outcomes:** The main task of this course is to help students consolidate their English language foundation, improve their comprehensive application abilities, and cultivate cross-cultural communication literacy and correct values. The specific objectives include: **Knowledge:** 1. Master core English vocabulary, phrases, and linguistic knowledge related to the textbook content, accumulating a vocabulary of 3,500-4,000 words; 2. Understand the basic application logic of English listening, speaking, reading, writing, and translation skills, and be familiar with the linguistic characteristics and expression habits of English materials with familiar themes and low difficulty. **Skills:** 1. Possess certain comprehensive English application skills, be able to understand and read English materials with familiar themes and low difficulty, and conduct basic oral and written English expression on relevant topics; 2. Master basic methods of communication and cooperation such as group learning and team interaction, and be able to clearly express personal views and opinions in English to achieve effective oral and written information communication; 3. Learn to use English to express content related to Chinese culture, and initially grasp basic language application skills in cross-cultural communication. **Ability:** 1. Possess the awareness of lifelong learning and independent development, and be able to actively expand English knowledge and skills to adapt to English application needs in different scenarios; 2. Form certain critical thinking and reflective habits, and be able to conduct preliminary analysis and optimization of the English learning process and communication content; 3. Have good social interaction skills and cross-cultural communication competence, and be able to respect cultural differences and achieve effective communication in cross-cultural scenarios; 4. Establish correct world outlook, outlook on life, and values, possess good humanistic literacy and aesthetic taste, and be able to spread Chinese culture through English to show cultural confidence.

Contents	**Theoretical Teaching (48 Contact Hours, 60 Self-Study Hours)** Unit 1 (8 Contact Hours, 10 Self-Study Hours) Level A Reading: Life at Harvard University Translation: Commonly used words or constructions in different contexts and sentences with inanimate subjects Writing: An effective paragraph Listening & Speaking: College life Level B Reading: Toward a brighter future for all Translation: Repetition Writing: A paragraph with a topic sentence supported by details Listening & Speaking: College life Unit 2 (8 Contact Hours, 10 Self-Study Hours) Level A Reading: Left Behind Translation: The precise meaning of polysemous expression "leave behind" and the major semantic patterns of "v. + off" Writing: A problem-solution paragraph Listening & Speaking: Making friends Level B Reading: A child's clutter awaits an adult's return Translation: Collocation Writing: A paragraph of problem-solution pattern Listening & Speaking: Making friends Unit 3 (8 Contact Hours, 10 Self-Study Hours) Level A Reading: Einstein and What Music Did for His Genius Translation: Ways of expressing superlative meaning Writing: An exemplification paragraph Listening & Speaking: Time management Level B Reading: To feed the world Translation: Omission Writing: A paragraph with statistics Listening & Speaking: Time management Unit 4 (8 Contact Hours, 10 Self-Study Hours) Level A Reading: Swimming in Socks Translation: The specific meaning of common polysemous words in specific field and the figurative meaning of collocations of

	"prepositions + n./noun phrases" Writing: A paragraph describing an event Listening & Speaking: School pressure Level B Reading: Social media: How much is too much Translation: Conversion Writing: A paragraph of listing Listening & Speaking: School pressure **CET-4 Special Intensive Course (16 Contact Hours, 20 Self-Study Hours)** CET-4 Question Type Special Lectures: Listening, Writing, Reading, Translation Past CET-4 Real Exam Questions
Study and examination requirements and forms of examination	1. Classroom Performance (20%) 2. Homework Assignments (10%) 3. Independent Learning (10%) 4. Final Assessment (60%): Final Examination
Media employed	Multimedia Computer
Reading list	1. Textbooks [1] D. Shu, Z. Liu, P. Peng, New Target College English: Comprehensive Course 1. Shanghai: Shanghai Foreign Language Education Press, 2021. [2] S. Zheng, New Horizon College English: Reading and Writing Course 1. Beijing: Foreign Language Teaching and Research Press, 2023. [3] Y. Zang, H. Duan, College English: Listening, Speaking and Viewing Course 1. Beijing: The Commercial Press, 2024. 2. Reference book [1] J. Hu, A New Era Moral-Oriented College English Reading Course 1. Beijing: Higher Education Press, 2024.

"College English (1)" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Unit 1	Level A Reading: Life at Harvard University Translation: Commonly used words or constructions in different contexts and sentences with inanimate subjects Writing: An effective paragraph Listening & Speaking: College life Level B Reading: Toward a brighter future for all Translation: Repetition Writing: A paragraph with a topic sentence supported by details Listening & Speaking: College life	8	10	1. Pre-class Preview: Complete the preview tasks on the UAI platform. (3 class hours) 2. Post-class Assignments: Finish the after-class exercises. (3 class hours) 3. Independent Learning: Complete check-ins and unit activities. (4 class hours)	1. Platform Records 2. Exercise Checks 3. Activity Assessments

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Unit 2	Level A Reading: Left Behind Translation: The precise meaning of polysemous expression “leave behind” and the major semantic patterns of “v. + off” Writing: A problem-solution paragraph Listening & Speaking: Making friends Level B Reading: A child’s clutter awaits an adult’s return Translation: Collocation Writing: A paragraph of problem-solution pattern Listening & Speaking: Making friends	8	10	1. Pre-class Preview: Complete the preview tasks on the UAI platform. (3 class hours) 2. Post-class Assignments: Finish the after-class exercises. (3 class hours) 3. Independent Learning: Complete check-ins and unit activities. (4 class hours)	1. Platform Records 2. Exercise Checks 3. Activity Assessments
3. Unit 3	Level A Reading: Einstein and What Music Did for His Genius Translation: Ways of expressing superlative meaning Writing: An exemplification paragraph Listening & Speaking: Time management Level B Reading: To feed the world Translation: Omission Writing: A paragraph with statistics Listening & Speaking: Time management	8	10	1. Pre-class Preview: Complete the preview tasks on the UAI platform. (3 class hours) 2. Post-class Assignments: Finish the after-class exercises. (3 class hours) 3. Independent Learning: Complete check-ins and unit activities. (4 class hours)	1. Platform Records 2. Exercise Checks 3. Activity Assessments
4. Unit 4	Level A Reading: Swimming in Socks	8	10	1. Pre-class Preview: Complete the preview tasks on the UAI platform.	1. Platform Records 2. Exercise Checks

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	Translation: The specific meaning of common polysemous words in specific field and the figurative meaning of collocations of "prepositions + n./noun phrases" Writing: A paragraph describing an event Listening & Speaking: School pressure Level B Reading: Social media: How much is too much Translation: Conversion Writing: A paragraph of listing Listening & Speaking: School pressure			(3 class hours) 2. Post-class Assignments: Finish the after-class exercises. (3 class hours) 3. Independent Learning: Complete check-ins and unit activities. (4 class hours)	3. Activity Assessments
5. CET-4 Special Intensive Course	CET-4 Question Type Special Lectures: Listening, Writing, Reading, Translation Past CET-4 Real Exam Questions	16	20	1. Special Topic Training (5 hours) 2. CET-4 Past Exam Questions (10 hours) 3. Mock Tests (5 hours)	1. Exercise Checks 2. Activity Assessments
Total		48	60	Total Class Hours = 108 hours	
Credit points (ECTS)		3.6			

College English (2)

Competence field	Foreign language
Curriculum designation	College English (2)
Curriculum code	9054111021
Semester(s) in which the curriculum is taught	2th Semester
Person responsible for the curriculum	Xiangyou Liu
Lecturer	Pingping Liu, Jun Tian, Xiuzhen Xu, Li Liu
Language	English
The relationship between the curriculum and the major	"College English (2)" is a public basic course for non-English major undergraduate students. Guided by foreign language teaching theories, it takes English linguistic knowledge, application skills, cross-cultural communication, and learning strategies as its core content. Integrating offline teaching with various online teaching platforms, the course forms a comprehensive teaching system that combines multiple teaching modes and methods. Built on the foundation of "College English (1)", this course aims to further improve students' comprehensive English language skills, including listening, speaking, reading, writing, and translation. Through English learning, students will gain a deeper understanding of foreign societies and cultures, enhance their comprehension of cultural diversity, and strengthen their awareness of the similarities and differences between Chinese and foreign cultures. Additionally, the course fosters students' cross-cultural communication competence, ultimately cultivating interdisciplinary talents in the field of electronic information engineering who meet the requirements of socialist economic development with Chinese characteristics in the new era and international exchanges.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Method: Theoretical Teaching Teaching hours (Contact hours): 48 hours Including: Theoretical Teaching: 48 hours Class Size: 4 classes with approximately 160 students
Workload	Total Workload = 108 hours Contact Hours = 48 hours Self-Study Hours = 60 hours
Credit points (ECTS)	3.6
Requirements according to the examination regulations	Only students with an attendance rate of over two-thirds and a homework completion rate of over two-thirds are eligible to take the exam.

Prerequisite curriculum	Senior High School English
Curriculum objectives /expected learning outcomes	**Learning Outcomes:** The main task of this course is to help students consolidate and expand their English language foundation, enhance their comprehensive language application capabilities, and further develop cross-cultural communication competence and humanistic literacy. The specific objectives include: **Knowledge:** 1. Master core vocabulary, phrases, and key linguistic points related to the course content, expanding the vocabulary to 4,000-4,500 words; 2. Understand the linguistic characteristics and discourse structures of English materials on academic, social, and professional-related topics (intermediate difficulty); 3. Grasp the basic principles and application methods of CET-4-related test skills, including listening comprehension strategies, reading analysis techniques, translation norms, and writing frameworks; 4. Acquire basic knowledge of foreign cultures (e.g., social customs, values, and communication etiquette) and deepen understanding of the similarities and differences between Chinese and foreign cultures. **Skills:** 1. Demonstrate improved comprehensive English skills: be able to understand intermediate-difficulty English listening materials (e.g., lectures, dialogues), read academic articles and practical texts smoothly, and express personal views coherently in oral and written forms; 2. Master CET-4-oriented test skills: be able to complete listening comprehension, reading comprehension, translation, and writing tasks efficiently and accurately, and improve test-taking proficiency; 3. Develop effective communication skills: be able to participate in English discussions, make short speeches, and write practical texts (e.g., letters, reports) on familiar topics, achieving clear information transmission; 4. Proficiently use online teaching platforms and learning tools to complete pre-class preview, after-class review, and independent learning tasks, and effectively integrate online and offline learning resources. **Ability:** 1. Cultivate independent learning and autonomous development capabilities: be able to formulate personalized learning plans, use diverse learning resources to solve learning problems, and continuously improve English proficiency;

	2. Enhance critical thinking and analytical capabilities: be able to evaluate and reflect on English learning processes and communication effects, and optimize learning strategies and expression methods; 3. Strengthen cross-cultural communication competence: be able to adapt to different cultural communication scenarios, respect cultural diversity, and conduct effective cross-cultural exchanges and cooperation; 4. Foster humanistic literacy and cultural confidence: be able to accurately convey Chinese culture and values in English, enhance the awareness of spreading Chinese culture, and lay a foundation for international communication in professional fields; 5. Develop team cooperation and collaborative learning capabilities: be able to participate in group discussions, cooperative tasks, and mutual evaluations, and improve communication and coordination skills in team settings.
Contents	**Theoretical Teaching (48 Contact Hours, 60 Self-Study Hours)** Unit 1 (8 Contact Hours, 10 Self-Study Hours) Level A Reading: What can Americans learn from Confucianism Translation: Parallel structures, Expressions of Chinese cultural concepts Writing: developing extended definition paragraphs Listening & Speaking: Human relationships Level B Reading: An impressive English lesson Translation: Calligraphy Writing: Moving from paragraph to essay Listening & Speaking: Human relationships Unit 2 (8 Contact Hours, 10 Self-Study Hours) Level A Reading: Successful entrepreneurs, A-students or B-students? Translation: Expressions of comparison and contrast; “While” in different contexts Writing: Developing comparison and contrast paragraphs Listening & Speaking: Love and marriage Level B Reading: The road to my major Translation: The development of education in China Writing: Focusing on a narrative essay Listening & Speaking: Love and marriage Unit 3 (8 Contact Hours, 10 Self-Study Hours)

	Level A Reading: What makes smart cities smart? Translation: the present progressive tense; Future action; Present and past participles Writing: Developing general-to-specific paragraphs Listening & Speaking: Human and Animals Level B Reading: The young generation-the future of China Translation: Self-employed Writing: Focusing on an example essay Listening & Speaking: Human and Animals Unit 4 (8 Contact Hours, 10 Self-Study Hours) Level A Reading: China's greatest poet Translation: Ways of expression cause-and-effect relations; Ways of expressing concession; Four-character idioms in Chines Writing: Developing cause-and-effect paragraphs Listening & Speaking: Ways to success Level B Reading: Huang Danian, a strategic scientist Translation: The Silk Road Writing: A comparison/contrast essay Listening & Speaking: Ways to success **CET-4 Special Intensive Course (16 Contact Hours, 20 Self-Study Hours)** CET-4 Question Type Special Lectures: Listening, Writing, Reading, Translation Past CET-4 Real Exam Questions
Study and examination requirements and forms of examination	1. Classroom Performance (20%) 2. Homework Assignments (10%) 3. Independent Learning (10%) 4. Final Assessment (60%): Final Examination
Media employed	Multimedia Computer
Reading list	1. Textbooks [1] D. Shu, Z. Liu, P. Peng, New Target College English: Comprehensive Course 2. Shanghai: Shanghai Foreign Language Education Press, 2021. [2] S. Zheng, New Horizon College English: Reading and Writing Course 2. Beijing: Foreign Language Teaching and Research Press, 2023. [3] Y. Zang, H. Duan, College English: Listening, Speaking and Viewing Course 2. Beijing: The Commercial Press, 2024.

	2. Reference book [1] J. Hu, A New Era Moral-Oriented College English Reading Course 2. Beijing: Higher Education Press, 2024.

"College English (2)" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Unit 1	Level A Reading: What can Americans learn from Confucianism Translation: Parallel structures, Expressions of Chinese cultural concepts Writing: developing extended definition paragraphs Listening & Speaking: Human relationships Level B Reading: An impressive English lesson Translation: Calligraphy Writing: Moving from paragraph to essay Listening & Speaking: Human relationships	8	10	1. Pre-class Preview: Complete the preview tasks on the UAI platform. (3 class hours) 2. Post-class Assignments: Finish the after-class exercises. (3 class hours) 3. Independent Learning: Complete check-ins and unit activities. (4 class hours)	1. Platform Records 2. Exercise Checks 3. Activity Assessments

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Unit 2	Level A Reading: Successful entrepreneurs, A-students or B-students? Translation: Expressions of comparison and contrast; “While” in different contexts Writing: Developing comparison and contrast paragraphs Listening & Speaking: Love and marriage Level B Reading: The road to my major Translation: The development of education in China Writing: Focusing on a narrative essay Listening & Speaking: Love and marriage	8	10	1. Pre-class Preview: Complete the preview tasks on the UAI platform. (3 class hours) 2. Post-class Assignments: Finish the after-class exercises. (3 class hours) 3. Independent Learning: Complete check-ins and unit activities. (4 class hours)	1. Platform Records 2. Exercise Checks 3. Activity Assessments
3. Unit 3	Level A Reading: What makes smart cities smart? Translation: the present progressive tense; Future action; Present and past participles Writing: Developing general-to-specific paragraphs Listening & Speaking: Human and Animals Level B Reading: The young generation-the future of China Translation: Self-employed Writing: Focusing on an example essay Listening & Speaking: Human and Animals	8	10	1. Pre-class Preview: Complete the preview tasks on the UAI platform. (3 class hours) 2. Post-class Assignments: Finish the after-class exercises. (3 class hours) 3. Independent Learning: Complete check-ins and unit activities. (4 class hours)	1. Platform Records 2. Exercise Checks 3. Activity Assessments

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
4. Unit 4	Level A Reading: China's greatest poet Translation: Ways of expression cause-and-effect relations; Ways of expressing concession; Four-character idioms in Chines Writing: Developing cause-and-effect paragraphs Listening & Speaking: Ways to success Level B Reading: Huang Danian, a strategic scientist Translation: The Silk Road Writing: A comparison/contrast essay Listening & Speaking: Ways to success	8	10	1. Pre-class Preview: Complete the preview tasks on the UAI platform. (3 class hours) 2. Post-class Assignments: Finish the after-class exercises. (3 class hours) 3. Independent Learning: Complete check-ins and unit activities. (4 class hours)	1. Platform Records 2. Exercise Checks 3. Activity Assessments
5. CET-4 Special Intensive Course	CET-4 Question Type Special Lectures: Listening, Writing, Reading, Translation Past CET-4 Real Exam Questions	16	20	1. Special Topic Training (5 hours) 2. CET-4 Past Exam Questions (10 hours) 3. Mock Tests (5 hours)	1. Exercise Checks 2. Activity Assessments
Total		48	60	Total Class Hours = 108 hours	
Credit points (ECTS)		3.6			

College English Extension Series (1)

Competence field	Foreign language
Curriculum designation	College English Extension Series (1)
Curriculum code	9054111031
Semester(s) in which the curriculum is taught	3th Semester
Person responsible for the curriculum	Jing Wen
Lecturer	Jing Wen, Jing Guo, Saijun Shangguan
Language	English
The relationship between the curriculum and the major	"College English Extension Series (1)" is a "bridge" connecting the major of Electronic Information Engineering with international academia and industries, whose core is to equip professional talents with academic communication capabilities in cross-cultural contexts and integrate professional technology with international communication literacy to serve the international development of the major. It is an "international expression tool" for the major: professional academic papers/reports writing, international academic exchanges, and reading of foreign professional literature are all facilitated through academic English. It is a direct support for the professional practice of Electronic Information Engineering, as technological R&D and industrial cooperation in this field often involve transnational collaboration, and the course's cross-cultural communication content closely caters to this practical demand. It is a key complement to the technical capabilities cultivated by the Electronic Information Engineering major—while the major hones students' strong technical skills, this course develops their cross-cultural academic expression and communication abilities. This "competence complementarity" enables professionals' technical achievements to be recognized by international peers, making it easier for them to participate in global technological competition and cooperation while having their own voice.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Method: Theoretical Teaching Teaching hours (Contact hours): 24 hours Including: Theoretical Teaching: 24 hours Class Size: 6 classes with approximately 240 students
Workload	Total Workload = 56 hours Contact Hours = 24 hours

	Self-Study Hours = 32 hours
Credit points (ECTS)	1.9
Requirements according to the examination regulations	Only students with an attendance rate of over two-thirds and a homework completion rate of over two-thirds are eligible to take the exam.
Prerequisite curriculum	College English (1), College English (2)
Curriculum objectives /expected learning outcomes	**Learning Outcomes:** The main task of this course is to help students master basic cross-cultural communication theories and skills, enhance their English language application capabilities in cross-cultural contexts, and develop cultural sensitivity, tolerance, and flexibility in handling cultural differences. The specific objectives include: **Knowledge:** 1. Master core vocabulary and sentence patterns required for daily conversations and basic academic communication in cross-cultural contexts; 2. Understand fundamental theories of cross-cultural communication and grasp key concepts related to cultural differences and interaction; Acquire basic knowledge of British and American cultures, including social customs, values, communication etiquette, and cultural norms; 3. Learn the theoretical framework for analyzing cross-cultural communication cases and the basic principles of handling cultural conflicts. **Skills:** 1. Be able to accurately and clearly express personal intentions and viewpoints using cross-cultural communication theories; 2. Demonstrate proficiency in applying basic cross-cultural communication skills to conduct daily conversations and simple academic exchanges in English; 3. Develop the ability to analyze cross-cultural communication cases systematically and propose appropriate solutions to cultural conflicts; Possess the linguistic competence required for participating in international academic conferences, including basic sociolinguistic and pragmatic skills; 4. Be able to elaborate on daily communication topics fluently in English and handle cross-cultural communication issues effectively. **Ability:** 1. Cultivate sensitivity to cultural differences, tolerance for diverse cultures, and flexibility in adapting to different cultural communication scenarios; 2. Enhance comprehensive English application capabilities that integrate linguistic skills with cross-cultural communication awareness; 3. Develop the ability to communicate effectively with Westerners

	and build positive interpersonal relationships in cross-cultural settings; 4. Foster critical thinking in evaluating cross-cultural communication phenomena and optimizing communication strategies; 5. Lay a solid foundation for participating in international academic and professional exchanges with improved cross-cultural communication competence.
Contents	**Theoretical Teaching (24 Contact Hours, 32 Self-Study Hours)** Chapter 1: Introduction to Cross-Cultural Communication (4 Contact Hours, 6 Self-Study Hours) 1. Intercultural Communication and Understanding Westerners 2. Stereotypes and Generalizations in Intercultural Communication (IC) Chapter 2: Understanding in Cross-Cultural Communication (4 Contact Hours, 4 Self-Study Hours) 1. Interpreting What Foreigners Mean 2. Individualist and Collectivist Cultures Chapter 3: Pressure in Speaking a Foreign Language (4 Contact Hours, 4 Self-Study Hours) 1. Speaking in a Foreign Language and Stress 2. Differences in Rank and Power Chapter 4: Culture Shock (4 Contact Hours, 6 Self-Study Hours) 1. Culture Shock and Culture Fatigue 2. Western Communication Styles Chapter 5: Expectations in Cross-Cultural Communication (4 Contact Hours, 4 Self-Study Hours) 1. Expectations and Projected Cultural Similarity 2. Conformity in Western Cultures Chapter 6: Ethnocentrism (4 Contact Hours, 4 Self-Study Hours) 1. Ethnocentrism 2. Family Relationships in the US Final Exam Preparation (4 Self-Study Hours)
Study and examination requirements and forms of examination	1. Attendance (10%): Meet the basic course requirements (no lateness, no early departure, no unexcused absence). 2. Assignments (10%): Writing tasks. 3. Group Projects (10%): PPT presentations, short video shooting, cross-cultural scenario performances. 4. Final Assessment (60%): Final examination.

Media employed	Multimedia Computer, Projector, Video Editing Software, Mobile Phone
Reading list	1. Textbooks [1] D. Snow, Encounters with Westerners: Improving Skills in English and Intercultural Communication. Shanghai: Shanghai Foreign Language Education Press, 2022. 2. Reference book [1] W. Hu, An Introduction to Intercultural Communication. Beijing: Foreign Language Teaching and Research Press, 1999. [2] X. Zu, Intercultural Communication. Beijing: Foreign Language Teaching and Research Press, 2015. [3] Y. Zhu, Cases and Analysis of Intercultural Communication. Beijing: Higher Education Press, 2018.

"College English Extension Series (1)" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Overview and Preliminary Knowledge of Cross-Cultural Communication	1. What is Culture 2. Intercultural communication 3. The importance of IC 4. Stereotypes and generalizations in IC	4	6	1. Intensive reading of Chapter 1 and sort out the theoretical frame work 2. Extended learning of concepts and complete the exercises of the chapter 3. Case analysis and association (1) 4. Knowledge integration (2)	1. Submission supervision 2. In-class inspection 3. Work in groups of 4-5.
2. Understanding in Cross-Cultural Communication	1. The tip culture in the USA 2. Interpreting what foreigners mean 3. Individualist and collectivist cultures	4	4	1. Supplementary Reading 1: Everyday Intercultural Missteps: What We Miss in Daily Chats and highlight 3-5cases in the article that match the scenarios from the textbook. (1) 2. Thematic reading on communication nuances.	1. Submit all reading notes, reflections, case analysis. 2. In-class sharing 3. Peer review of their short essays and case analysis.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				3. Case study “Cross-Cultural Workplace Conflicts”: Small Talks, Big Misunderstandings” and output 300 summery.	
3. Pressure in Speaking a Foreign Language	1. The different emphasis on language skills 2. The way of giving and responding to complements 3. The rank and power	4	4	1.Self- study of Chapter 7 and understand In/ Outgroups in collectivist and individualist cultures 2. Case analysis learning 3. Film-watching: The Fugitive.	1. Concept mastery check 2. Case analysis report (150-200 words) 3. In-class Scene discussion.
4. Culture Shock	1. The ways of solving culture shock 2. The meaning of high context and low context	4	6	1. Reading : Cultural Shock in Daily Interactions with Westerners 2. Output an essay: How to Cope with Cultural Shock When Interacting with Westerners, 150 words. Telling stories about encounters (chapter 8)	1. Chapter 8 knowledge check:submit a key points summary sheet (150-200 words inn English). 2. Case Analysis Submission to clarify the shock trigger and apply the chapter’s coping skills to propose solutions 3. In-class reading quiz.
5. Expectations in Cross-Cultural Communication	1. The difference of invitation between China and western countries 2. The meaning of loose culture and tight culture 3. Body language	4	4	1. Self study Chapter 9: Giving the benefit of the doubt and friendship patterns. (2) 2. Reading materials: Cultural Expectations in Cross- Cultural Communication: What We Assume vs. What’s True. Managing Expectations in Interactions with Westerners. (2)	1. Chapter 9 knowledge check: submit a key points summary sheet (150-200 words inn English). 2. Reading reports (100 words) 3. In-class sharing of reading reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
6. Ethnocentrism	1. The way of “go dutch” 2. The concept of ethnocentrism 3. The proper way of discussing private topics 4. The family relationship in the U.S	4	4	1. Self-learning of Chapter 10: Being an effective intercultural communicator. Extract two core modules: qualities of effective IC communicators (2) Advice for communicating with westerners: practical tips	1. In-class check and interaction 2. Comprehensive feedback: how to balance multiple qualities in real communication.
7. Final Examination	Students' Exam Preparation	0	4	1. Review key cultural concepts and theories; 2. Be able to apply relevant knowledge and theories to analyze cross-cultural communication cases; 3. Practice English writing.	1. Form study groups for peer supervision: Group members agree on daily study schedules and tasks with each other, establish WeChat groups, and check in daily for record-keeping. 2. Instructor supervision: Set fixed offline or online consultation hours. Assess the overall review progress of the class based on the frequency and depth of students' questions. 3. Counselor supervision: Visit students' dormitories during the review week to supervise and inspect their review progress.
Total		24	32	Total Class Hours = 56 hours	
Credit points (ECTS)		1.9			

College English Extension Series (2)

Competence field	Foreign language
Curriculum designation	College English Extension Series (2)
Curriculum code	9054111041
Semester(s) in which the curriculum is taught	4th Semester
Person responsible for the curriculum	Weipin Chen
Lecturer	Weipin Chen
Language	English
The relationship between the curriculum and the major	"College English Extension Series (2)" is a "bridge" connecting the major of Electronic Information Engineering with multinational corporations and industries. Its core is to equip professional talents with academic communication capabilities in cross-cultural contexts, integrate professional technology with international communication literacy, and serve the international development of the major. It is also a compulsory general education course for non-English major undergraduate students (excluding music, physical education, and art majors) in our university, and an important part of university education. Guided by foreign language teaching theories, the course takes English linguistic knowledge, application skills, cross-cultural communication, and learning strategies as its core content. Building on the foundation of "College English (1)", "College English (2)", and "College English Extension Series (1)", it further strengthens the training of listening, speaking, reading, writing, and other skills. Adhering to the overall principle of fostering virtue through education, the course organically integrates ideological and political education into English teaching, enhancing the affinity and correct value orientation of ideological and political education, and stimulating students' sense of responsibility and patriotic feelings. The cross-cultural communication and application skills content of the course directly serves professional practice and employment. The strong technical capabilities cultivated by the Electronic Information Engineering major require cross-cultural academic expression and communication skills. The "competence complementarity" formed between the course and the major enables professionals' technical achievements to be recognized by international peers, making it easier for them to participate in global technological competition and cooperation while having their own voice.

Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Method: Theoretical Teaching Teaching hours (Contact hours): 24 hours Including: Theoretical Teaching: 24 hours Class Size: 6 classes with approximately 240 students
Workload	Total Workload = 56 hours Contact Hours = 24 hours Self-Study Hours = 32 hours
Credit points (ECTS)	1.9
Requirements according to the examination regulations	Only students with an attendance rate of over two-thirds and a homework completion rate of over two-thirds are eligible to take the exam.
Prerequisite curriculum	College English (1), College English (2), College English Extension Series (1)
Curriculum objectives /Expected learning outcomes	**Learning Outcomes:** The main task of this course is to help students consolidate English linguistic knowledge related to career scenarios, enhance their comprehensive English application and business practice capabilities, and foster correct values, team spirit, and humanistic literacy. The specific objectives include: **Knowledge:** 1. Understand the background knowledge related to the textbook texts and fully grasp the content of the texts as well as key linguistic points; 2. Master core English vocabulary, phrases, and relevant linguistic knowledge associated with specific texts; 3. Acquire basic knowledge of business English application scenarios and relevant cross-cultural communication norms. **Skills:** 1. Improve comprehensive English abilities through integrated training of listening, speaking, reading, and writing skills; 2. Develop practical business English application capabilities to meet the needs of professional practice and workplace communication; 3. Master correct learning strategies and cross-cultural communication skills to effectively conduct oral and written information communication in English in future work and social interactions; 4. Be able to apply relevant English knowledge and skills to complete basic business communication tasks and information exchange. **Ability:** 1. Cultivate good learning habits, harmonious team spirit, and

	innovative awareness; 2. Enhance national spirit, ideals and beliefs, and moral qualities through ideological and political education integrated into the course; 3. Establish correct ideological and cultural concepts, develop preliminary critical thinking and reflective habits, and foster good humanistic literacy and aesthetic taste; 4. Lay a solid foundation for disseminating Chinese culture to the outside world in English and participating in international workplace communication with cultural confidence.
Contents	**Theoretical Teaching (24 Contact Hours, 32 Self-Study Hours)** Chapter 1: Listening, Speaking, Reading & Writing – Job-Seeking (4 Contact Hours, 6 Self-Study Hours) 1. The online job market 2. Major types of job interviews Chapter 2: Listening, Speaking, Reading & Writing – Business Etiquette (4 Contact Hours, 4 Self-Study Hours) 1. Office workers "admit being rude" 2. Networking etiquette Chapter 3: Listening, Speaking, Reading & Writing – Companies (4 Contact Hours, 4 Self-Study Hours) 1. A matter of choice 2. Company types & company structure Chapter 4: Listening, Speaking, Reading & Writing – Strategy (4 Contact Hours, 6 Self-Study Hours) 1. Nike's Goddess 2. Strategic planning Chapter 5: Listening, Speaking, Reading & Writing – Marketing (4 Contact Hours, 4 Self-Study Hours) 1. Are we being manipulated into buying brands? 2. Marketing mix Chapter 6: Listening, Speaking, Reading & Writing – Finance (4 Contact Hours, 4 Self-Study Hours) 1. Europe's Enron 2. Balance sheet Final Exam Preparation (4 Self-Study Hours)
Study and examination requirements and forms of	1. Attendance (10%): Meet the basic course requirements (no lateness, no early departure, no unexcused absence).

examination	2. Assignments (10%): Writing tasks. 3. Group Projects (10%): PPT presentations, short video shooting, cross-cultural scenario performances. 4. Final Assessment (60%): Final examination.
Media employed	Multimedia Computer, Projector, Video Editing Software, Mobile Phone
Reading list	1. Textbooks [1] T. Trappe, G. Graha, et al. Business English: Entering the Workplace. Beijing: Foreign Language Teaching and Research Press, 2016. 2. Reference book [1] T. Trappe, G. Graha, et al. Business English: Entering the Workplace (Teacher's Book). Beijing: Foreign Language Teaching and Research Press, 2016. [2] T. Trappe, G. Graha, et al. Business English: Advancing in the Workplace. Beijing: Foreign Language Teaching and Research Press, 2017.

" College English Extension Series (2)" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Job-Seeking	1. Reading: The online job market & Major types of job interviews 2.Listening & Speaking: Preparing for job-seeking 3. Discussion: Work for love or for money 4. Writing: Writing a CV	4	6	1. Intensive reading of Chapter 1 and sort out the theoretical frame work 2. Extended learning of concepts and complete the exercises of the chapter 3. Case analysis and association 4. Knowledge integration	1. Submission supervision 2. In-class inspection 3. Work in groups of 4-5.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Business Etiquette	1. Reading: Office workers “admit being rude” & Networking etiquette 2. Listening 1: Politeness in the workplace 3. Listening 2: Business etiquette in other cultures 4. Discussion: How to face and handle properly a workplace bully	4	4	1. Supplementary Career Skills: Culture at work :Being direct and highlight 3-5 cases in the article that match the scenarios from the textbook. 2. Thematic reading on communication nuances. Case study “Dilemma: A workplace bully” and output 300 summary.	1. Submit all reading notes, reflections, case analysis. 2. In-class sharing 3. Peer review of their short essays and case analysis.
3. Companies	1. Reading: A matter of choice; Company types & Company structure 2. Listening 1: Overview of a company 3. Listening 2: Success of a company 4. Writing: To write a letter of proposal on company’s “safety conscious culture”	4	4	1.Self- study of Unit 7 and understand Advertising 2. Case analysis learning 3. Film-watching: Thank You for Smoking.	1. Concept mastery check 2. Case analysis report (150-200 words) 3. In-class Scene discussion.
4. Strategy	1. Reading: Nike’s Goddess; Strategic planning 2. Listening 1: The SWOT analysis 3. Listening 2: A presentation about strategic planning 4. Writing: To write a letter of proposal to improve company’s strategy of future products	4	6	1. Reading : Coping with infoglut 2. Learning to write business :Principles of business writing. Using email effectively (Unit 8)	1. Unit 8 knowledge check: submit a key points summary sheet (150-200 words in English). 2. Case Analysis Submission to clarify the shock trigger and apply the unit’s coping skills to propose solutions 3. In-class reading quiz.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
5. Marketing	1. Reading: Are we being manipulated into buying brands?; Marketing mix 2. Listening 1: The importance of brands 3. Listening 2: Reasons for online marketing growth 4. Writing: To write a minute for the director	4	4	1. Self study Unit 9: Teamworking. 2. Reading materials: Think before you meet BIZ knowledge: Team roles.	1. Chapter 9 knowledge check: submit a key points summary sheet (150-200 words inn English). 2. Reading reports (100 words) 3. In-class sharing of reading reports.
6. Finance	1. Reading: Are we being manipulated into buying brands?；Marketing mix 2. Listening 1: The importance of brands 3. Listening 2: Reasons for online marketing growth 4. Writing: To write a minute for the director	4	4	2. Self-learning of Unit 10: Innovation---Failure is glorious. BIZ knowledge: Preparing for business innovation.	1. In-class check and interaction 2. Comprehensive feedback : how to balance multiple qualities in real communication.
7. Final Examination	Students' Exam Preparation	0	4	1. Review key cultural concepts and theories; 2. Be able to apply relevant knowledge and theories to analyze cross-cultural communication cases; 3. Practice English writing.	1. Form study groups for peer supervision: Group members agree on daily study schedules and tasks with each other, establish WeChat groups, and check in daily for record-keeping. 2. Instructor supervision: Set fixed offline or online consultation hours. Assess the overall review progress of

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
					the class based on the frequency and depth of students' questions. 3. Counselor supervision: Visit students' dormitories during the review week to supervise and inspect their review progress.
Total		24	32	Total Class Hours = 56 hours	
Credit points (ECTS)		1.9			

Module Descriptions - Mathematics and physics basics

Advanced Mathematics A(1)

Competence field	Mathematics and physics basics
Curriculum designation	Advanced Mathematics A (1)
Curriculum code	9092112011
Semester(s) in which the curriculum is taught	1st Semester
Person responsible for the curriculum	Xiayun Li, Liangfu Li, et al.
Lecturer	Liangfu Li, Xia Cai, Yuqing Liu, Min Fu, Fei Wang.
Language	Chinese
The relationship between the curriculum and the major	"Advanced Mathematics A (1)" is one of the common basic theory courses for the electronic information engineering major. This course focuses on functions (dependencies of quantities in the process of change). The main content includes functions, limits, continuity, differential calculus of single-variable functions, integral calculus of single-variable functions, and ordinary differential equations, etc. The main task of this course is to gradually develop students' abstract thinking ability, logical thinking ability, spatial imagination ability and self-study ability through various teaching links, as well as students' proficient arithmetic ability and the ability to comprehensively apply the knowledge they have learned to analyze and solve problems; To enable students to master the basic concepts, theories and operational skills of calculus, and to lay the necessary mathematical foundation for further study and improvement. At the same time, this course emphasizes practical application, conducting demand analysis, scheme design and system implementation for specific application scenarios, effectively enhancing students' professional quality and competitiveness, and laying a solid foundation for future career development in the field of electronic information engineering.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theoretical instruction Teaching hours (Contact hours): 72 hours Among them: Theoretical instruction: 72 hours Laboratory/practical teaching: 0 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 150 class hours; Contact hours = 72 hours; Self-study hours = 78 hours;
Credit points (ECTS)	5

Requirements according to the examination regulations	Students who are absent from class less than three times or less and have a completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Middle school mathematics
Curriculum objectives /expected learning outcomes	**Learning outcomes:** Through the study of this course, students will systematically acquire the basic theories, operations and analytical methods of limits of single-variable functions, differentiation of single-variable functions, integration of single-variable functions and ordinary differential equations, and lay the necessary mathematical foundation for learning Advanced Mathematics (Part II), professional courses and further expansion of mathematical knowledge. The specific objectives include: **Knowledge:** Students systematically acquire limits of single-variable functions, basic theories, basic operations, and analytical methods of single-variable function calculus and ordinary differential equations. **Skills:** Master knowledge of mathematics and natural sciences, and have the ability to calculate and deduce. Be able to apply basic principles of mathematics, natural science and engineering science to identify complex engineering problems. **Ability:** One is to provide the necessary basic mathematical knowledge for subsequent courses; The second is to impart mathematical ideas, cultivate students' innovative consciousness, and gradually improve students' mathematical literacy, mathematical thinking ability, and ability to apply mathematics.
Contents	**Theoretical instruction (72 contact hours, 78 self-study hours)** Unit 1: Functions, Limits and Continuity (18 contact hours, 16 self-study hours) 1. Preparatory knowledge; 2. The concept of a function 3. The limit of a sequence; 4. Limit of a function 5. Infinitesimal and infinitesimal quantities; 6. Rules of limits; 7. Limit existence criteria and two important limits; 8. Comparison of infinitesimals; 9. Continuity of functions. Unit 2: Derivatives and Differentials (10 contact hours, 8 self-study hours)

	1. The concept of derivatives; 2. Rules of differentiation; 3. Differentiation and its applications; 4. Higher derivatives and higher differentials; 5. Simple applications of derivatives. Unit 3: The Mean Value Theorem of Differential Calculus and Its Application (12 contact hours, 10 self-study hours) 1. Lagrange's Mean Value theorem and the monotonicity of functions; 2. Cauchy's mean value theorem and the limits of infinitives; 3. Taylor's formula; 4. Extreme and maximum values of a function; 5. The concavity and convexity of functions and inflection points; 6. Discussion of function graphs. Unit 4: Indefinite Integrals (10 contact hours, 8 self-study hours) 1. Concepts and properties of indefinite integrals; 2. Substitution integration of indefinite integrals; 3. Integration by parts for indefinite integrals; 4. Indefinite integrals of several special types of functions. Unit 5: Definite Integrals and their applications (12 contact hours, 10 self-study hours) 1. Introduction to calculus methods and the concept of definite integrals; 2. Properties of definite integrals; 3. Basic formulas of calculus; 4. Substitution integration of definite integrals; 5. Integration by parts of definite integrals; 6. The application of definite integrals 7. Improper integrals. Unit 6: Ordinary Differential Equations (10 contact hours, 8 self-study hours) 1. Basic concepts of differential equations; 2. First-order differential equations; 3. Higher-order differential equations that can be reduced; 4. Second-order linear differential equations; 5. Examples of applications of differential equations. Chapter 7: Final Exam (0 contact hours, 18 self-study hours) 1. Students prepare and review for the exam.

Study and examination requirements and forms of examination	1. Classroom performance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence, seriousness, etc.). 2. Assignments (30%) : After-class assignments, open-ended assignments. 1-2 assignments for each knowledge unit (1-6), completed independently by the individual. 10 assignments, 1-3 open-ended assignments. 3. Final assessment (60%) : Final exam.
Media employed	Multimedia computers, projectors, Learning Pass, Rain Classroom
Reading list	1. Textbooks [1] Y. Q. Song, et al. Advanced Mathematics (Volume I)[M]. Changsha: The Commercial Press, 2025. 2. Reference book [2] L. H. Huang, et al. Advanced Mathematics (Volume II)[M]. Beijing: Peking University Press, 2018. 3. Teaching Website: https://www.icourses.cn/web/sword/portalsearch/homeSearch

“Advanced Mathematics A (1)” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Function Limits and Continuity	1. Preparatory knowledge; 2. The concept of a function; 3. The limit of a sequence; 4. Limit of a function 5. Infinitesimal and infinitesimal quantities; 6. Rules of limits; 7. Limit existence criteria and two important limits; 8. Comparison of infinitesimals; 9. Continuity of functions.	18	16	1. Pre-class preview: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (8 class hours) 2. Homework: Exercises assigned after each class. (7 class hours) 3. Open-ended assignment: Collecting infinitesimal quantities from daily life (1 class hour)	1. Correction of exercises. 2. The Learning Pass platform automatically records the viewership of videos. 3. Quiz: Take an exercise or written quiz about limits at the end of this chapter

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Derivatives and differentials	1. The concept of derivatives; 2. Rules of differentiation; 3. Differentiation and its applications; 4. Higher derivatives and higher differentials; 5. Simple applications of derivatives.	10	8	1. Preview before class: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (3 class hours) 2 Homework after class (3 hours) 3. Open-ended Assignment: Summary of this chapter, Talk about your understanding of differential calculus of single-variable functions (2 hours).	1. The Learning Pass platform automatically records video views. 2. Exercise correction. 3. Quiz: At the end of this chapter, take an offline or written quiz.
3. The differential mean value theorem and its application	1. Lagrange's mean value theorem and the monotonicity of functions; 2. Cauchy's mean value theorem and the limits of infinitives; 3. Taylor's formula; 4. Extreme and maximum values of a function; 5. The concavity and convexity of functions and inflection points; 6. Discussion of function graphs.	12	10	1. Preview before class: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (4 class hours) 2. Homework: Complete the corresponding exercises. (4 class hours) 3. Open-ended Assignment: Talk about an example of how you used extremum-maximum value theory to solve practical problems in your daily life (2 hours).	1. The Learningpass platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.
4. Indefinite integrals	1. The concept and properties of indefinite integrals; 2. Substitution integration of	10	8	1. Pre-class preview: Watch the micro-lesson videos of Learning Pass and preview the teaching PPT. (3 class	1. The Learning Pass platform automatically records video views. 2. Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	indefinite integrals; 3. Integration by parts for indefinite integrals; 4. Indefinite integrals of several special types of functions.			hours) 2. After-class assignment: Relevant exercises. (3 class hours) 3. Open-ended Assignment: Summary of Integral Knowledge, Talk about your understanding of integral theory of unary functions (2 hours)	3. Check students' learning outcomes.
5. Definite integrals and their applications	1. Introduction to calculus methods and the concept of definite integrals; 2. Properties of definite integrals; 3. Basic formulas of calculus; 4. Substitution integration of definite integrals; 5. Integration by parts of definite integrals; 6. Applications of definite integrals; 7. Improper integrals.	12	10	1. Pre-class preview: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (4 class hours) 2. Homework: Complete the relevant exercises. (4 class hours) 3. Summarize the knowledge and write a learning reflection on the study of single-variable calculus (2 class hours)	1. The Learning Pass platform automatically records video views. 2. Exercise modification. 3. Check and evaluate each other's learning experiences.
6. Ordinary differential equations	1. Basic concepts of differential equations; 2. First-order differential equations; 3. Higher-order differential equations that can be reduced; 4. Second-order linear differential equations;	10	8	1. Preview before class: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (3 class hours) 2. Homework: Complete the relevant exercises. (3 class hours) 3. Open-ended assignment: Write a	1. The Learning Pass platform automatically records video views. 2. Exercise modification. 3. Complete the essay in groups and present it publicly to the whole class

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	5. Examples of applications of differential equations.			short essay on using differential equations to solve practical problems in production and life (2 hours)	
7. Final exam	Students prepare and review	0	18	Review key points and consolidate difficult points;	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, establish wechat groups, and check in daily for record. 2. Teacher supervision: Set up fixed offline or online Q&A sessions. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by counselors: Visiting student dormitories during the review week to supervise and inspect.
(Theoretical teaching) Tips		72	78		
Total		72	78	Total hours =150 hours	
Credits (ECTS)		5			

Advanced Mathematics A(2)

Competence field	Mathematics and physics basics
Curriculum designation	Advanced Mathematics A (2)
Curriculum code	9092112021
Semester(s) in which the curriculum is taught	2nd Semester
Person responsible for the curriculum	Xiayun Li, Liangfu Li, et al.
Lecturer	Liangfu Li, Xia Cai, Yuqing Liu, Min Fu, Fei Wang.
Language	Chinese
The relationship between the curriculum and the major	"Advanced Mathematics A (2)" is one of the common basic theory courses for the electronic information engineering major. This course focuses on functions (dependencies of quantities in the process of change). The main content includes vector algebra and spatial analytic geometry, differential calculus of multivariate functions, integral calculus of multivariate functions, infinite series and ordinary differential equations, etc. The main task of this course is to gradually develop students' abstract thinking ability, logical thinking ability, spatial imagination ability and self-study ability through various teaching links, as well as students' proficient arithmetic ability and the ability to comprehensively apply the knowledge they have learned to analyze and solve problems; To enable students to master the basic concepts, theories and operational skills of calculus, and to lay the necessary mathematical foundation for further study and improvement. At the same time, this course emphasizes practical application, conducting demand analysis, scheme design and system implementation for specific application scenarios, effectively enhancing students' professional quality and competitiveness, and laying a solid foundation for future career development in the field of electronic information engineering.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theoretical instruction Teaching hours (Contact hours): 80 hours Among them: Theoretical instruction: 80 class hours Laboratory/practical teaching: 0 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 165 class hours; Contact hours = 80 hours; Self-study hours = 85 hours;
Credit points (ECTS)	5.5
Requirements according to	Students who are absent from class less than three times or less and

the examination regulations	have a completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics A (1)
Curriculum objectives /expected learning outcomes	**Learning outcomes:** Through the study of this course, students will systematically acquire the basic theories, operations and analytical methods of calculus, infinite series and ordinary differential equations, and lay the necessary mathematical foundation for the study of professional courses and further expansion of mathematical knowledge. The specific objectives include: **Knowledge:** Students systematically acquire the basic theories, operations, and analytical methods of multivariable function calculus, infinite series, and ordinary differential equations. **Skills:** Master knowledge of mathematics and natural sciences, and have the ability to calculate and deduce. Be able to apply basic principles of mathematics, natural science and engineering science to identify complex engineering problems. **Ability:** One is to provide the necessary basic mathematical knowledge for subsequent courses; The second is to impart mathematical ideas, cultivate students' innovative consciousness, and gradually improve students' mathematical literacy, mathematical thinking ability, and ability to apply mathematics.
Contents	**Theoretical instruction (80 contact hours, 85 self-study hours)** Chapter 1: Vector Algebra and Analytic Geometry of Space (16 contact hours, 13 self-study hours) 1. Spatial Cartesian coordinate system; 2. Vector algebra 3. Plane and line equations; 4. The relationship between points, lines and planes and their applications 5. Spatial surfaces and spatial curves. Chapter 2: Differential Calculus of Multivariate Functions (20 contact hours, 16 self-study hours) 1. Basic concepts of multivariate functions; 2. Limits and continuity of multivariate functions; 3. Partial derivatives and total differentials; 4. Differential of multivariate composite functions; 5. Directional derivatives and gradients; 6. Geometric applications of differential calculus of multivariate functions; 7. The extremum of a multivariate function.

	Chapter 3: Double Integrals (14 contact hours, 12 self-study hours) 1. Line integration over arc length; 2. Integral of the coordinate curve; 3. Green's Formula and its applications; 4. Surface integral with respect to area; 5. Integral over coordinate surfaces; 6. Gauss formula. Chapter 4: Line Integrals and Surface Integrals (16 contact hours, 12 self-study hours) 1. Integrals of arc-length curves; 2. Integral of the coordinate curve; 3. Green's Formula and its applications; 4. Surface integrals over area; 5. Integral over coordinate surfaces; 6. Gauss formula. Chapter 5: Infinite Series (14 contact hours, 12 self-study hours) 1. Concepts and properties of constant term series; 2. A method for determining the convergence or divergence of positive term series; 3. The method for identifying arbitrary term series; 4. Series of functions; 5. Power series expansion of a function. Chapter 6::Final Exam (0 contact hours, 20 Self-study hours) 1. Students' review for the exam.
Study and examination requirements and forms of examination	1. Classroom performance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence, seriousness, etc.). 2. Assignments (30%) : After-class assignments, open-ended assignments. 1-2 assignments for each knowledge unit (1-5), completed independently. Open-ended assignments consist of three major questions. 3. Final assessment (60%) : Final exam.
Media employed	Multimedia computers, projectors, Learning Pass, Rain Classroom,

Reading list	1. Textbooks [1] S. S. Zhou, et al. Advanced Mathematics (Volume II) [M]. Changsha: The Commercial Press, 2025. 2. Reference book [2] L. H. Huang, et al. Advanced Mathematics (Volume II) [M]. Beijing: Peking University Press, 2018. 3. Teaching Website: https://www.icourses.cn/web/sword/portalsearch/homeSearch

“Advanced Mathematics A (2)” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Vector Algebra and Analytic Geometry in Space	1. Spatial rectangular coordinate system; 2. Vector algebra; 3. Plane and line equations; 4. The relationship between points, lines and planes and their applications 5. Spatial surfaces and spatial curves.	16	13	1. Pre-class preview: Watch the micro-lesson videos of Learning Pass and preview the teaching PPT. (8 class hours) 2. Homework: Exercises assigned after each class. (5 class hours)	1. Exercise correction. 2. The Learning Pass platform automatically records video views. 3. Quiz: Take a quiz on analytic geometry in space or in writing at the end of this chapter

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Differential calculus of multivariate functions	1. Basic concepts of multivariate functions; 2. Limits and continuity of multivariate functions; 3. Partial derivatives and total differentials; 4. Differential of multivariate composite functions; 5. Directional derivatives and gradients; 6. Geometric applications of differential calculus of multivariate functions; The extremum of a multivariate function	20	16	1. Preview before class: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (7 class hours) 2 Homework after class (6 hours) 3. Open-ended Assignment: Summary of this chapter, Talk about your understanding of differential calculus of multivariate functions (3 hours).	1. The Learning Pass platform automatically records the viewership of videos. 2. Exercise correction. 3. Quiz: At the end of this chapter, take an offline or written quiz.
3. Re-integrate	1. Line integration over arc length; 2. Integral of the coordinate curve; 3. Green's Formula and its applications; 4. Surface integrals over area; 5. Integral over coordinate surfaces; 6. Gauss formula.	14	12	1. Preview before class: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (7 class hours) 2. Homework: Complete the corresponding exercises. (5 class hours)	1. The Learning Pass platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.
4. Line integrals and surface integrals	1. Integral over the arc length; 2. Integral of the coordinate curve; 3. Green's Formula and its applications; 4. Surface integrals over area; 5. Integral over coordinate surfaces;	16	12	1. Preview before class: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (7 class hours) 2. After-class assignment: Relevant exercises. (3 class hours) 3. Open-ended Assignment: Summary	1. The Learning Pass platform automatically records video views. 2. Exercise correction. 3. Check students' learning outcomes.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	6. Gauss formula.			of Integral Knowledge, Talk about your understanding of multivariable function integrals (2 hours)	
5. Infinite series	1. Concepts and properties of constant term series; 2. A method for determining the convergence or divergence of positive term series; 3. The method for identifying arbitrary term series; 4. Series of function terms 1. Power series expansion of a function.	14	12	1. Preview before class: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (6 class hours) 2. Homework: Complete the relevant exercises. (4 class hours) 3. Summarize knowledge and write a reflection on learning about series (2 hours)	1. The Learning Pass platform automatically records video views. 2. Exercise modification.
6. Final exams	Students prepare and review	0	20	Review key points and consolidate difficult points	1. Form study groups with peer supervision: Group members agree on daily study time and tasks, establish QQ groups, and check in daily for record. 2. Teacher supervision: Set up fixed offline or online Q&A sessions. Judge the

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
					overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by counselors: Visiting student dormitories during the review week to supervise and inspect.
(Theoretical teaching) Tips		80	85		
Total		80	85	Total hours = 165 hours	
Credit (ECTS		5.5			

Linear Algebra

Competence field	Mathematics and physics basics
Curriculum designation	Linear Algebra
Curriculum code	9092112051
Semester(s) in which the curriculum is taught	3rd Semester
Person responsible for the curriculum	Hongyan Cheng
Lecturer	Hongyan Cheng, Fei Long, Yihua Yu, Ying Mo
Language	Chinese
The relationship between the curriculum and the major	"Linear Algebra" is an important public basic theory course for all majors in higher engineering colleges. With the development of modern science and technology, especially computer science, computations such as solving large systems of linear equations and finding eigenvalues and eigenvectors of matrices have become common problems in the field of engineering and technology. Therefore, learning and mastering the theory and methods of linear algebra is an important foundation and means for mastering modern science and technology and conducting scientific research. It is also a prerequisite for achieving the training objectives of all engineering majors in our school. The main task of this course is to learn the matrix method, systems of linear equations and related basic calculation methods commonly used in science and technology. Equip students with the ability to perform matrix operations proficiently and to solve some practical problems using matrix methods. This lays the necessary mathematical foundation for students to study subsequent courses and improve further.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theoretical instruction Teaching hours (Contact hours): 40 hours Among them: Theoretical instruction: 40 class hours Class size: Four classes with approximately 160 students
Workload	Total workload = 90 class hours; Contact hours = 40 hours; Self-study hours = 50 hours
Credit points (ECTS)	3
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.

Prerequisite curriculum	Advanced Mathematics A(1), Advanced Mathematics A(2)
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to equip students with knowledge of mathematics and natural sciences and the ability to calculate and deduce. Be able to apply the basic principles of mathematics, natural science and engineering science to solve some practical problems. Be capable of using modern tools to model and calculate complex engineering problems, and to analyze the validity and limitations of predictions and simulations. Specific goals include: **Knowledge:** 1. Through learning, enable students to master the relevant concepts and properties of determinants, and understand algebraic cofactors and Clem's rule; 2. Through learning, students will understand the concept of matrices and master various operation rules of matrices, especially the mixed operation rules of square matrices and determinants; 3. Through learning, students will be able to determine whether a system of linear equations has a solution and eliminate them; Master the method of determining the linear correlation of vector groups, master the conditions for homogeneous linear equations to have non-zero solutions and the structure of the solutions, master the conditions for non-homogeneous linear equations to have solutions and the structure of the solutions; 4. Through teaching, enable students to understand the concepts and properties of eigenvalues and eigenvectors of matrices, the concepts and properties of similar matrices, and the necessary and sufficient conditions for a matrix to be similar to a diagonal matrix. **Skills:** 1. Be proficient in using the properties of determinants to calculate determinants, and be able to apply the two basic methods of calculating determinants: the method of transforming triangles and the method of reducing prices; 2. Be able to use the properties of inverse matrices to perform matrix operations and solve simple matrix equations, and be proficient in determining the rank of matrices; 3. Be proficient in finding the rank of vector groups and maximal independent groups, and be proficient in using elementary transformation methods to find solutions to systems of linear equations and fundamental solution systems; **Ability:**

	1. Develop students' ability to calculate and deduce determinants; 2. Develop students' ability to calculate and deduce matrices and to identify complex problems using the basic principles of matrices; 3. Cultivate students' ability to model and solve complex problems by applying the knowledge of systems of linear equations. 4 Develop students' ability to calculate and deduce matrix diagonalization.
Contents	**Theoretical instruction (40 contact hours, 50 self-study hours)** Chapter 1: Determinants (8 contact hours, 5 self-study hours) 1. Second-order and third-order determinants and Cramer's rule; 2. Properties of determinants; 3. Calculation of N-order determinants. Chapter 2: Matrices (10 contact hours, 8 self-study hours) 1. Concepts and properties of matrices; 2. Inverse matrix; 3. Elementary transformations of matrices and the rank of matrices. Chapter 3: Vectors and Systems of Linear Equations (10 contact hours, 8 self-study hours) 1. Elimination of systems of linear equations; 2. Vector groups and their linear correlations; 3. The structure of the solution to a system of linear equations. Chapter Four: EigenValues and EigenVectors (10 Contact hours, 10 Self-study hours) 1. Vector Inner Product, Length, and Orthogonality; 2. Eigenvalues and eigenvectors of the square matrix; 3. Similar matrices. Chapter 5: Quadratic Forms and Their Matrices (2 contact hours, 4 self-study hours) 1. Quadratic forms and their matrices. Chapter 6: Final Exam (0 contact hours, 15 self-study hours) 1. Students prepare and review for the exam.

Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Assignments (30%) : After-class assignments, chapter tests and watching instructional videos. 3. Final assessment (60%) : final exams.
Media employed	Multimedia computers, projectors
Reading list	1. Textbooks [1] S. Chen et al., Linear Algebra, Beijing: Peking University Press, 2022. 2. Reference book [1] Department of Mathematics, Huazhong University of Science and Technology, Linear Algebra, Beijing: Higher Education Press, 2008. [2] Y. Zhou, Linear Algebra, Beijing: Peking University Press, 2018. [3] G. Mao, Linear Algebra: Methods and Techniques for Problem Solving, Wuhan: Huazhong University of Science and Technology Press, 2015.

“Linear Algebra” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
Determinant	1. Second-order and third-order determinants and Klem's rule; 2. Properties of determinants; 3. Calculation of N-order determinants.	8	5	1. Homework: Complete the determinant exercises. (5 class hours)	1. Exercise correction.
2. Matrices	1. Concepts and Properties of matrices; 2. Inverse matrix; 3. Elementary transformations of matrices and the rank of matrices.	10	8	1. Pre-class preview: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (4 class hours) 2. After-class assignment: Completing matrix exercises (4 hours)	1. The Learning Pass platform automatically records video views. 2. Exercise correction. 3. Quiz: Take an online or written quiz on matrices at the end of this chapter.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
3. Vectors and Systems of Linear equations	1. Elimination method for linear equations; 2. Vector groups and their linear correlations; 3. Structure of solutions to systems of linear equations.	10	8	1. Preview before class: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (4 class hours) 2. Homework: Completing exercises on vectors and Systems of Linear equations (4 hours)	1. The Learning Pass platform automatically records video views. 2. Exercise correction. 3. Quiz: Take an online or written quiz on vectors and systems of linear equations at the end of this chapter.
4 EigenValues and EigenVectors	1. Vector inner product,length and orthogonality; 2. Eigenvalues and eigenvectors of the square matrix; 3. Similarity matrices.	10	10	1. Pre-class preview: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (4 class hours) 2. Homework: Completing exercises on eigenvalues and eigenvectors (4 hours)	1. The Learning Pass platform automatically records video views. 2. Exercise correction. 3. Quiz: At the end of this chapter, conduct an online or written quiz on eigenvalues and eigenvectors.
5. Quadratic forms and their matrices	1. Quadratic forms and their matrices	2	4	1. Pre-class preview: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (4 class hours) 2. Homework: Completing exercises on quadratic forms and their matrices (4 hours)	1. The Learning Pass platform automatically records video views. 2. Exercise correction

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
6. Final exams	Students prepare and review	0	15	1. Review key points and consolidate difficult points; 2. Review class experiments, etc.	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, establish wechat groups, and check in daily for record. 2. Teacher supervision: Set up fixed offline or online Q&A sessions. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by counselors: Visiting student dormitories during the review week to supervise and inspect.
Combined		40	50	Total class hours = 90 class hours	
Credit (ECTS)		3			

Probability Theory and Mathematical Statistics

Competence field	Mathematics and physics basics
Curriculum designation	Probability Theory and Mathematical Statistics
Curriculum code	9092112061
Semester(s) in which the curriculum is taught	4thSemester
Person responsible for the curriculum	Hongyan Cheng
Lecturer	Hongyan Cheng, Fei Long, Yihua Yu, Ying Mo
Language	Chinese
The relationship between the curriculum and the major	"Probability Theory and Mathematical Statistics" is a compulsory course for undergraduate programs in science, engineering and management. It is particularly important for electronic information engineering and is a key tool for dealing with various "uncertainties" in the field. For example, there is noise during signal transmission, which helps model the noise and extract useful information from the jumbled signals; It also helps calculate bit error rates and optimize transmission quality during communication; When the control system encounters interference or parameter fluctuations, it can analyze stability and make the control more precise; Now, when processing sensor data and making intelligent decisions, it is also needed for data statistics and analysis. Core courses like Digital Signal processing and Principles of communication cannot do without its support.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theoretical instruction Teaching hours (Contact hours): 32 hours Among them: Theoretical instruction: 32 class hours Class size: Four classes with approximately 160 students
Workload	Total workload =75 class hours; Contact hours = 32 hours; Self-study hours = 43 hours;
Credit points (ECTS)	2.5
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics A(1), Advanced Mathematics A(2), Linear Algebra
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to equip students with

	knowledge of mathematics and natural sciences and the ability to calculate and deduce. Through this course, students will have an initial grasp of the basic knowledge and methods of probability theory and mathematical statistics; Be able to establish appropriate probability and statistics models for some practical problems and lay the foundation for the application of probability and statistics methods. Specific goals include: **Knowledge:** 1 Enable students to understand the basic concepts of probability theory through learning; 2. Through learning, students will master random variables and their distributions, multi-dimensional random variables; 3. Through learning, enable students to master the numerical characteristics of random variables; 4. Through teaching, enable students to understand the basic concepts of mathematical statistics and parameter estimation. **Skills:** 1. Be able to represent random events using relations and operations, and be able to use properties to convert the probabilities of complex events into the probabilities of simple events; 2 Be able to calculate probabilities using distribution function values and solve related probability problems using distribution laws or distribution functions; 3. Be proficient in using the conditional density function to calculate conditional probabilities, and be proficient in the probability distribution of the sum of two independent random variables, the maximum and minimum values; 4 Be able to solve problems using the mathematical expectations and variances of common distributions of random variables. **Ability:** 1. Develop students' ability to identify problems, think about problems and solve problems; 2. Cultivate students' abilities in calculation and deduction, as well as their capacity to apply the fundamental principles of probability theory and mathematical statistics to solve practical problems. 3. Develop students' ability to model and solve complex problems using knowledge of probability theory and mathematical statistics. 4. Learn to study and develop innovative spirit and practical ability, etc.

Contents	**Theoretical instruction (32 contact hours, 43 self-study hours)** Chapter 1: Basic Concepts of Probability Theory (8 contact hours, 6 self-study hours) 1. Random events; 2. Statistical probabilities and axiomatic definitions of probabilities; 3. Classical probabilities and geometric probabilities; 4. Conditional probability; 5. Independence of events. Chapter 2: Random Variables and Their Distribution (8 contact hours, 6 self-study hours) 1. Random variables and distribution functions; 2. Discrete random variables and their distributions; 3. Continuous random variables and their distributions; 4. Distribution of the function of the random variable. Chapter 3: Multidimensional Random Variables (6 Contact hours, 5 Self-study hours) 1. Multidimensional random variables and their distributions; 2. Marginal distribution; 3. Conditional distribution; 4. Independence of random variables; 5. The distribution of a function of two random variables. Chapter 4: Numerical Characteristics of Random Variables (4 contact hours, 5 self-study hours) 1. Mathematical expectations; 2. Variance. Chapter 5: Basic Concepts of Mathematical Statistics (3 contact hours, 3 self-study hours) 1. Samples and Statistics; 2. Sampling distribution Chapter 6: Parameter Estimation (3 contact hours, 3 self-study hours) 1. Point estimation. Chapter 7: Final Exams (0 contact hours, 15 self-study hours) 1. Students prepare and review for the exam.
Study and examination requirements and forms of	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence).

examination	2. Assignments (30%) : After-class assignments, chapter tests and watching instructional videos. 3. Final assessment (60%) : final exams.
Media employed	Multimedia computers, projectors
Reading list	1. Textbooks [1] B. Guo et al., Probability Theory and Mathematical Statistics, Beijing: Peking University Press, 2022. 2. Reference book [1] X. Huang et al., Probability Theory and Mathematical Statistics, Beijing: China Railway Publishing House, 2016. [2] educational website: https://www.mosoteach.cn/web/index.php?c=passport&m=index

“Probability Theory and Mathematical Statistics” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
1. Basic concepts of probability theory	1. Random events; 2. Statistical probabilities and axiomatic definitions of probabilities; 3. Classical probabilities and geometric probabilities; 4. Conditional probability; 5. Independence of events.	8	6	1. Pre-class preview: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (3 class hours) 2. After-class assignment: Completing exercises on basic concepts of probability Theory (3 hours)	1. The Learning Pass platform automatically records video views. 2. Exercise correction. 3. Quiz: At the end of this chapter, take an online or written quiz.
2. Random variables and their distributions	1. Random variables and distribution functions; 2. Discrete random variables and their distributions; 3. Continuous random	8	6	1. Preview before class: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (3 class hours) 2. Homework: Completing	1. The Learning Pass platform automatically records video views. 2. Exercise correction. 3. Quiz: Take an online or written quiz at the end of this chapter.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	variables and their distributions; 4. Distribution of the function of the random variable.			exercises on Random variables and their distribution (3 hours)	
3. Multidimensional random variables	1. Random variables and their distributions; 2. Marginal distribution; 3. Conditional distribution; 4. Independence of random variables; 5. The distribution of a function of two random variables.	6	5	1. Preview before class: Watch the Learning Pass micro-lesson video and preview the teaching PPT. (2 class hours) 2. After-class assignment: Completing multi-dimensional random variable exercises (3 hours)	1. The Learning Pass platform automatically records video views. 2. Exercise correction. 3. Quiz: Take an online or written quiz on vectors and systems of linear equations at the end of this chapter.
4. Numerical characteristics of random variables	1. Mathematical expectations; 2. Variance.	4	5	1. Homework: Complete exercises on the numerical characteristics of random variables (5 class hours)	1. Correction of exercises. 2. Quiz: Take an online or written quiz on eigenvalues and eigenvectors at the end of this chapter.
5 Basic concepts of mathematical statistics	1. Samples and statistics; 2. Sampling distribution.	3	3	1. Homework: Complete exercises on basic concepts of mathematical statistics (3 class hours)	1. Exercise correction. 2. Quiz: Take an online or written quiz on eigenvalues and eigenvectors at the end of this chapter.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
6. Parameter estimation	1. Point estimation.	3	3	1. Homework: Complete parameter estimation exercises (3 class hours)	1. Correction of exercises. 2. Quiz: Take an online or written quiz on eigenvalues and eigenvectors at the end of this chapter.
7. Final exam	Students prepare and review	0	15	3. Review key points and consolidate difficult points; 4. Master the problem-solving ideas and methods for chapter exercises.	1. Form study groups for peer supervision: Group members agree on daily study time and tasks with each other, establish wechat groups, and check in daily for record. 2. Teacher supervision: Set up fixed offline or online Q&A sessions. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by counselors: Visiting student dormitories during the review week to supervise and inspect.
Combined		32	43	Total hours = 75 hours	
Credit (ECTS		2.5			

Functions of Complex Variables

Competence field	Mathematics and physics basics
Curriculum designation	Functions of Complex Variables
Curriculum code	9061112041
Semester(s) in which the curriculum is taught	3rd Semester
Person responsible for the curriculum	Yaqi Deng
Lecturer	Yaqi Deng, Lin Lin, Shiying Mo
Language	Chinese
The relationship between the curriculum and the major	"Functions of Complex Variables" is a discipline foundation course for science and engineering majors, and it is the mathematical foundation for understanding physics, mechanics, and engineering technology. This course introduces the concept of complex numbers, as well as the limits of complex functions, analytical properties, integral properties, series expansion theorems and residue theorems, etc. It effectively enhances students' abstract thinking ability, logical reasoning ability, spatial imagination ability and scientific computing ability, laying the foundation for future teaching and research, and career development in the field of electronic information engineering.
Teaching methods, number of teaching hours	Target major: Electronic Information Engineering Teaching method: Theoretical instruction Teaching hours (Contact hours): 24 hours Among them: Theoretical instruction: 24 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 57 class hours; Contact hours = 24 hours; Self-study hours = 33 hours;
Credit points (ECTS)	1.9
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics A(1), Advanced Mathematics A(2), Linear Algebra
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to enable students to master the concept and properties of complex functions, and to gain an in-depth understanding of the analytical nature of complex functions from four aspects: definition, integration, series, and residue. The specific objectives include:

	Knowledge: 1. Master the concept, properties and integral characteristics of analytic functions of complex numbers; 2. Be familiar with the Taylor series expansion and Laurent series expansion of complex functions; 3 Understand the residue theorem of analytic functions and its application in definite integrals. **Skills:** 1. Master the application of the residue theorem for complex functions in definite integrals and be able to calculate different types of definite integrals; 2 Learn to use the basic theory and methods of complex functions to solve practical problems. **Ability:** 1. Develop abstract thinking ability, logical reasoning ability, spatial imagination ability and scientific computing ability; 2. Possess the basic qualities and abilities to independently analyze and solve theoretical and practical problems.
Contents	**Theoretical instruction (24 contact hours, 33 self-study hours)** Chapter 1: Complex Numbers and Complex Functions (5 Contact hours, 4 Self-study hours) 1. Concepts and operations of complex numbers; 2. Complex functions and their limits and continuity. Chapter 2: Analytic Functions (4 contact hours, 4 self-study hours) 1. The concept of analytic functions and their determination; 2. Complex elementary functions. Chapter 3: Integration of Complex Functions (6 contact hours, 5 self-study hours) 1. Concepts and calculations of integration of complex functions; 2. The Cauchy-Gussa Fundamental Theorem and its generalizations; 3. Primitive Functions and indefinite integrals; 4. Cauchy integral formula and higher-order derivative formula; 5. The relationship between analytic and harmonic functions. Chapter 4: Series of Complex Function Terms (5 contact hours,

	5 self-study hours) 1. Series of complex terms; 2. Power series; 3. Taylor series; 4. Laurent series. Chapter 5: Residues and Their Applications (4 contact hours, 5 self-study hours) 1. Isolated singularities of Analytic functions; 2. Residue and the residue theorem; 3. Application of the Residue Theorem in definite integrals. Chapter 6: Final Exams (0 contact hours, 10 self-study hours) 1. Students prepare and review for the exam.
Study and examination requirements and forms of examination	1. In-class interaction (20%) : attendance rate, class activity level, accuracy of answering questions, expressive communication and discussion. 2. Homework (20%) : After-class assignments. 3. Final assessment (60%) : final exam.
Media employed	Multimedia computer, projector, laser pointer, blackboard, chalk
Reading list	1. Textbooks [1] M. Wang, Complex Functions, Beijing: Higher Education Press, 2020. 2. Reference book [1] B. Ma, Complex Functions and Integral Transforms, Beijing: Peking University Press, 2019.

“Functions of Complex Variables” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Overview of complex numbers and complex functions	1. Concepts and operations of complex numbers; 2. Complex functions and their limits and continuity.	5	4	1. Pre-class preview: Preview the teaching PPT and review the relevant knowledge of advanced mathematics. (2 class hours) 2. Homework: Complete exercises related to complex number algebraic operations, exponentiation and roots. (2 class hours)	1. Random quizzes in class: to test the effectiveness of previewing/reviewing. 2. Exercise correction.
2. Analytic functions	1. The concept of analytic functions and their determination; 2. Complex elementary functions.	4	4	1. Pre-class preview: Preview the lecture PPT and review the relevant knowledge of advanced mathematics. (2 class hours) 2. Homework: Complete exercises related to the determination of analytic functions and the calculation of elementary functions.	1. Random quizzes in class: to test the effectiveness of previewing/reviewing. 2. Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				(2 class hours)	
3. Integration of complex functions	1. The concept and calculation of integration of complex functions; 2. The Cauchy-Gussa Fundamental Theorem and its generalizations; 3. Primitive Functions and indefinite integrals; 4. Cauchy integral formula and higher-order derivative formula; 5. The relationship between analytic functions and harmonic functions.	6	5	1. Pre-class preview: Preview the lecture PPT and review the relevant knowledge of advanced mathematics. (2 class hours) 2. Homework: Complete exercises related to the integration calculation and proof of complex functions. (3 class hours)	1. Random quizzes in class: to test the effectiveness of previewing/reviewing. 2. Exercise correction.
4. Complex function term series	1. Series of complex terms; 2. Power series; 3. Taylor series; 4. Laurent series.	5	5	1. Pre-class preview: Preview the lecture PPT and review advanced mathematics. (2 class hours) 2. Homework: Complete the power series of complex functions. Exercises related to Taylor series, Laurent series expansion, etc. (3 class hours)	1. Random quizzes in class: to test the effectiveness of previewing/reviewing. 2. Exercise correction.
5. Leave the number and its application	1. Isolated singularities of analytic functions; 2. Residue and the Residue Theorem; 3. Application of the Residue	4	5	1. Pre-class preview: Preview the lecture PPT and review the relevant knowledge of advanced mathematics. (2 class hours) 2. Homework: Complete exercises related to leaving residues and calculating real	1. Random quizzes in class: to test the effectiveness of previewing/reviewing. 2. Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	Theorem in definite integrals.			integrals using the residue theorem. (3 class hours)	
7. Final exams	Students prepare and review	0	10	1 Review key points and consolidate difficult points; 2. Redo the exercises at the end of the class, etc.	1. Form study groups with peer supervision: Group members agree on daily study time and tasks with each other, establish wechat groups, and check in daily for record. 2. Teacher supervision: Set up fixed offline or online Q&A sessions. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by the counselor: Visiting student dormitories during the review week to supervise and inspect.
(Theoretical teaching) Tips		24	33		
(Practical Teaching) Tips		0	0		
Total		24	33	The total class hours = 57	
Credits (ECTS)		1.9			

College Physics (1)

Competence field	Mathematics and physics basics
Curriculum designation	College Physics (1)
Curriculum code	9065112011
Semester(s) in which the curriculum is taught	2nd Semester
Person responsible for the curriculum	Saiwen Zhang
Lecturer	Saiwen Zhang, Cuixiu Xiong, Jian Rao, Shoujian Wu, Huixia Jin, Ying Deng
Language	Chinese
The relationship between the curriculum and the major	Physics is a science that studies the most universal and basic forms of motion and their laws in the material world. It is the foundation of many natural sciences and engineering technologies. For higher engineering majors, "College Physics" is an important compulsory basic course, closely linked to many basic courses and technical basic courses. Through learning scientific thinking methods and research approaches, students will acquire the ability to comprehensively apply physical and mathematical knowledge to solve practical problems. It improves the ability to discover, analyze and solve problems, as well as the quality of innovation and development. It lays a solid foundation for students to further study professional knowledge and engage in scientific and technological work and scientific research in the future.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Methods: Theoretical Teaching Teaching Hours (Contact Hours): 48 hours Including: Theoretical Teaching: 48 hours Class Size: Approximately 160 students in four classes
Workload	Total Workload = 108 class hours; Contact Hours = 48 hours; Self-study Hours = 60 hours;
Credit points (ECTS)	3.6
Requirements according to the examination regulations	Only students with an attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics
Curriculum objectives /expected learning outcomes	**Learning Outcomes:** Core Task of the Course: Lay a solid theoretical foundation of physics for the Electronic Information Engineering major, enable students to master core knowledge of mechanics, vibration and wave motion, form scientific thinking methods, and acquire initial ability to solve engineering-related problems using physical and mathematical

	knowledge. **Knowledge:** 1. Master core concepts, basic principles and research methods of physics, and clarify their fundamental supporting role in Electronic Information Engineering; 2. Understand the representation logic of vectors and calculus in physics, and learn about the development history, current status and cutting-edge directions of physics; 3. Master core concepts and physical images of particle motion, rigid body rotation, simple harmonic motion and mechanical waves; 4. Clarify the applicable conditions and physical essence of conservation laws such as conservation of momentum, conservation of mechanical energy and conservation of angular momentum; 5. Understand the physical connotation and engineering significance of phenomena such as damped vibration, resonance and Huygens' principle. **Skills:** 1. Be able to describe the motion states of particles and rigid bodies in different coordinate systems using physical quantities such as position vectors and velocity; 2. Proficiency in applying calculus thinking to solve kinematics problems and master the application of the rotating vector method for simple harmonic motion; 3. Be able to correctly apply Newton's laws, momentum theorem, kinetic energy theorem, etc. to solve practical mechanical problems; 4. Master the establishment and application of the wave equation of plane harmonic waves, and clarify the laws and calculation methods of standing waves and the Doppler effect; 5. Be able to analyze and calculate problems related to the fixed-axis rotation of rigid bodies by combining the rotational law, angular momentum theorem, etc. **Ability:** 1. Possess the ability to comprehensively apply physical knowledge and mathematical tools to analyze and solve mechanics, vibration and wave-related problems in engineering and technology; 2. Form a scientific thinking mode, which can discover, decompose complex problems and propose solutions based on physical essence; 3. Possess the ability to independently analyze physical problems and learn new physical knowledge autonomously, laying a solid foundation for subsequent professional course learning and scientific research in Electronic Information Engineering.
Contents	**Theoretical Teaching (48 contact hours, 60 self-study hours)** Chapter 1: Particle Kinematics (9 contact hours, 9 self-study hours) 1. Position vector, displacement, velocity, acceleration;

	2. Plane curvilinear motion; 3. Circular motion; 4. Two types of problems in motion; 5. Relative motion; Chapter 2: Particle Dynamics (10 contact hours, 10 self-study hours) 1. Newton's laws of motion; 2. Momentum theorem and law of conservation of momentum; 3. Work, work done by conservative forces; 4. Particle kinetic energy theorem, system of particles kinetic energy theorem, law of conservation of mechanical energy; 5. Non-inertial frames, inertial forces; Chapter 3: Fundamentals of Rigid Body Mechanics (12 contact hours, 12 self-study hours) 1. Fixed-axis rotation of rigid bodies; 2. Angular momentum, kinetic energy and moment of inertia of fixed-axis rotation; 3. Torque, rotational law of fixed-axis rotation of rigid bodies; 4. Work done by torque, kinetic energy theorem; 5. Law of conservation of angular momentum for fixed-axis rotation of rigid bodies; Chapter 4: Mechanical Vibration (9 contact hours, 9 self-study hours) 1. Dynamic characteristics of simple harmonic motion; 2. Kinematics of simple harmonic motion; 3. Energy of simple harmonic motion; 4. Superposition of simple harmonic motions; 5. Damped vibration, forced vibration, resonance; Chapter 5: Mechanical Waves (8 contact hours, 8 self-study hours) 1. Plane harmonic waves; 2. Energy and energy flow of waves; 3. Huygens' principle, superposition and interference of waves; 4. Standing waves; 5. Doppler effect. Final Independent Review (0 contact hours, 12 self-study hours)
Study and examination requirements and forms of examination	1. Attendance Rate (10%): Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Homework (30%): 3. Final Assessment (60%): Final exam.
Media employed	Multimedia computers, projectors
Reading list	1. Textbooks

	[1] J. Zhao, D. Wang, College Physics, Beijing: Beijing University of Posts and Telecommunications Press, 2021. 2. Reference Books [1] Y. Yao, College Physics, Harbin: Harbin Institute of Technology Press, 2018. [2] S. Cheng, Z. Jiang, General Physics, Beijing: Higher Education Press, 2012.

"College Physics (1)"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Particle Kinematics	1. Position vector, displacement, velocity, acceleration; 2. Plane curvilinear motion; 3. Circular motion; 4. Two types of problems in motion; 5. Relative motion;	9	9	1. Pre-class preview: Watch microlecture videos on Xuexitong and preview lecture PPTs. (5 class hours) 2. Post-class homework: Complete homework on Particle Kinematics. (4 class hours)	1. Xuexitong Platform automatically records video viewing progress. 2. Homework correction. 3. Quiz: Conduct an online quiz on Particle Kinematics after the chapter ends.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Particle Dynamics	1. Newton's laws of motion; 2. Momentum theorem and law of conservation of momentum; 3. Work, work done by conservative forces; 4. Particle kinetic energy theorem, system of particles kinetic energy theorem, law of conservation of mechanical energy; 5. Non-inertial frames, inertial forces;	10	10	1. Pre-class preview: Watch microlecture videos on Xuexitong and preview lecture PPTs. (7 class hours) 2. Post-class homework: Complete homework on Particle Dynamics. (3 class hours)	1. Xuexitong Platform automatically records video viewing progress. 2. Homework correction. 3. Quiz: Conduct an online quiz on Particle Dynamics after the chapter ends.
3. Rigid Body Mechanics	1. Fixed-axis rotation of rigid bodies; 2. Angular momentum, kinetic energy and moment of inertia of fixed-axis rotation; 3. Torque, rotational law of fixed-axis rotation of rigid bodies; 4. Work done by torque, kinetic energy theorem; 5. Law of conservation of angular momentum for fixed-axis rotation of rigid bodies;	12	12	1. Pre-class preview: Watch microlecture videos on Xuexitong and preview lecture PPTs. (7 class hours) 2. Post-class homework: Complete homework on Rigid Body Mechanics. (3 class hours)	1. Xuexitong Platform automatically records video viewing progress. 2. Homework correction. 3. Quiz: Conduct an online quiz on Rigid Body Mechanics after the chapter ends.
4. Mechanical Vibration	1. Dynamic characteristics of simple harmonic motion; 2. Kinematics of simple harmonic motion; 3. Energy of simple harmonic motion; 4. Superposition of simple harmonic motions;	9	9	1. Pre-class preview: Watch microlecture videos on Xuexitong and preview lecture PPTs. (6 class hours) 2. Post-class homework: Complete homework on Mechanical Vibration. (3 class hours)	1. Xuexitong Platform automatically records video viewing progress. 2. Homework correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	5. Damped vibration, forced vibration, resonance;				
5. Mechanical Waves	1. Plane harmonic waves; 2. Energy and energy flow of waves; 3. Huygens' principle, superposition and interference of waves; 4. Standing waves; 5. Doppler effect.	8	8	1. Pre-class preview: Watch microlecture videos on Xuexitong and preview lecture PPTs. (6 class hours) 2. Post-class homework: Complete homework on Mechanical Waves. (2 class hours)	1. Xuexitong Platform automatically records video viewing progress. 2. Homework correction. 3. Quiz: Conduct an online quiz on Mechanical Vibration and Mechanical Waves after the chapter ends.
Final Independent Review	All knowledge points of College Physics learned this semester	0	12	All knowledge points of College Physics learned this semester	
Subtotal (Theoretical Teaching)		48	60		
Subtotal (Practical Teaching)		0	0		
Total		48	60	**Total Hours = 108 class hours**	
Credit points (ECTS)		3.6			

College Physics (2)

Competence field	Mathematics and physics basics
Curriculum designation	College Physics (2)
Curriculum code	9065112021
Semester(s) in which the curriculum is taught	3rd Semester
Person responsible for the curriculum	Saiwen Zhang
Lecturer	Saiwen Zhang, Cuixiu Xiong, Jian Rao, Shoujian Wu, Huixia Jin, Ying Deng
Language	Chinese
The relationship between the curriculum and the major	Physics is a science that studies the most universal and basic forms of motion and their laws in the material world. It is the foundation of many natural sciences and engineering technologies. For higher engineering majors, "College Physics" is an important compulsory basic course, closely linked to many basic courses and technical basic courses. Through learning scientific thinking methods and research approaches, students will acquire the ability to comprehensively apply physical and mathematical knowledge to solve practical problems. It improves the ability to discover, analyze and solve problems, as well as the quality of innovation and development. It lays a solid foundation for students to further study professional knowledge and engage in scientific and technological work and scientific research in the future.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Methods: Theoretical Teaching Teaching Hours (Contact Hours): 48 hours Including: Theoretical Teaching: 48 hours Class Size: Approximately 160 students in four classes
Workload	Total Workload = 108 class hours; Contact Hours = 48 hours; Self-study Hours = 60 hours;
Credit points (ECTS)	3.6
Requirements according to the examination regulations	Only students with an attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics, College Physics 1
Curriculum objectives /expected learning outcomes	**Learning Outcomes:** Core Task of the Course: Lay a solid theoretical foundation of electromagnetism and optics for the Electronic Information Engineering major, enable students to master core laws of electric fields, magnetic fields and wave optics, and improve the ability to solve professional-related practical problems using physical knowledge.

	Knowledge: 1. Master basic concepts, core laws and physical images of electromagnetism and wave optics, and clarify their application value in the electronic information field; 2. Understand the application logic of vectors and calculus in electromagnetism, and learn about the development history of electromagnetic field theory and cutting-edge related technologies; 3. Clarify the physical essence and applicable scenarios of core laws such as Gauss's Theorem, Ampère's Circuital Theorem and Faraday's Law of Electromagnetic Induction; 4. Master the essence of interference phenomena, and understand the intrinsic connection between electromagnetic fields and electromagnetic waves as well as the working principle of the Michelson Interferometer. **Skills:** 1. Be able to calculate electric field distribution using Coulomb's Law and Gauss's Theorem, and analyze magnetic field problems using Ampère's Circuital Theorem and Ampère's Theorem; 2. Proficiency in applying Faraday's Law of Electromagnetic Induction and Lenz's Law to solve induced electromotive force and current, and master the engineering application analysis of self-inductance and mutual inductance; 3. Be able to calculate the electric potential of electrostatic fields and the capacitance of capacitors, and analyze the motion of charged particles in electromagnetic fields and the Hall Effect; 4. Master the fringe laws and calculation methods of Young's Double-Slit Interference and Wedge Interference, and clarify the impact of half-wave loss; 5. Be able to explain the formation mechanism of electromagnetic waves combined with Maxwell's theory, and analyze the working process of the Michelson Interferometer using the interference principle. **Ability:** 1. Possess the ability to comprehensively apply electromagnetism, optics knowledge and mathematical tools to solve related problems in Electronic Information Engineering; 2. Form a scientific analytical thinking mode, which can decompose complex problems based on physical essence and improve innovative thinking and practical ability; 3. Establish a rigorous scientific worldview, and possess the ability to independently research physical problems and autonomously absorb new professional-related physical knowledge; 4. Lay a solid physical foundation for subsequent professional courses such as Circuits and Communications, as well as scientific research in the electronic information field.

Contents	**Theoretical Teaching (48 contact hours, 60 self-study hours)** Chapter 1: Electrostatic Field (16 contact hours, 16 self-study hours) 1. Electric Field Intensity and Gauss's Theorem; 2. Work Done by Electric Field Force, Electric Potential; 3. Conductors in Electrostatic Fields; 4. Dielectrics in Electrostatic Fields; 5. Capacitance, Capacitors; 6. Energy Storage of Capacitors, Energy of Electrostatic Fields; Chapter 2: Steady Magnetic Field (12 contact hours, 12 self-study hours) 1. Gauss's Theorem for Magnetic Fields and Ampère's Circuital Theorem; 2. Ampère's Theorem; 3. Action of Magnetic Fields on Current-Carrying Conductors; 4. Action of Magnetic Fields on Moving Charges; 5. Cyclotrons and Magnetic Confinement; 6. Magnetic Dielectrics; Chapter 3: Electromagnetic Induction (10 contact hours, 10 self-study hours) 1. Lenz's Law and Faraday's Law of Electromagnetic Induction; 2. Motional Electromotive Force and Induced Electromotive Force; 3. Betatron, Eddy Currents; 4. Self-inductance and Mutual Inductance; 5. Energy of Magnetic Fields; Chapter 4: Electromagnetic Fields and Waves (4 contact hours, 4 self-study hours) 1. Displacement Current, Maxwell's Equations; 2. Electromagnetic Waves; Chapter 5: Optical Interference (6 contact hours, 6 self-study hours) 1. Young's Double-Slit Interference, Optical Path and Optical Path Difference; 2. Thin-Film Interference; 3. Wedge Interference, Newton's Rings, Michelson Interferometer. Final Independent Review (0 contact hours, 12 self-study hours)
Study and examination requirements and forms of examination	1. Attendance Rate (10%): Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Homework (30%): 3. Final Assessment (60%): Final exam.
Media employed	Multimedia computers, projectors

Reading list	1. Textbooks [1] J. Zhao, D. Wang, College Physics, Beijing: Beijing University of Posts and Telecommunications Press, 2021. 2. Reference Books [3] Y. Yao, College Physics, Harbin: Harbin Institute of Technology Press, 2018. [4] S. Cheng, Z. Jiang, General Physics, Beijing: Higher Education Press, 2012.

"College Physics (2)"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Electrostatic Field	1. Electric Field Intensity and Gauss's Theorem; 2. Work Done by Electric Field Force, Electric Potential; 3. Conductors in Electrostatic Fields; 4. Dielectrics in Electrostatic Fields; 5. Capacitance, Capacitors; 6. Energy Storage of Capacitors, Energy of Electrostatic Fields	16	16	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (12 class hours) 2. Post-class homework: Complete homework on Electrostatic Field. (4 class hours)	1. Rain Classroom automatically records video viewing progress. 2. Homework correction. 3. Quiz: Conduct an online quiz on Electrostatic Field after the chapter ends.
2. Steady Magnetic Field	1. Gauss's Theorem for Magnetic Fields and Ampère's Circuital	12	12	1. Pre-class preview: Watch microlecture videos on Rain	1. Rain Classroom automatically records video viewing progress.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	Theorem; 2. Ampère's Theorem; 3. Action of Magnetic Fields on Current-Carrying Conductors; 4. Action of Magnetic Fields on Moving Charges; 5. Cyclotrons and Magnetic Confinement; 6. Magnetic Dielectrics			Classroom and preview lecture PPTs. (8 class hours) 2. Post-class homework: Complete homework on Steady Magnetic Field. (4 class hours)	2. Homework correction. 3. Quiz: Conduct an online quiz on Steady Magnetic Field after the chapter ends.
3. Electromagnetic Induction	1. Lenz's Law and Faraday's Law of Electromagnetic Induction; 2. Motional Electromotive Force and Induced Electromotive Force; 3. Betatron, Eddy Currents; 4. Self-inductance and Mutual Inductance; 5. Energy of Magnetic Fields;	10	10	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (6 class hours) 2. Post-class homework: Complete homework on Electromagnetic Induction. (4 class hours)	1. Rain Classroom automatically records video viewing progress. 2. Homework correction. 3. Quiz: Conduct an online quiz on Electromagnetic Induction after the chapter ends.
4. Electromagnetic Fields and Waves	1. Displacement Current, Maxwell's Equations; 2. Electromagnetic Waves	4	4	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (2 class hours) 2. Post-class homework: Complete homework on Electromagnetic Fields and Waves. (2 class hours)	1. Rain Classroom automatically records video viewing progress. 2. Homework correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
5. Optical Interference	1. Young's Double-Slit Interference, Optical Path and Optical Path Difference; 2. Thin-Film Interference; 3. Wedge Interference, Newton's Rings, Michelson Interferometer.	6	6	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (4 class hours) 2. Post-class homework: Complete homework on Optical Interference. (2 class hours)	1. Rain Classroom automatically records video viewing progress. 2. Homework correction.
Final Independent Review	All knowledge points of College Physics learned this semester	0	12	All knowledge points of College Physics learned this semester	
Subtotal (Theoretical Teaching)		48	60		
Subtotal (Practical Teaching)		0	0		
Total		48	60	**Total Hours = 108 class hours**	
Credit points (ECTS)		3.6			

College Physics Experiment

Competence field	Mathematics and physics basics
Curriculum designation	College Physics Experiment
Curriculum code	9065212030
Semester(s) in which the curriculum is taught	2nd Semester
Person responsible for the curriculum	Saiwen Zhang
Lecturer	Saiwen Zhang, Taiping Deng, Shan Lei, Yanqing Cao, Li Wen
Language	Chinese
The relationship between the curriculum and the major	This course is an experimental course following "College Physics", serving as a supplement and enhancement to classroom teaching. After learning "College Physics", students have initially mastered the basic principles and experimental methods of college physics. "College Physics Experiment" is an independent compulsory course for college students to receive basic scientific experiment training. It plays an irreplaceable role in cultivating students' practical abilities and knowledge, laying a necessary foundation for their lifelong learning and continuous development. This course is one of the six key courses established by the former State Education Commission.
Teaching methods, number of teaching hours	Target Major: Electronic Information Engineering Teaching Methods: Practical Teaching Teaching Hours (Contact Hours): 16 hours Class Size: Approximately 160 students in four classes
Workload	Total Workload: 32 class hours Contact Hours: 16 hours Self-study Hours: 16 hours
Credit points (ECTS)	1.1
Requirements according to the examination regulations	None
Prerequisite curriculum	College Physics
Curriculum objectives /expected learning outcomes	**Learning Outcomes:** Core Task of the Course: Enable students to master the basic principles and methods of physical experiments, improve hands-on operation and data processing capabilities, cultivate experimental collaboration literacy and scientific work attitude, and lay a practical foundation for solving engineering problems using physical knowledge. **Knowledge:** 1. Master the concept, classification and analysis methods of experimental errors, and clarify the logic for evaluating the reliability of experimental data; 2. Understand the principles and operational basis of core experiments such as the determination of Young's modulus by tensile method and

	the verification of the law of conservation of momentum; 3. Master the core physical laws of experiments such as oscilloscope use, equal-thickness interference measurement, and magnetoresistance characteristic testing; 4. Clarify the physical essence and data correlation of experiments such as Lissajous figures observation and radius of curvature measurement of plano-convex lenses. **Skills:** 1. Be able to select reasonable methods and instruments according to experimental objectives, abide by operational specifications, and complete experiments and read original data independently or collaboratively; 2. Proficiency in processing experimental data, presenting results standardizedly through tables and graphs, and possessing complete experimental calculation capabilities; 3. Be able to write neat and standardized experimental reports, accurately analyze error sources, propose improvement plans, and complete discussion questions as required; 4. Be able to apply principles of mathematics and natural sciences to identify complex problems in experiments and initially analyze their causes. **Ability:** 1. Improve the ability to comprehensively apply physical knowledge to solve practical experimental problems, and strengthen engineering practice literacy and employment competitiveness; 2. Cultivate experimental collaboration capabilities, enabling efficient cooperation in team tasks to jointly promote experimental progress and problem-solving; 3. Develop a rigorous scientific work attitude and good habits, reviewing and summarizing when experiments succeed, and calmly troubleshooting when encountering setbacks; 4. Establish a rational engineering values, accumulating standardized experimental thinking and methods for subsequent professional practice and scientific research.
Contents	**Experimental teaching (16 contact hours, 16 self-study hours)** 1. Error Theory (1 contact hour, 1 self-study hour) Definition and classification methods of errors; learning error estimation methods; learning experimental data processing methods. 2. Determination of Young's Modulus of Metal Wire by Tensile Method (3 contact hours, 3 self-study hours) Proficiently adjust the metal wire Young's modulus measuring instrument; skillfully select appropriate measuring tools and measure relevant experimental data; correctly use the method of successive

	differences and graphing method to process experimental data. 3. Use of Oscilloscope (3 contact hours, 3 self-study hours) Learn the basic structure and working principle of oscilloscopes and signal generators; learn to measure signal voltage and frequency with oscilloscopes, proficiently measuring signal voltage and frequency; learn the operation method of Lissajous figures and observe them carefully. 4. Study of the Law of Conservation of Momentum on Air Track (3 contact hours, 3 self-study hours) Verify the law of conservation of momentum; magnetic damping effect when moving magnets move relative to non-magnetic conductors; quantitative relationship of mutual forces. 5. Magnetoresistance Effect Experiment (3 contact hours, 3 self-study hours) Measure the relationship between the resistance value of the indium antimonide (InSb) magnetoresistance sensor and magnetic induction intensity; draw and fit the relationship curve between the resistance change of the InSb magnetoresistance sensor and magnetic induction intensity. 6. Observation of Equal-Thickness Interference Phenomena of Light (3 contact hours, 3 self-study hours) Observe and study the phenomena and characteristics of equal-thickness interference; learn to measure the radius of curvature of plano-convex lenses and film thickness by equal-thickness interference method; proficiently use the reading microscope.
Study and examination requirements and forms of examination	Exam Format: Assessment Exam Requirements: 100% attendance rate and 100% completion rate of experimental reports to be eligible for assessment. Final Score Composition: Complete all experiments; ① Deeply understand experimental principles and schemes, with very standardized experimental operation processes and reasonable experimental data; ② Experimental reports must be completed and submitted on time, with very standardized writing; ③ Be able to correctly process experimental data, including complete calculation processes and tables/graphs presenting experimental results, carefully discuss experimental results (such as analyzing main error sources or proposing improved measurement schemes), and answer post-experiment discussion questions as required by teachers;

	④ Score Evaluation: Scores are given separately for mechanics and thermodynamics experiments, electromagnetism experiments, and optics experiments, then the total score is calculated based on their respective weights.
Media employed	Experimental equipment and venues required for the experiments are provided.
Reading list	1. Textbooks [1] T. Deng, L. Xu, College Physics Experiments, Hunan: Xiangtan University Press, 2022. 2. Reference Books [1] Y. Huang, College Physics Experiments, Beijing: Science Press, 2024. [2] M. Zhan, Y. Qi, B. Yu, College Physics Experiments, Beijing: China Machine Press, 2025. [3] P. Liu, College Physics Experiments, Beijing: Higher Education Press, 2019.

"College Physics Experiment"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Error Theory	(1) Definition and classification methods of errors; (2) Learning error estimation methods; (3) Learning experimental data processing methods;	1	1	(1) Definition and classification methods of errors; (2) Learning error estimation methods; (3) Learning experimental data processing methods;	1. Random questioning: Assess students' understanding of knowledge. 2. Assign homework: Provide experimental data and ask students to submit processing results.
Determination of Young's Modulus of Metal Wire by Tensile Method	(1) Measurement principle of Young's modulus; (2) Proficiency in adjusting the metal wire Young's modulus measuring instrument; (3) Skillfully selecting appropriate measuring tools and measuring relevant experimental data;	3	3	(1) Measurement principle of Young's modulus; (2) Proficiency in adjusting the metal wire Young's modulus measuring instrument; (3) Skillfully selecting appropriate measuring tools and measuring relevant experimental data;	1. Preview report: Check the completion of preview reports before class and randomly ask questions related to the experiment. 2. In-class inspection: Check students' ability to operate experimental equipment in class. 3. Experimental report: Quality of completed experimental reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	(4) Correctly using the method of successive differences and graphing method to process experimental data			(4) Correctly using the method of successive differences and graphing method to process experimental data	
Use of Oscilloscope	(1) Learning the basic structure and working principle of oscilloscopes and signal generators; (2) Learning to measure signal voltage and frequency with oscilloscopes, proficiently measuring signal voltage and frequency; (3) Learning the operation method of Lissajous figures and observing them carefully	3	3	(1) Learning the basic structure and working principle of oscilloscopes and signal generators; (2) Learning methods for measuring signal voltage and frequency with oscilloscopes; (3) Familiarizing with Lissajous figures;	1. Preview report: Check the completion of preview reports before class and randomly ask questions related to the experiment. 2. In-class inspection: Check students' ability to operate experimental equipment in class. 3. Experimental report: Quality of completed experimental reports.
Study of the Law of Conservation of Momentum on Air Track	(1) Verifying the law of conservation of momentum; (2) Magnetic damping effect when moving magnets move relative to non-magnetic conductors; (3) Quantitative relationship of mutual forces	3	3	(1) Principle of the law of conservation of momentum; (2) Quantitative relationship of mutual forces;	1. Preview report: Check the completion of preview reports before class and randomly ask questions related to the experiment. 2. In-class inspection: Check students' ability to operate experimental equipment in class. 3. Experimental report: Quality of completed experimental reports.
Magnetoresistance Effect Experiment	(1) Measuring the relationship between the resistance value of the indium antimonide (InSb)	3	3	(1) Principle of magnetoresistance effect; (2) Learning methods for fitting	1. Preview report: Check the completion of preview reports before class and randomly ask questions related to the experiment.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	magnetoresistance sensor and magnetic induction intensity; (2) Drawing and fitting the relationship curve between the resistance change of the InSb magnetoresistance sensor and magnetic induction intensity.			the relationship curve between the resistance change of the InSb magnetoresistance sensor and magnetic induction intensity online.	2. In-class inspection: Check students' ability to operate experimental equipment in class. 3. Experimental report: Quality of completed experimental reports.
Observation of Equal-Thickness Interference Phenomena of Light	(1) Observing and studying the phenomena and characteristics of equal-thickness interference; (2) Learning to measure the radius of curvature of plano-convex lenses and film thickness by equal-thickness interference method; (3) Proficiently using the reading microscope	3	3	(1) Phenomena and characteristics of equal-thickness interference; (2) Methods for measuring the radius of curvature of plano-convex lenses and film thickness by equal-thickness interference method; (3) Usage method of the reading microscope.	1. Preview report: Check the completion of preview reports before class and randomly ask questions related to the experiment. 2. In-class inspection: Check students' ability to operate experimental equipment in class. 3. Experimental report: Quality of completed experimental reports.
Total		16	16	**Total Hours = 32 class hours**	
Credit points (ECTS)		1.1			

Module Descriptions - Engineering basics

C Language Programming A

Competence field	Engineering basics
Curriculum designation	C Language Programming A
Curriculum code	9063313063
Semester(s) in which the curriculum is taught	1st Semester
Person responsible for the curriculum	Hao Chen
Lecturer	Hao Chen, Xinliang Tan, Shu Xu, Depeng Chen
Language	Chinese
The relationship between the curriculum and the major	"C Language Programming A" is a core professional foundation course for science and engineering majors such as artificial intelligence, electronic information engineering, and computer science and technology, and it is the starting point for students to build programming skills and computational thinking. This course systematically introduces the basic knowledge of C language, including syntax, data types, control structures, functions, arrays, Pointers, structures, etc., aiming to cultivate students' structured and modular programming thinking and algorithm implementation ability. At the same time, the course places a strong emphasis on hands-on practice, guiding students to solve practical problems by writing and debugging programs. Mastering this course will not only provide the necessary programming tools and prerequisite knowledge for the subsequent study of Data Structures and various specialized courses, but also effectively enhance students' logical thinking ability and problem-solving ability, laying an extremely solid programming foundation for future career development in various technical fields.
Teaching methods, number of teaching hours	Target students: Artificial Intelligence major, Electronic Information Engineering major Teaching method: Theory teaching, experiment teaching Teaching hours (Contact hours): 80 hours Among them: Theoretical instruction: 48 hours Laboratory/practical teaching: 32 hours Class size: Six classes with approximately 260 students
Workload	Total workload = 158 class hours; Contact hours = 80 hours; Self-study hours = 78 hours;
Credit points (ECTS)	5.3
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics

Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to enable students to systematically master the grammar rules and programming ideas of the C language, and to have the initial ability to solve practical problems using computer programming. The specific objectives include: **Knowledge:** 1. Understand the basic concepts of programs and algorithms: Understand the basic features and elements of algorithms, know the role of programming languages, and master the standard methods of describing algorithms in various ways such as natural language, traditional flowcharts, N-S flowcharts, and pseudo-code. 2. Master the core syntax system of C language: Be familiar with the basic data types, operators and expressions of C language; Have a deep understanding of the three basic programming structures of order, selection, and loop; Master the definitions and usage rules of core syntax elements such as functions, arrays, Pointers, structures, Commons, and files. 3. Understand the memory organization of the program: Initially understand the storage form of variables in memory, master the core concepts of Pointers and addresses, understand the basic principles of static and dynamic memory allocation, and lay the foundation for further understanding of computer systems. **Skills:** 1. Proficient in using an integrated development environment (IDE) : Master at least one mainstream C language development environment (such as Visual Studio, VS Code, Dev-C++, etc.) and be capable of independently editing, compiling, linking, running, and debugging programs. 2. Implement structured programming: Be proficient in using if and switch statements to implement selection structures, use for, while, do-while loops (including nested loops) to implement loop structures, and break down complex logic into combinations of the three basic structures. 3. Use diverse data structures to solve problems: Be able to flexibly use one-dimensional/two-dimensional arrays, strings, structs and other constructive data types to organize and process data; Master the basic operations of Pointers and be able to use Pointers to create dynamic data structures such as linked lists, insert and delete nodes, etc. **Ability:** 1. Computational thinking and algorithmic design ability: Be capable of analyzing simple practical problems, abstracting their mathematical models and data structures, and designing logically clear and structurally sound algorithms to solve the problems. Have

	an initial grasp of common algorithmic ideas such as enumeration, iteration, recursion, and recursion. 2. Program debugging and problem-solving skills: Have the ability to read, analyze and understand program code; Be able to debug programs by setting breakpoints, single-step tracking, observing variables, and locate and fix logical and runtime errors in the code. 3. Preliminary ability in modular programming and engineering: Understand the encapsulation and calling mechanism of functions, be able to decompose large programs into multiple functionally independent function modules, and achieve data interaction between modules through parameter passing and return values. Initially possess the programming concepts of modularization and engineering.
Contents	**Theoretical instruction (48 contact hours, 46 self-study hours)** Chapter 1: An Overview of C Language (2 contact hours, 1 self-study hour) 1. Computer languages and language processing programs; 2. History of C language, features, composition of C programs; 3. C language runtime steps, development environment. Chapter 2: Constants, Variables, and Data Types (4 exposure hours, 3 self-study hours) 1. Constants and Variables; 2. Identifiers, keywords; 3. Data type; 4. Input/Output of data. Chapter 3: Operators, Expressions, and Statements (4 contact hours, 3 self-study hours) 1. Arithmetic, assignment, relational, logical and other operators; 2. Expressions and statements; 3. Type conversion. Chapter 4: Sequential Structure Programming (4 Contact hours, 3 Self-study hours) 1. Algorithms; 2. Sequential structure programming. Chapter 5: Selective Structure Programming (4 contact hours, 3 self-study hours) 1. if statements; 2. switch statement. Chapter 6: Loop Structure Programming (6 contact hours, 4 self-study hours)

	1. while, do while loops; 2. for loop; 3. Nesting of loops. Chapter 7: Arrays (4 contact hours, 3 self-study hours) 1. One-dimensional arrays; 2. Two-dimensional array; 3. Character array; 4. And strings. Chapter 8: Functions (6 contact hours, 4 self-study hours) 1. Definition and invocation of functions; 2. Nested calls, recursive calls; 3. Arrays as parameters of functions; 4. Variable Scope and Storage methods. Chapter 9: Pointers (6 contact hours, 4 self-study hours) 1. Pointers, pointer variables and their basic operations; 2. Pointers and Arrays; 3. Pointers and Strings; 4. Pointers and Functions. Chapter 10: Structures and Other Data Forms (6 contact hours, 4 self-study hours) 1. Structures and their variables; 2. Struct arrays, struct Pointers; 3. Dynamic Memory allocation, Linked List; 4. Other data types. Chapter 11: Files (2 contact hours, 2 self-study hours) 1. Opening and closing of documents; 2. Reading and writing of files. Chapter 12: Final Exams (0 contact hours, 12 self-study hours) 1. Students prepare and review for the exam. **Experimental teaching (32 contact hours, 32 self-study hours)** Experiment Project 1: Use of C Language Integrated Environment. (2 contact hours, 2 self-study hours) Experiment Content: Be familiar with and master the installation and usage of at least one mainstream C language integrated development environment (IDE, such as Visual Studio/VS Code/dev-C ++). Learn the complete process of creating a new project, writing the source code, compiling and linking to generate an executable file. Write a

	simple "Hello, World!" independently. Run the program successfully and observe the output. Learn basic debugging techniques such as setting breakpoints and single-step execution to get a preliminary understanding of how the program runs. Experiment Project 2: Data Types, Operators, Expressions. (2 contact hours, 2 self-study hours) Experiment: Programming to define and use various basic data types in C language (such as int, float, double, char), practice assignment and forced type conversion between different types of data. Be proficient in writing complex expressions using arithmetic operators, relational operators, logical operators, and assignment operators, and verify the evaluation order and results of the expressions through actual programming cases, such as temperature conversion, geometric calculation, etc. Experiment Project 3: Sequential Structure Programming. (2 contact hours, 2 self-study hours) Experiment Content: Learn and master the basic idea of sequential structure programming, that is, code is executed in sequence from top to bottom. By writing several small programs with a typical three-part structure of input, processing, and output (such as calculating the area of a circle, finding the sum of two numbers, etc.), focus on practicing the use of scanf and printf functions, and master the control method of formatted input and output. Experiment Project 4: Use of if statements and switch statements. (2 exposure hours, 2 self-study hours) Experiment Content: Programming to implement single-branch, dual-branch, and multi-branch selection structures. Master the nested use of if, if-else and if-else statements, and solve conditional judgment problems (such as determining leap years, solving piecewise functions, etc.). At the same time, learn and apply the switch statement to handle multiple-choice problems (such as outputting comments based on levels), and understand the role of the break statement in it. Experiment Project 5: while statements, do while statements implement loops. (2 contact hours, 2 self-study hours) Experiment Content: Master the syntax structure and execution logic of while (when type) loops and do-while (until type) loops. Compare the similarities and differences between the two types of loops through programming cases (such as finding the sum of several numbers, guessing the number game, etc.), especially the timing of

	judging loop conditions. Learn design techniques that use loop control variables and loop termination conditions. Experiment Project 6: Implementing Loops with a for statement. (2 contact hours, 2 self-study hours) Experiment Content: Focus on mastering the syntax structure of the for loop and understanding its three elements of initialization, loop condition, and loop increment. By solving typical counting loop problems (such as calculating factorials, printing multiplication tables, etc.), master the use of the for statement and experience its simplicity and advantages when dealing with fixed-number loop problems. Experimental Project 7: Multiple Cycles. (2 contact hours, 2 self-study hours) Experiment Content: Learn and practice the nested use of loops and understand the execution relationship of inner and outer layer loops. Master the design method of using multiple loops to solve two-dimensional and multi-dimensional logical problems by programming complex pattern outputs (such as printing star pyramids, hollow rhombuses, etc.) and two-dimensional data processing (such as matrix operations), and learn to control the loop flow using break and continue statements. Experiment Project 8: The Use of one-dimensional and two-dimensional arrays. (2 contact hours, 2 self-study hours) Experiment Content: Master the definition, initialization, and element reference methods of one-dimensional and two-dimensional arrays. Practice the basic operations of arrays through programming, such as data storage, traversal, search (linear search), sort (such as bubble sort or selection sort), etc. Use two-dimensional arrays to handle tabular data (such as calculating the average score of students) to deepen your understanding of arrays as data sets. Experiment Project 9: Use of Character Arrays and String Functions. (2 contact hours, 2 self-study hours) Experiment Content: Learn to store and process strings using character arrays and understand the convention that strings end with '\0'. Practice the input and output methods of strings and program to perform operations such as string copying, concatenation, comparison, and length calculation using common string processing functions in the <string.h> header file (such as strcpy, strcat, strcmp, strlen, etc.).

	Experiment Project 10: Definition and Invocation of Functions. (2 contact hours, 2 self-study hours) Experiment Content: Master the definition, declaration, and calling methods of functions, and understand the role of functions in modular programming. By writing custom functions to solve specific problems (such as finding the greatest common divisor, judging prime numbers, etc.), practice the passing of function parameters (value passing) and the correct use of return values, initially establish the idea of modular programming. Experiment Project 11: Nested Calls of Functions, Recursive Calls, arrays as Function Parameters, Local Variables and Global Variables. (2 contact hours, 2 self-study hours) Experiment Content: In-depth study of nested calls and recursive calls of functions, understanding the idea and implementation of recursion through classic cases (such as using recursion to calculate factorial). Master the method of passing an array name as a function parameter through address. Learn and distinguish the scope and lifetime of local and global variables, and understand the visibility rules of variables in different parts of the program. Experiment Project 12: Arrays and Pointers, Strings and Pointers. (2 contact hours, 2 self-study hours) Experiment Content: Mastering the definition, initialization and basic operations (& and *) of pointer variables. Focus on practicing accessing one-dimensional array elements through Pointers and understanding the nature of array names as pointer constants. Learn to use character Pointers to handle strings and compare the similarities and differences in storage and manipulation with character arrays. Experiment Project 13: Pointers and Functions, Pointer Arrays. (2 contact hours, 2 self-study hours) Experiment Content: Learn to use Pointers as function parameters, understand the mechanism of address passing and its application in data exchange between functions. Master the definition and usage of pointer arrays, and practice the management of pointer arrays through programming cases, such as handling multiple strings. Get an initial understanding of the concept of Pointers pointing to functions. Experiment Project 14: Operations on Linked Lists. (2 contact hours, 2 self-study hours) Experiment Content: Master the usage of the struct keyword, learn to

	define struct types and declare struct variables. Learn to access members through struct Pointers. Focus on practicing the basic operations of dynamic linked lists: dynamically create linked list nodes using the malloc function, and program the creation, insertion, deletion, and traversal output of singly linked lists. Experimental Project 15: Definition and Usage of Commons, Enumeration Types, and Usage of typedef. (2 contact hours, 2 self-study hours) Experiment Content: Learn the definition and usage of a union, and understand the characteristics of its members sharing memory through programming. Master the usage of the enum type for defining collections of symbolic constants. Be proficient in using the typedef keyword to create new type aliases for existing data types, including basic types, arrays, Pointers, structures, etc., to enhance program readability. Experiment Project 16: Opening and closing Files, Reading and writing Files. (2 contact hours, 2 self-study hours) Experiment Content: Master the basic operation process of files in C language. Learn to use the fopen function to open files in different modes (read, write, append, etc.) and use fclose to close files. Practice using a series of functions such as fgetc/fputc, fgets/fputs, fscanf/fprintf to read and write characters, strings, and formatted data on text files.
Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Assignments (30%) : Pre-class preview assignments, after-class assignments, lab reports. 3. Final assessment (60%) : final exam.
Media employed	Multimedia computers, projectors, CodeBlocks software
Reading list	1. Textbook [1] H. Q. Tan. C Programming[M]. 5th ed. Beijing: Tsinghua University Press, 2023. 2. Reference Books [1] H. Q. Tan. C Programming Study Guide[M]. 5th ed. Beijing: Tsinghua University Press, 2023. [2] Z. M. Ma, et al. C Language Application Programming for Single-Chip Microcomputers[M]. Beijing: Beijing University of Aeronautics and Astronautics Press, 2021.

“ C Language Programming A ” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Overview of the C language	1. Computer languages and language processing programs; 2. History of C language, features, composition of C programs; 3. C language runtime steps, development environment.	2	1	1. Homework (1 class hour): Successfully compile and run the first "Hello, World!" Program.	1. Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2 Constants, variables, and data types	1. Constants and Variables; 2. Identifiers, keywords; 3. Data type; 4. Input/Output of data.	4	3	1. Pre-class preview (2 class hours): Watch micro-lesson videos on "Data Types and Keywords" and "Formatted Input/Output"; Preview the lecture PPT to learn about the memory usage and value range of different data types. 2. Homework (1 class hour): Complete the corresponding exercises in the textbook on data type definitions, assignments, and the use of printf/scanf functions; Write a small program to perform mixed operations and type conversions for different data types.	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Quiz: Take an online or written quiz about data input and output at the end of this chapter.
3. Operators, expressions, and statements	1. Arithmetic, assignment, relational, logical, and other operators; 2. Expressions and statements; 3. Type conversion.	4	3	1. Pre-class preview (2 class hours): Watch the micro-lesson video on "C Language Operators" to familiarize yourself with the usage of arithmetic, relational, and logical operators. 2. Homework after class (1 class hour): Complete the exercises in the textbook regarding operator precedence and expression evaluation; Self-study conditional operators (?) :) and the comma operator, and program the practice.	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.
4. Sequential structure programming	1. Algorithms; 2. Sequential structure programming.	4	3	1. Pre-class preview (2 class hours): Watch the micro-lesson video on "Basic Concepts and Representations of Algorithms" to understand the characteristics of algorithms.	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				2. After-class assignment (1 hour): Practice using flowcharts (or N-S diagrams) to describe algorithms for simple problems; Write 2-3 typical sequence-structured mini-programs.	effectiveness of review.
5. Select Structure Programming	1. if statements; 2. switch statement.	4	3	1. Pre-class preview (2 class hours): Watch micro-lesson videos on "if statements" and "switch statements"; Preview the teaching PPT and understand the single-branch, double-branch, and multi-branch structures. 2. Homework after class (1 class hour): Complete the programming exercises related to if and switch statements in the textbook, with a focus on practicing the use of nested if statements.	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.
6. Loop Structure programming	1 while, do while loops; 2. for loop; 3. Nested loops.	6	4	1. Pre-class preview (2 class hours): Watch micro-lesson videos on "while/do-while loops" and "for loops"; Preview the teaching PPT and compare the scenarios where different loops are applicable. 2. Homework (2 class hours): Complete the programming exercises on the three types of loop statements in the textbook; Try to implement a loop problem using three different loop structures.	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.
7. Arrays	1. One-dimensional array; 2. Two-dimensional	4	3	1. Pre-class preview (2 class hours): Watch micro-lesson videos on "one-dimensional/two-dimensional Arrays" and	1. The Rain Classroom platform automatically records video views. 2. Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	array; 3. Character array; 4. And strings.			"Character Arrays and Strings"; Preview the lecture PPT and master the definition and initialization methods of arrays. 2. Homework (1 class hour): Complete the programming exercises in the textbook on array traversal, search, sort, and string processing functions.	3. Random test answers in class: To test the effectiveness of review.
8. Functions	1. Function Definition and Invocation; 2. Nested calls, recursive calls; 3. Arrays as parameters of functions; 4. Variable Scope and Storage methods.	6	4	1. Pre-class preview (2 class hours): Watch micro-lesson videos on "Function Definition and Invocation" and "Variable Scope"; Preview the lecture PPT and understand the modular programming idea. 2. Homework (2 class hours): Complete the programming exercises in the textbook on custom functions, nested calls, and recursive calls, with a focus on passing arrays as function parameters.	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.
9. Pointer	1. Pointers, pointer variables and their basic operations; 2. Pointers and Arrays; 3. Pointers and Strings;	6	4	1. Pre-class preview (2 class hours): Watch micro-lesson videos on "Basic Concepts of Pointers" and "Pointers and Arrays"; Preview the lecture PPT to understand the relationship between addresses and Pointers. 2. Homework (2 class hours): Complete programming exercises in the textbook on basic pointer operations	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	4. Pointers and Functions.			and accessing arrays and strings through Pointers.	
10 Structures and other data forms	1. Structures and their variables; 2. Struct arrays, struct Pointers; 3. Dynamic memory allocation, Linked lists.	6	4	1. Pre-class preview (2 class hours): Watch micro-lesson videos on "Structures" and "Dynamic Memory Allocation and Linked Lists"; Preview the lecture PPT and master the usage of struct and malloc/free. 2. Homework (2 class hours): Complete the programming exercises on struct variables and struct arrays in the textbook; Program the creation and traversal of singly linked lists.	1. The Rain Classroom platform automatically records the viewership of videos. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.
11. Documents	1. Opening and closing files; 2. Reading and writing files.	2	2	1. Pre-class preview (1 class hour): Watch micro-lesson videos on "Opening and Closing Files" and "Reading and Writing Files"; Preview the lecture PPT to learn about file Pointers and basic file operation functions. 2. After-class assignment (1 class hour): Complete programming exercises on text file reading and writing in the textbook, practice saving program results to a file or reading data from a file	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
12. Final exams	Students prepare and review	0	12	5. Review key points and consolidate difficult points; 6. Review class experiments, etc.	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, establish wechat groups, and check in daily for record. 2. Supervision by the course instructor: Set up fixed offline or online Q&A times. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by counselors: Visiting student dormitories during the review week to supervise and inspect.
(Theoretical teaching) Tips		48	46		
Practical teaching					
1. Experiment One (Confirmatory)	Use of the C language integrated environment	2	2	Pre-class preview (1 class hour): Watch the instructional video on "IDE Installation and Configuration" released by the teaching platform and complete the installation of the IDE in advance. After-class consolidation (1 hour): Learn the basic debugging functions of the IDE, such as setting	1. Submit the successful installation of the IDE through the teaching platform before class and run "Hello, World!" A screenshot of the program; 2. Randomly check students' demonstrations of setting breakpoints and single-step

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				breakpoints, single-step execution, and use this method to observe "Hello, World!" The execution flow of the program.	execution in the lab class.
2. Experiment 2 (Confirmatory)	Data types, operators, expressions	2	2	Pre-class preview (1 class hour): Watch relevant micro-lesson videos and preview the chapters on basic data types and various operators in the textbook. After-class extension (1 hour): Study the complete table of C language operators' priority and associativity and verify it by writing complex expressions.	1. The teaching platform publishes online quizzes that include complex expression evaluations and data type conversions, which are completed within a limited time and automatically scored; **2.** A programming question involving multiple data type conversions is submitted as an after-class assignment.
3. Experiment 3 (Confirmatory)	Sequential structure programming	2	2	Pre-class preview (1 class hour): Watch the instructional video on "Formatting Input/Output Functions" to familiarize yourself with the common format controls of printf and scanf. Post-class consolidation (1 class hour): Practice using flowcharts (or N-S diagrams) to describe the program logic in the experiment and consolidate algorithmic ideas.	1. Submit a photo or electronic version of the algorithm flowchart for a specified problem through the teaching platform before class; 2. Conduct quick questions in the lab class to spot-check students' understanding of scanf formatted input.
4. Experiment 4 (Verification)	The use of if statements and switch statements	2	2	Pre-class preview (1 class hour): Watch instructional videos on "if-else nesting" and "switch statements" to understand the syntax and execution process of different choice structures. After-class extension (1 hour): Compare the similarities	1. Submit a photo or electronic version of the algorithm flowchart for a specified problem before class; 2. The after-class assignment requires rewriting a given if-else if structure to an

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				and differences between if-else if and switch, think about the best scenarios for each, and look up information related to the "hanging else" problem.	equivalent switch structure (or vice versa) and submitting the code.
5. Experiment 5 (Verification)	while statements and do while statements implement loops	2	2	Pre-class preview (1 class hour): Preview the chapters in the textbook about while and do-while loops, with a focus on comparing the differences in judgment timing between the two types of loops. Post-class consolidation (1 hour): Rewrite the program implemented in the experiment using the while loop to the do-while version (and vice versa), and experience the subtle differences in logic.	1. Ask questions in the experiment class to compare at least one key difference between the two loops; 2. The after-class assignment includes a programming question that requires submission of both while and do-while implementations.
6. Experiment 6 (Verification)	The for statement implements the loop	2	2	Preview before class (1 class hour): Watch the instructional video "for Loop Explanation" and master the execution order of its three expressions. After-class extension (1 hour): Try to implement an infinite loop using a for loop and learn about the usage in a for loop where all three expressions can be omitted.	1. The teaching platform publishes an online multiple-choice/fill-in-the-blank question about the order in which the for loop is executed, with a time limit for completion; 2 Submit a programming problem solved using a for loop as an assignment after class.
7. Experiment 7 (Verification)	Multiple loops	2	2	Preview before class (1 class hour): Preview the chapter on loop nesting in the textbook and understand the execution relationship of inner and outer layer loops through sample code. After-class extension (1 hour): Study the different roles and distinctions of break and continue statements in single-layer and nested loops.	1. The after-class assignment requires submitting a nested loop program that uses either break or continue and commenting on its function in the code; 2. Randomly check students' explanations of the number of times nested loops are executed in the lab class.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
8. Experiment 8 (Confirmatory	The use of one-dimensional arrays and two-dimensional arrays	2	2	Preview before class (1 class hour): Watch the teaching video "Array Definition and Initialization" to master the basic syntax of arrays. Post-class consolidation (1 class hour): Preview the basic ideas of a simple sorting algorithm (such as bubble sort) to prepare for practical application on arrays.	1. Conduct a "code walkthrough" in the lab class and randomly select one student to explain the logic of their sorting code; 2. Submit a code that implements a simple sorting algorithm, such as bubble sort, as an assignment after class.
9. Experiment 9 (Confirmatory)	Use of character arrays and string functions	2	2	Preview before class (1 class hour): Preview the content of the <string.h> header file in the textbook and familiarize yourself with the functions of strcpy, strlen, strcat, and strcmp. After-class extension (1 hour): Understand and try to use the safety risks of the gets function and the usage of the alternative function fgets.	1. The teaching platform publishes an online programming question containing multiple string processing functions; 2. Conduct an online questionnaire before class about the functionality of common string functions.
10. Experiment 10 (Confirmatory)	Function definition and invocation	2	2	Preview before class (1 class hour): Watch the teaching video on "Encapsulation and Modularization of Functions" to understand the role of functions in programming. After-class consolidation (1 hour): Practice writing clear function comments for custom functions in the experiment, explaining their functions, parameters, and return values.	1. The after-class assignment requires rewriting a "procedural" program into a modular version that uses multiple custom functions 2. In the lab class, students are required to show the idea behind their function partitioning.
11. Experiment 11 (Verification)	Nested calls, recursive calls, arrays as	2	2	Pre-class preview (1 class hour): Watch instructional videos on "Introduction to Recursive Algorithms" and	1. Submit a code that uses recursion to solve a problem (such as factorial) after class;

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	function parameters, local variables and global variables			"Variable Scope". After-class extension (1 hour): Look up information to understand the basic working principle of the Call Stack to deepen your understanding of recursion and function calls.	2. Conduct an online quiz on variable scope on the teaching platform.
12. Experiment 12 (Confirmatory)	Arrays and Pointers, strings and Pointers	2	2	Pre-class preview (1 class hour): Watch instructional videos on "Pointer Basics" and "The Relationship between Pointers and Arrays" to understand the concepts of addresses and Pointers. After-class consolidation (1 hour): Practice traversing arrays through pointer arithmetic operations (such as p++) and compare them with subscript.	1. The after-class assignment requires traversing and modifying array elements using pointer arithmetic operations (non-subscripts) and submitting the code online; 2. A quick question-and-answer session in the lab class where you look at the code and say the result.
13. Experiment 13 (Verification)	Pointers and functions, pointer arrays	2	2	Pre-class preview (1 class hour): Preview the chapters in the textbook about "Pointers as function Parameters" (address passing) and "pointer arrays". After-class extension (1 hour): Think and try to write a swap function that swaps the values of two integer variables by passing Pointers.	1. Submit a sample code of a swap function that modifies the value of the main function variable by passing pointer parameters after class; 2. Randomly check students' oral description of the difference between pointer passing and value passing in the lab class.
14. Experiment 14 (Confirmatory)	Operations on linked lists	2	2	Preview before class (1 class hour): Watch instructional videos on "Structures" and "Dynamic Memory Allocation (malloc/free)". After-class extension (1 hour): Draw a memory	1. Submit photos of hand-drawn memory diagrams of linked list creation and node insertion before class 2. Submit a programming question for

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				diagram of linked list creation, insertion, and deletion operations to deepen your understanding of pointer operations.	creating and traversing a linked list as an assignment after class.
15. Experiment 15 (Verification)	Definition and use of Commons, enumeration types, use of typedef	2	2	Pre-class preview (1 class hour): Preview the chapters in the textbook on the union, enum, and typedef keywords and their sample codes. After-class extension (1 hour): Look up information about the Big/Little Endian problem of union and try to write a program to verify it.	1. An after-class assignment: Submit a programming example that uses union, enum, typedef to enhance program readability; 2. Have a group discussion in the lab class to share insights on the use of different keywords.
16. Experiment 16 (Confirmatory)	Opening and closing files, reading and writing files	2	2	Pre-class preview (1 class hour): Watch the "Basics of File Manipulation" teaching video to familiarize yourself with the functions and parameters of core file manipulation functions. After-class extension (1 hour): Understand the differences between text files and binary files, and preview the usage of the binary file read-write functions fread and fwrite.	1. The after-class assignment requires submitting a program that writes a set of struct data to a file and then reads it out; 2. Ask questions in the lab about the differences between different file opening modes.
(Practical Teaching) Tips		32	32		
Total		80	78	Total class hours = 158	
Credits (ECTS)		5.3			

Circuit Analysis

Competence field	Engineering basics
Curriculum designation	Circuit Analysis
Curriculum code	9061313011
Semester(s) in which the curriculum is taught	1th Semester
Person responsible for the curriculum	Saichun Hu
Lecturer	Saichun Hu, Qiuxiang Zhu, Zhi Cui, Yong Ye
Language	Chinese
The relationship between the curriculum and the major	Circuit Analysis is a technical foundation course for the electronic information Engineering major. Starting from the circuit model, this course focuses on the basic theories and analysis methods of lump parameters and linear time-invariant circuits, improving the thinking ability and computational ability of circuit analysis, and laying the necessary theoretical foundation for subsequent courses. The specific contents of this course include: basic concepts, laws, theorems and general analysis methods of circuits, analysis of dynamic circuits, sinusoidal steady-state circuits, circuits with coupled inductors, three-phase circuits, analysis of non-sinusoidal periodic current circuits, two-port networks, fundamentals of network graph theory, etc.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + experiment Teaching hours (Contact hours):64 hours Among them: Theoretical instruction: 48 hours Laboratory/practical teaching: 16 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 120 class hours; Contact hours = 64 hours; Self-study hours = 56 hours;
Credit points (ECTS)	4.0
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics, College Physics
Curriculum	**Learning outcomes:**

objectives /expected learning outcomes	This course should maintain and emphasize the scientific and rigorous nature of the theory, cultivate students' rigorous scientific attitude and logical and systematic analysis of problems, as well as the perspective and method of analyzing engineering problems, cultivate students' perspective and method of handling problems flexibly based on reality and under the guidance of theory. To establish the necessary theoretical foundation for the subsequent courses. Specific objectives include: **Knowledge:** Master the basic concepts, laws, theorems and general analysis methods of circuits, analysis of dynamic circuits, sinusoidal steady-state circuits, circuits with coupled inductors, three-phase circuits, analysis of non-sinusoidal periodic current circuits, two-port networks, fundamentals of network graph theory, etc. **Skills:** Be proficient in basic experimental skills. **Abilities:** 1. Possess the mathematical and physical knowledge and basic knowledge of electronics, information, and computer necessary for working in engineering fields such as electronic information technology, and have the ability to conduct abstract modeling and analysis of electronic information devices, equipment, and systems. 2. Develop students' ability to analyze and solve problems. 3. Learn about new methods of circuit analysis and design, be able to choose the right research route based on specific problems, and design feasible circuit experiment schemes, etc.
Contents	**Theoretical instruction (48 contact hours, 48 self-study hours)** Chapter 1: Circuit Models and Circuit Laws (6 contact hours, 6 self-study hours) Introduction, Circuit Model, Reference Directions of Current and Voltage, Circuit Power; 2. Circuit components, voltage source and current source, controlled power supply; 3. Kirchhoff's laws. Chapter 2: Equivalent Transformation of Resistance Circuits (6 contact hours, 6 self-study hours) 1. Equivalent transformation of circuits, series and parallel resistors; 2. Y-shaped and Δ connection equivalent transformation of resistors; 3. Two models of the actual power supply and their equivalent transformations, input resistance. Chapter 3: General Analysis of Resistance Circuits (6 contact hours, 6 self-study hours) 1. Diagram of the circuit, number of independent equations for KCL and

	KVL; 2. Branch current method, mesh current method; 3. Loop current method, node voltage method. Chapter 4: Circuit Laws (4 contact hours, 4 self-study hours) 1. Superposition theorem, Homogeneity theorem, substitution theorem; 2. Davinen's theorem, NORTON's theorem, Maximum power transfer theorem. Chapter 5: Resistance Circuits with Operational Amplifiers (2 contact hours, 2 self-study hours) 1. Model of operational amplifiers, analysis of proportional circuits; 2. Analysis of circuits containing ideal operational amplifiers. Chapter 6: Energy Storage Components (2 contact hours, 2 self-study hours) 1. Capacitive components; 2. Inductors; 3. Series and parallel connection of capacitive and inductive components. Chapter 7: Time-domain Analysis of First-order and Second-order circuits (6 contact hours, 6 self-study hours) 1. Equations of dynamic circuits and their initial conditions; 2. Zero-input response and zero-state response of first-order circuits; 3. Full response, step response, impulse response of first-order circuits. Chapter 8: Phasor method (6 contact hours, 6 self-study hours) 1. Complex numbers, sinusoidal quantities, fundamentals of phasor method; 2. The phasor form of circuit laws. Chapter 9: Analysis of Sinusoidal Steady-state Circuits (10 contact hours, 10 self-study hours) 1. Impedance (admittance) in series and parallel; 2. Phasor diagrams of circuits, analysis of sinusoidal steady-state circuits; 3. Power, complex power, maximum power transmission in a sinusoidal steady-state circuit. **Experimental teaching (16 contact hours, 8 self-study hours)** Experiment Item 1: Research on node Potential and Circuit Voltage. (3 contact hours, 2 self-study hours) Experiment content: 1. Verify the relationship between potential and voltage in the circuit; 2. Master the method of drawing circuit potential diagrams; 3 Learn to analyze and troubleshoot simple circuit faults.

	Experiment Item 2: Verification of Kirchhoff's Laws. (3 contact hours, 1 self-study hour) Experiment content: 1. Deepen your understanding of Kirchhoff's laws; 2 Learn how to measure DC voltage and DC current using a multimeter to verify Kirchhoff's laws; 3 Learn to measure the current in each branch using an ammeter. Experiment Item 3: Research on the Characteristics of Linear circuits. (3 contact hours, 2 self-study hours) Experiment content: 1. Deepen understanding of the main characteristics of linear circuits (homogeneity, superposition, displacement, reciprocity). 2 Learn the research methods for the main characteristics of linear circuits. Experiment Item 4: Research on Equivalent Circuits of Linear Active Two-terminal Networks. (3 contact hours, 1 self-study hour) Experimental content 1. Learn methods for measuring the equivalent power supply parameters of linear active two-terminal networks and the external characteristics of circuits. 2 Deepen your understanding of the equivalent power supply theorem and verify the maximum power transmission conditions. 3. Consolidate the usage of the multimeter and deepen the understanding of its internal resistance. Experiment Item 5: Study on Operational Amplifiers and Controlled Source Characteristics (4 contact hours, 2 self-study hours) Experiment Content: 1. Learn how to use operational amplifiers and form the concept of active devices; 2 Understand and master the external characteristics of controlled sources; 3. Understand the basic principles by which operational amplifiers form controlled sources; 4 Test VCVS, VCCS, CCVS, CCCS to deepen your understanding of the controlled characteristics of controlled sources.
Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Homework (30%) : After-class assignments (20%) and laboratory reports (10%). 3. Final assessment (60%) : final exam.
Media employed	Multimedia computer, projector, laser pointer, blackboard, chalk, circuit experiment box.

Reading list	1. Textbooks [1] G. Qiu. Circuit Theory[M]. 5th ed. Beijing: Higher Education Press, 2006. 2. Reference Books [1] Y. Liu. Fundamentals of Circuit Analysis[M]. 3rd ed. Beijing: Publishing House of Electronics Industry, 2017. [2] H. Ma. Fundamentals of Circuit Analysis[M]. Chengdu: Sichuan Education Press, 2003. [3] Y. He. Introduction to Circuits[M]. Changsha: Hunan University Press, 2004. [4] J. Gao. Fundamentals of Circuit Analysis: Learning Guidance and Exercise Solutions[M]. Beijing: Electronic Industry Press, 2010. [5] S. Wang. Analysis of Common Circuit Fundamentals Problems and Simulated Questions[M]. Xi'an: Northwestern Polytechnical University Press, 2000. [6] Y. Wang, Circuit Tutoring and Exercise Solutions[M]. Dalian: Dalian University of Technology Press, 2006. [7] Z. Wang, et al. Circuit Problem Analysis[M]. Xi'an: Xi'an Jiaotong University Press, 2007.

“Circuit Analysis” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Circuit models and circuit laws	1. Introduction, Circuit Model, reference directions for current and voltage, Circuit power; 2. Circuit components, voltage source and current source, controlled power supply; 3. Kirchhoff's laws.	6	6	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (4 class hours) 2. Homework after class. (2 class hours)	1. The Rain Classroom platform automatically records video viewing time; 2. Exercise correction.
2. Equivalent transformation of resistance circuits	1. Equivalent transformation of circuits, series and parallel connection of resistors; 2. Equivalent transformation of Y-shaped connection and Δ connection of resistors; 3. Two models of the actual power supply and their equivalent transformations, input resistance.	6	6	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (4 class hours) 2. Homework after class. (2 class hours)	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Quizzes.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
3. General analysis of resistance circuits	1. Diagram of the circuit, number of independent equations for KCL and KVL; 2. Branch current method, mesh current method; 3. Loop current method, node voltage method.	6	6	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (4 class hours) 2 Homework after class (2 hours)	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.
4. Circuit Laws	1. Superposition theorem, Homogeneity theorem, substitution theorem; 2. Davinen's theorem, NORTON's theorem, maximum power transfer theorem.	4	2	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (1 class hour) 2 Homework after class (1 class hour)	1. The Rain Classroom platform automatically records the viewership of videos. 2. Exercise correction.
5. A resistor circuit with an operational amplifier	1. Model of the operational amplifier, analysis of the proportional circuit; 2. Analysis of circuits with an ideal operational amplifier.	2	2	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (1.5 class hours) 2. Homework after class. (0.5 class hours)	1. The Rain Classroom platform automatically records video views. 2. Homework correction after class.
6. Energy storage components	1. Capacitive components; 2. Inductors; 3. Series and parallel connection of capacitive and inductive components	2	2	1. Preview before class: Watch the Rain Classroom micro-lesson video, preview the teaching PPT, etc. (1 class hour) 2. Homework after class. (1 class hour)	1. The Rain Classroom platform automatically records video views. 2. Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
7. Time-domain analysis of first-order and second-order circuits	1. Equations of dynamic circuits and their initial conditions; 2. Zero-input response and zero-state response of first-order circuits; 3. Full response, step response, impulse response of first-order circuits.	6	4	1. Pre-class preview: Watch the Rain Classroom micro-lesson video, preview the teaching PPT, etc. (2 class hours) 2. Homework after class (2 hours)	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.
8. Phasor method	1. Complex numbers, sine quantities, the basis of the phasor method; 2. The phasor form of circuit laws.	6	4	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (2 class hours) 2. Homework after class (2 hours)	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.
9. Analysis of Sinusoidal Steady-state circuits	1. Impedance (admittance) in series and parallel; 2. Phasor diagrams of circuits, analysis of sinusoidal steady-state circuits; 3. Power, complex power, maximum power transmission in sinusoidal steady-state circuits.	10	8	1. Pre-class preview: Watch the Rain Classroom micro-lesson video, preview the teaching PPT, etc. (4 class hours) 2. Homework after class (4 hours)	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
10. Final exams	Students prepare and review	0	8	1. Review key points and consolidate difficult points; 2. Review class experiments, etc.	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, establish wechat groups, and check in daily for record. 2. Supervision by the course instructor: Set up fixed offline or online Q&A times. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by counselors: Visiting student dormitories during the review week to supervise and inspect.
Theoretical teaching tips		48	48		
Practical teaching					
1. Experiment I: Research on Node Potential and Circuit Voltage (Comprehensive)	1. Verify the relationship between potential and voltage in the circuit; 2. Master the method of drawing circuit potential diagrams; 3 Learn to analyze and troubleshoot simple circuit faults.	3	2	1. Preview the corresponding experiment content and understand the purpose of the experiment; (0.5 class hours) 2. Write a preview report. (0.5 class hours) 3. Submit the experiment report: Include the purpose of the	1. Pre-class document review: Request to submit preview reports before class and laboratory reports after class; 2. On-site acceptance of experimental data; 3. Review of experimental reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				experiment, the experimental circuit diagram, the processing of experimental data, answers to questions, and detailed documentation of at least 1-2 problems encountered, explaining how they were analyzed and solved. (1 class hour)	
2. Experiment II. Verification of Kirchhoff's Laws (Verification)	1. Deepen your understanding of Kirchhoff's laws; 2. Learn to use a multimeter to measure DC voltage and DC current, and verify Kirchhoff's laws; 3 Learn to measure the current in each branch using an ammeter.	3	1	1. Preview the corresponding experiment content and understand the purpose of the experiment; 2. Write a good preview report. (0.5 class hours) 3. Submit the experiment report. (0.5 class hours)	1. Pre-class document review: Request to submit preview reports before class and laboratory reports after class; 2. On-site acceptance of experimental data; 3. Review of experimental reports.
3 Research on the characteristics of linear circuits	1. Deepen the understanding of the main characteristics of linear circuits (homogeneity, superposition, displacement, reciprocity). 2. Learn the research methods for the main characteristics of linear circuits.	3	2	1. Preview the corresponding experiment content and understand the purpose of the experiment; 2. Write a good preview report. (1 class hour) 3. Submit the experiment report. (1 class hour)	1. Pre-class document review: Request to submit preview reports before class and laboratory reports after class; 2. On-site acceptance of experimental data; 3. Review of experimental reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
4. Research on Equivalent circuits of Linear Active Two-terminal networks	1. Deepen the understanding of the main characteristics of linear circuits (homogeneity, superposition, displacement, reciprocity). 2. Learn the research methods for the main characteristics of linear circuits.	3	1	1. Preview the corresponding experiment content and understand the purpose of the experiment; 2. Write a good preview report. (0.5 class hours) 3. Submit the experiment report. (0.5 class hours)	1. Pre-class document review: Request to submit preview reports before class and laboratory reports after class; 2. On-site acceptance of experimental data; 3. Review of experimental reports.
5. Research on Operational Amplifiers and Controlled sources	1. Learn how to use operational amplifiers and form the concept of active devices; 2. Understand and master the external characteristics of controlled sources; 3. Understand the basic principles by which operational amplifiers form controlled sources; 4. Test VCVS, VCCS, CCVS, CCCS to deepen your understanding of the controlled characteristics of controlled sources.	4	2	1. Preview the corresponding experiment content and understand the purpose of the experiment; 2. Write a good preview report. (1 class hour) 3 Submit the experiment report. (1 class hour)	1. Pre-class document review: Request to submit preview reports before class and laboratory reports after class; 2. On-site acceptance of experimental data; 3. Review of experimental reports.
Laboratory class hour count		16	8		
Total		64	56	Total hours = 120 hours	
Credits (ECTS)		4.0			

Data Structure A

Competence field	Engineering basics
Curriculum designation	Data Structure A
Curriculum code	9063313083
Semester(s) in which the curriculum is taught	3rd Semester
Person responsible for the curriculum	Hao Chen
Lecturer	Hao Chen
Language	Chinese
The relationship between the curriculum and the major	"Data Structure A" is a core professional foundation course for science and engineering majors such as artificial intelligence, electronic information engineering, and computer science and technology, and is the cornerstone of advanced programming. This course systematically introduces the logical structure of data (such as linear lists, trees, graphs), the physical storage structure, and the various basic operations defined on these structures (such as search, insert, delete, sort, etc.). At the same time, this course emphasizes algorithmic analysis and design, guiding students to understand the decisive impact of different data structures on algorithmic efficiency and mastering the analytical methods of time and space complexity. Mastering this course not only provides the necessary theoretical basis and implementation tools for subsequent core courses such as Algorithm Design and Analysis, but also systematically cultivates students' abstract thinking, logical reasoning, and ability to solve complex problems, laying the most critical technical foundation for future career development in fields such as software development, algorithm engineering, and system design.
Teaching methods, number of teaching hours	Target students: Artificial Intelligence major, Electronic Information Engineering major Teaching method: Theory + experiment Teaching hours (Contact hours): 72 hours Among them: Theoretical instruction: 40 class hours Laboratory/practical teaching: 32 hours Class size: Six classes with approximately 260 students
Workload	Total workload = 152 class hours; Contact hours = 72 hours; Self-study hours = 80 hours;
Credit points (ECTS)	5.1
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are

	eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics A(1), Advanced Mathematics A(2)
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to enable students to systematically master the principles and implementation of various basic data structures, and to have an initial ability to analyze and design algorithms. The specific objectives include: **Knowledge:** 1. Master the basic concepts and terms of data structures: Understand core concepts such as data, data elements, data structures, logical structures, and storage structures; Master the definitions of algorithms, their characteristics, and the basic concepts and representations of the key metrics for measuring algorithm efficiency - time complexity and space complexity (Big O notation). 2 Be familiar with the logical and physical representation of classical data structures: Master the logical definitions, characteristics, and main application scenarios of linear structures (sequential list, linked list, stack, queue), tree structures (binary tree, heap, Huffman tree, etc.), and graph structures (adjacency matrix, adjacency list). 3 Understand the principles and ideas of core algorithms: Deeply understand the basic principles, execution processes, and spatio-temporal performance of typical operation algorithms based on various data structures, such as search (sequential, split, hash), sort (bubble, selection, insertion, quick, merge, heap sort), etc. **Skills:** 1. Be able to implement basic data structures in a high-level language: Be proficient in using programming languages such as C/C++/Java to implement storage and basic operations (add, delete, modify, query) of core data structures such as sequential lists, single/double linked lists, stacks, queues, and binary trees on a computer. 2 Be able to program classic algorithms: Have the ability to convert pseudo-code descriptions of classic algorithms such as sorting and searching into executable program code, and be able to debug to ensure the correctness of the algorithm. 3 Master the initial analysis method of time and space complexity: Be able to conduct frequency analysis of the execution statements of simple algorithms and estimate their time and space complexity, and have basic algorithm performance evaluation skills. **Ability:** 1. Ability to abstract data and model: Be capable of analyzing

	real-world problems, abstracting logical relationships from the data, and selecting or designing appropriate data structures to effectively model the problem. 2. Algorithm Design and selection ability: In response to specific problem requirements, be able to select the most appropriate data structure and algorithm by taking into account factors such as data size and operational characteristics, or make adaptive modifications to existing algorithms to design efficient and robust solutions. 3. Program synthesis and optimization capabilities: Possess the ability to solve moderately complex comprehensive problems, be capable of combining and applying multiple data structures and algorithms, and conduct analysis and preliminary optimization of program performance to meet the requirements of practical applications for time and space efficiency. 4. Self-study and exploration ability: Be able to independently learn and understand more advanced data structures (such as B-tree, red-black tree, graph traversal algorithms, etc.) by reading documentation and technical materials, and apply this knowledge to solve more complex engineering problems, laying a solid foundation for future in-depth study and research.
Contents	**Theoretical instruction (40 contact hours, 40 self-study hours)** Chapter 1: Introduction (2 contact hours, 1 self-study hour) 1. Basic Concepts and terms; 2. Abstract Data types; 3. Algorithms and Algorithm Analysis. Chapter 2: Linear Lists (6 contact hours, 6 self-study hours) 1. Definition of linear lists, definition of abstract data types; 2. Sequential Representation and Implementation of linear lists; 3. Linked Representation and Implementation of a linear list; 4. Applications of Linear Lists. Chapter 3: Stacks and Queues (6 contact hours, 3 self-study hours) 1. Definitions and characteristics of stacks and queues; 2. Stack and Recursion; 3. The representation of queues and the implementation of operations; 4. Applications of stacks and queues. Chapter 4: Strings and Arrays (2 contact hours, 1 self-study hour) 1. Basic concepts of strings, BF, KMP algorithms; 2. Array definition and storage.

	Chapter 5: Trees and Binary Trees (6 contact hours, 5 self-study hours) 1. Definitions and basic terms of trees; 2. Properties and storage structures of binary trees; 3. Traversal binary trees and threaded binary trees; 4. Trees and Forests; 5. Huffman trees and their applications. Chapter 6: Diagrams (6 contact hours, 5 self-study hours) 1. Definition and basic terms of graphs; 2. The storage structure of the graph; 3. Graph traversal; 4. Applications of graphs. Chapter 7: Search (6 Contact Hours, 4 Self-study Hours) 1. Basic Concepts of Search; 2. Searching a linear list; 3. Tree table lookup; 4. Lookup of hash tables. Chapter 8: Sorting (6 contact hours, 5 self-study hours) 1. Basic Concepts; 2. Insertion sort; 3. Swap sort; 4. Selection sort; 5. Merge sort; 6 Radix sort 8. Comparison of various sorting methods. Chapter 9: Final Exams (0 contact hours, 10 self-study hours) 1. Students prepare and review for the exam. **Experimental teaching (32 contact hours, 40 self-study hours)** Experimental Project 1: Basic Operations of Sequential Lists. (2 contact hours, 3 self-study hours) Experiment: Programming to define a static storage structure for sequential lists. Implement and test the basic operations of the sequential list, including the initialization of the sequential list, the insertion of elements at the specified position, the deletion of elements at the specified position, the lookup of elements by value, and the traversal output of the sequential list. Focus on the precise control of array indices and the logic of element movement.

	Experiment Project 2: Implementation of Linked List. (2 contact hours, 3 self-study hours) Experiment: Programming to define the node structure of a singly linked list and creating and destroying nodes using dynamic memory allocation (malloc/free). Implement and test the basic operations of a singly linked list, including creating the list by head insertion/tail insertion, inserting nodes at specified positions, deleting nodes at specified positions, finding nodes by value, and traversing the output of the list. Experiment Project 3: Applications to Linear Lists. (2 contact hours, 3 self-study hours) Experiment Content: To solve a specific application problem using a sequential list or linked list (such as addition/subtraction of a polynomial, or the Josephus ring problem). Students are required to select the appropriate linear list storage structure based on the characteristics of the problem, design the corresponding algorithm, complete the full program implementation and testing, and compare the advantages and disadvantages of different storage structures in this application. Experiment Project 4: Stack and Its Application. (2 contact hours, 3 self-study hours) Experiment Content: Basic operations of the stack (initialization, pushing onto the stack, popping off the stack, picking the top element of the stack, checking empty) based on sequential storage (sequential stack) and linked storage (linked stack) respectively. Use the implemented stack structure to solve a typical application problem such as number conversion (decimal to binary/octal) or parenthesis matching check. Experiment Project 5: Implementation of a queue. (2 contact hours, 3 self-study hours) Experiment Content: Programming to implement the basic operations of a circular queue (based on sequential storage), including queue initialization, enqueuing, dequeuing, taking the head element of the queue, checking for empty and full, with a focus on mastering the movement logic of the head and tail Pointers of the queue and the conditions for checking for empty/full. Experiment Project 6: Implementation of Pattern Matching Algorithm. (2 contact hours, 3 self-study hours) Experiment: Programming to implement a naive (Brute-Force)

	pattern matching algorithm. Based on this, focus on learning and programming to implement the KMP (Knuth-Mormorris Pratt) pattern matching algorithm, with the core task of correctly calculating and generating the next array of the pattern string and using that array for efficient matching. Experiment Project 7: Recursive Traversal of a Binary Tree. (2 contact hours, 3 self-study hours) Experiment: Programming to define the chained storage structure of a binary tree. Using the idea of recursion, implement the preorder, inorder, and postorder traversal algorithms of binary trees respectively, and be able to create a binary tree based on the given data sequence (such as the preorder sequence). Verify the correctness of the traversal results through a specific tree structure. Experiment Project 8: Graph Traversal algorithm. (3 contact hours, 3 self-study hours) Experiment Content: Programming to define the adjacency matrix or adjacency list storage structure of a graph. Based on the selected storage structure, implement the depth-first traversal (DFS) and breadth-first traversal (BFS) algorithms of the graph respectively. Verify the correctness of the algorithm by traversing from different vertices through the given graph instance and printing out the traversal sequence. Experimental Project 9: Minimum Spanning Tree (3 contact hours, 3 self-study hours) Experiment: Program two classic minimum Spanning tree (MST) construction algorithms for weighted undirected connected graphs: Prim algorithm and Kruskal algorithm. Through specific examples, run the two algorithms respectively, print out the edges of the minimum spanning tree and their total weights, and compare the implementation ideas and complexities of the two algorithms. Experiment Project 10: Familiarity with the Shortest Path Algorithm. (3 contact hours, 3 self-study hours) Experiment: Program two classic shortest path algorithms for weighted directed graphs: Dijkstra's algorithm (for the shortest path of a single source) and Floyd's algorithm (for the shortest path between all vertex pairs). Run the two algorithms with specific examples and output the lengths of the shortest paths from the source points to each vertex and the paths themselves. Experiment Project 11: Searching for a Linear list. (3 contact

	hours, 3 self-study hours) Experiment: Program the binary search algorithm on an ordered sequential list and compare its performance with that of sequential search. Learn and implement an index search algorithm (such as block search) and understand the idea of "index + in-block search". Experiment Project 12: Lookup of Hash Tables. (3 contact hours, 4 self-study hours) Experiment: Programming the construction and lookup of hash tables. Students are required to design or select a hash function (such as the division remainder method) and use the chaining address method (zipper method) to handle hash collisions. Implement the operation of inserting elements into the hash table and finding the specified element, and test its average lookup performance. Experiment Project 13: Implementation and Comparison of Internal Sorting algorithms. (3 contact hours, 3 self-study hours) Experiment: Program to implement a variety of classic internal sorting algorithms, including at least: insertion sort, Shell sort, bubble sort, quick sort, selection sort, and merge sort. By sorting datasets of different sizes (such as randomly generated 1000, 10000, or 100,000 data), recording and comparing the execution times of different algorithms, intuitively experience the huge performance differences of algorithms with different time complexities.
Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Assignments (30%) : Pre-class preview assignments, after-class assignments, lab reports. 3. Final assessment (60%) : final exam.
Media employed	Multimedia computers, projectors, CodeBlocks software
Reading list	1. Textbooks [1] W. Yan, D. Li, and W. Wu, Data Structures (C Language Version), 2nd ed., Beijing: Posts & Telecom Press,2024 2. Reference book [1] W. Yan, Ed., Data Structures (C Language Version), Beijing: Tsinghua University Press, 2007. [2] R. Yin, Ed., Data Structures and Exercise Analysis: Using Object-Oriented Methods and C++ Description, Beijing: Tsinghua University Press,2002. [3] the Data Structure and Algorithm the Visualization Website:https://www.cs.usfca.edu/~galles/visualization/

“Data Structure A” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Introduction	1. Basic Concepts and terms; 2. Abstract Data types; 3. Algorithms and Algorithm Analysis.	2	1	1. Pre-class preview (1 class hour): Read Chapter One of the textbook to initially understand basic concepts such as data, data elements, data structures, logical structures, and storage structures, with a particular focus on the definition method of "Abstract Data Type (ADT)".	1. The teaching platform will release an online multiple-choice/true/false quiz on the core terms of this chapter within a limited time to test the previewing effect.
2. Linear list	1. Definition of linear list, definition of abstract data type; 2. Sequential Representation and	6	6	1. Preview before class (2 class hours): Watch the micro-lesson videos on "sequential list" and "singly linked list" to understand the basic ideas and differences of the two storage structures. 2. Post-class consolidation (4 hours): Self-study	1. Submit complete code for the basic operations of sequential lists and singly linked lists on the Rain Classroom platform after class. 2. Randomly check students' hand-drawn diagrams of pointer changes for inserting/deleting

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	Implementation of linear lists; 3. Linked Representation and Implementation of a linear list; 4. Applications of Linear Lists.			the definitions and basic operations (insertion, deletion) of doubly linked lists and circular linked lists; Write and debug the basic operation code for sequential lists and singly linked lists independently, and try to solve a simple application problem (such as merging two ordered linear lists).	nodes in a doubly linked list.
3. Stacks and queues	1. Definitions and characteristics of stacks and queues 2. Representation of stacks and implementation of operations 3. Stack and Recursion 4. Representation of queues and implementation of operations 5. Applications of Stacks and Queues	6	3	1. Pre-class preview (1 class hour): Watch micro-lesson videos on "stack" and "queue" to understand their "last-in-first-out (LIFO)" and "first-in-first-out (FIFO)" characteristics. 2. Post-class consolidation (2 hours): Study the implementation details of circular queues, especially the conditions for checking empty and full; Practice programming a stack application case (such as expression evaluation or number system conversion).	1. The after-class assignment requires submitting a program code for a parenthesis matching check to test the application ability of the stack. 2. In class, there are quick questions and answers about the movement of the pointer at the head and tail of the loop line.
4. Strings, arrays	1. Basic concepts of strings, BF, KMP algorithms	2	1	1. Pre-class preview (1 class hour): Preview the part of the textbook about the KMP algorithm, with a focus on understanding the meaning and	1. The teaching platform publishes a fill-in-the-blank question about calculating the next array of the given pattern string, and submit

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	2. Definition and storage of arrays			calculation method of the next array.	the result.
5. Trees and binary trees	1. Definitions and basic terms of trees 2. Properties and storage structures of binary trees 3. Traversing binary trees and threaded binary trees 4. Trees and Forests 5. Huffman trees and their applications	6	5	1. Pre-class preview (2 class hours): Watch the micro-lesson videos on "Properties and Storage Structures of Binary Trees" and "Recursive Traversal of Binary Trees"; Preview the textbook to understand the conversion relationship between trees, forests and binary trees. 2. After-class consolidation (3 hours): Self-study the non-recursive traversal algorithm of binary trees (with the help of stacks); Program the construction of Huffman trees and the generation of Huffman codes.	1. The after-class assignment requires the submission of program code for building a binary tree based on preorder and in-order traversal sequences 2. The teaching platform publishes an online quiz on the calculation of binary tree properties (such as the number of nodes, depth, and the number of leaf nodes).
6. Graph	1. Definitions and basic terms of graphs 2. The storage structure of graphs 3. Graph traversal 4. Application of Graphs	6	5	1. Preview before class (2 class hours): Watch the micro-lesson videos on "Graph Storage Structures (Adjacency Matrix/adjacency List)" and "Graph Traversal (DFS/BFS)". 2. Post-class consolidation (3 hours): Self-study the basic ideas and execution processes of minimum spanning trees (Prim/Kruskal algorithm) and shortest paths (Dijkstra/Floyd algorithm); Program to implement at least one of the application algorithms.	1. The after-class assignment requires the submission of program code for depth-first (DFS) and breadth-first (BFS) traversals of the graph. 2. Randomly check the adjacency matrix and adjacency list of the given graph hand-drawn by students.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
7. Search	1. Basic concepts of searching 2. Searching a linear list 3. Tree table lookup 4. Lookup of Hash tables	6	4	1. Pre-class preview (2 class hours): Watch micro-lesson videos on "Split Search" and "Hash Table" to understand their basic principles and performance advantages. 2. Post-class consolidation (2 hours): Self-study the definition, search, insertion, and deletion operations of binary sort trees (BST); Program the creation and lookup of hash tables based on the chain address method.	1. The assignment requires submission of code for the binary search program of an ordered sequential list. 2. The teaching platform conducts an online quiz on the calculation of the average search length (ASL) for different search algorithms.
8. Sort	1. Basic concepts 2. Insertion sort 3. Swap sort 4. Selection sort 5. Merge sort 6. Radix sort 7. Comparison of various sorting methods	6	5	1. Preview before class (2 class hours): Watch micro-lesson videos on "Quick Sort" and "Merge Sort" to understand their divide-and-conquer ideas. 2. Post-class consolidation (3 hours): Self-study the algorithmic ideas of Shell sort and heap sort; Program the implementation of at least three class-taught sorting algorithms and design experiments to compare their execution efficiency on different data scales.	1. after-class assignment requires the submission of program codes for quick sort or merge sort. 2. Students are required to discuss in groups and submit a comparison table summarizing different internal sorting algorithms (time/space complexity, stability).
9. Final exam	Students prepare and review	0	10	1. Review key points and consolidate difficult points; 2. Review class experiments, etc.	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, establish wechat groups, and check in daily for record. 2. Teacher supervision: Set up fixed offline or

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
					online Q&A sessions. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by counselors: Visiting student dormitories during the review week to supervise and inspect.
(Theoretical teaching) Tips		40	40		
Practical teaching					
1. Experiment One (Confirmatory)	Basic operations of a sequential list	2	3	Watch the "Sequential list" micro-lesson video before class to preview the definition, storage structure and pseudo-code implementation of the basic operations (initialization, insertion, deletion, search) of sequential lists in the textbook.	1. The teaching platform will release an online quiz on the calculation of the number of times elements are moved when performing insertion/deletion operations on a sequential list; 2. Randomly check the strengths and weaknesses of students' oral statements of the sequence list during the laboratory class.
2. Experiment 2 (Verification	Implementation of the linked list	2	3	Watch the "Single Linked List" micro-lesson video before class to preview the node definition of the single linked list in the textbook, the creation of the list by head insertion/tail insertion, and the pseudo-code implementation of insertion and deletion operations, with a focus on understanding the	1. Submit a hand-drawn photo of the pointer changes for inserting/deleting nodes in the singly linked list through the teaching platform before class; **2.** A quick question-and-answer session on the differences in operations between a linked list with a leading node and without a leading node

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				modification logic of Pointers.	will be conducted in the lab class.
3. Experiment 3 (Confirmatory)	Applications of linear lists	2	3	Preview the application problem given in the experiment guidebook (such as the addition of monoculars), analyze the problem requirements, and think about the ideas and pros and cons of implementing the problem using sequential list and linked list respectively.	1. Before the experiment class, students are required to submit in groups a statement of reasons for choosing sequential list or linked list to solve the application problem in the discussion area of the teaching platform.
4. Experiment 4 (Confirmatory)	Stacks and Their Applications	2	3	Watch the micro-lesson video on "stack" before class, preview the implementation methods of sequential stack and chain stack in the textbook, and understand the application principles of stack in expression evaluation or number system conversion.	1. The after-class assignment requires submission of a program code for parenthesis matching verification; 2. The teaching platform publishes an online fill-in-the-blank question simulating stack changes during a function call.
5. Experiment 5 (Verification)	Queue implementation	2	3	Before class, watch the micro-lesson video on "queues", focusing on previewing the implementation of circular queues, understanding how it solves the "false overflow" problem, as well as the conditions for empty and full judgment.	1. Submit the program code for the basic operations of the circular queue after class; 2. Randomly check students' oral instructions on the movement rules of the head and tail Pointers of the circular queue during the laboratory class.
6. Experiment 6 (Verification)	Implementation of the pattern matching algorithm	2	3	Preview the KMP algorithm chapter in the textbook, watch the related animated video, and focus on understanding the meaning of the next array and the manual solution process.	1. The teaching platform publishes a fill-in-the-blank question about calculating the next array of a given pattern string; 2. Quick questions in the experiment class about

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
					the advantages of the KMP algorithm over the BF algorithm.
7. Experiment 7 (Confirmatory)	Recursive traversal of a binary tree	2	3	Watch the micro-lesson videos on "Definition and Properties of Binary Trees" and "Traversal of Binary Trees" before class to master the access order of preorder, inorder, and postorder recursive traversals.	1. Submit hand-drawn photos of the three traversal sequences of the given binary tree before class; 2. The after-class assignment requires the submission of program code for constructing a binary tree based on preorder and in-order sequences.
8. Experiment 8 (Confirmatory)	Graph traversal algorithms	3	3	Watch the micro-lesson videos on "Graph Storage Structures" and "Graph Traversal" before class to understand the construction methods of adjacency matrices and adjacency lists, as well as the basic ideas of DFS and BFS.	1. Before class, randomly check the adjacency matrix and adjacency list of the given graph hand-drawn by students. 2. Submit the code for the DFS and BFS traversal of the graph as an assignment after class.
9. Experiment 9 (Confirmatory)	Minimum spanning tree	3	3	Preview the chapters on Prim and Kruskal algorithms in the textbook, watch the related animated demonstration videos, and understand the greedy strategies and execution steps of both algorithms.	1. The teaching platform publishes an online question that manually simulates the execution process of the Prim or Kruskal algorithm; 2. Conduct group discussions in the lab class to compare the applicable scenarios of the two algorithms.
10. Experiment 10 (Confirmatory)	Familiarity with the shortest path algorithm	3	3	Preview the chapters on Dijkstra's algorithm and Floyd's algorithm in the textbook, watch the related animated demonstration videos, and understand the iterative processes and core	1. Submit a photo of the step-by-step table for manually simulating Dijkstra's algorithm to solve the single-source shortest path before class 2. Experiment Class to quickly answer questions

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				ideas of the two algorithms.	about the core differences and complexity of the two algorithms.
11. Experiment 11 (Confirmatory)	Lookup of the linear list	3	3	Watch the micro-lesson video on "binary search" before class, focusing on understanding its preconditions (order) and pointer movement logic. Preview the basic idea of block search.	1. The teaching platform publishes an online quiz on the calculation of the number of comparisons in a halved search; 2. Submit the program code for the half-search of the homework after class.
12. Experiment 12 (Confirmatory)	Lookup of hash tables	3	4	Watch the micro-lesson video on "Hash tables" before class to understand the concepts of hash functions and hash collisions, and preview at least one collision resolution method such as the chain address method.	1. Submit the program code for creating and searching hash tables based on the chain address method after class; 2 Ask questions about calculating the average search length (ASL) in the lab class.
13. Experiment 13 (Confirmatory)	Implementation and comparison of internal sorting algorithms	3	3	Watch animated demonstration videos of "Quick Sort" and "Merge sort" before class to understand their divide-and-conquer ideas and execution processes. Preview the textbook and summarize the stability of common sorting algorithms.	1. Before the experiment class, students are required to submit a comparison table summarizing different internal sorting algorithms (time/space complexity, stability); 2. Submit implementation code for at least three sorting algorithms after class.
(Practical Teaching) Tips		32	40		
Total		72	80	Total hours = 152 hours	
Credits (ECTS)		5.1			

Analog Electronic Technology

Competence field	Engineering basics
Curriculum designation	Analog Electronic Technology
Curriculum code	9061313021
Semester(s) in which the curriculum is taught	2th Semester
Person responsible for the curriculum	Dongchu Jiang
Lecturer	Qiuxiang Zhu, Xuejun Zhang, Yong Ye
Language	Chinese
The relationship between the curriculum and the major	"Analog Electronic Technology" is one of the engineering foundation courses for the major of electronic information Engineering. It is a discipline that studies the performance of various semiconductor devices, circuits and their applications. Through the study of common electronic components, analog circuits and their systems, this course enables students to acquire basic theories, knowledge and skills in analog electronic technology, develop comprehensive abilities to analyze and solve related problems and engineering practice abilities, and lay the foundation for in-depth study of electronic technology and its application in the major. At the same time, this course emphasizes engineering practice application. Through the cultivation of circuit design, analysis and debugging skills, it effectively enhances students' innovation ability and practical problem-solving ability, which is of great significance for future work in fields such as electronic product development, communication system design, instrumentation, signal processing, etc.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + experiment Teaching hours (Contact hours): 64 hours Among them: Theoretical instruction: 48 hours Laboratory/practical teaching: 16 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 192 class hours; Contact hours = 64 hours; Self-study hours = 128 hours;
Credit points (ECTS)	6.4
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics, College Physics, Circuit Analysis

Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to enable students to have an in-depth understanding of the principles and applications of microcontrollers and to master the design and development methods of microcontroller systems. The specific objectives include: **Knowledge:** 1. Master the basic knowledge of how basic electronic circuits work, their main characteristics, and the interconnections and matching between circuits; 2. Understand the physical structure, working principle, characteristic curve and main parameters of semiconductor devices (PN junction, diode, FET, BJT, etc.), as well as circuits composed of semiconductor devices and their analysis methods (graphical analysis method and model analysis method) and applications; 3. Understand the basic concept of feedback and the types of negative feedback amplification circuits, understand the general expression of the gain of negative feedback amplification circuits, understand the influence of the performance of negative feedback amplification circuits, and understand the design of negative feedback amplification circuits; 4. Understand signal processing (filtering) and signal generation (oscillation), including active filters, sinusoidal oscillation circuits, non-sinusoidal generation circuits, and voltage comparators, etc. 5. Master low-power rectifier, filter circuits and linear series regulator circuits, and understand the working principles of three-terminal integrated linear regulators and switching regulator power supplies. **Skills:** 1. Learn how to use common electronic instruments; 2. Testing methods for electronic circuits; 3. Troubleshooting methods; 4. Application of Multisim software. **Ability** 1. Be able to qualitatively and quantitatively analyze electronic circuits such as feedback circuits, filters, signal generators, etc., using professional knowledge such as mathematics, physics, and circuits; Through in-depth analysis of the voltage transfer function, evaluate the performance of the filter,

	determine whether the sine wave generator meets or how to select the parameters to meet the oscillation conditions; 2. Be able to apply physical knowledge to explain the structure and working principle of common semiconductor devices; Be able to use circuit knowledge to build an abstract model of the amplifier through in-depth analysis, define the performance parameters of the amplifier, and use modeling methods to analyze the amplifier. Be able to build an equivalent linear model of a nonlinear device through reasonable and conditional approximation under limited conditions and use the model to analyze electronic circuits. 3. Design application electronic circuits that meet technical requirements, are reliable in performance and low in cost, and even form some kind of fully functional electronic system.
Contents	**Theoretical instruction (48 contact hours, 96 self-study hours)** Chapter 1: Introduction (2 contact hours, 4 self-study hours) 1、Signals, spectrum of signals; Analog signals and digital signals; 2、Amplification circuit model; The main performance indicators of the amplification circuit. Chapter 2: Operational Amplifiers (6 contact hours, 10 self-study hours) 1、Integrated circuit operational amplifiers; 2、Ideal operational amplifier; 3、Basic linear operational amplifier circuits; 4、Other applications for in-phase and inverting input amplification circuits. Chapter 3: Diodes and Their Basic Circuits (6 contact hours, 10 self-study hours) 1、Basic knowledge of semiconductors; Formation and characteristics of PN junctions; Semiconductor diodes; 2、The basic circuit of a diode and its analysis method; Special diodes. Chapter 4: Bipolar Junction Transistors (BJT) and Their Amplification Circuits (6 contact hours, 10 self-study hours) 1、Semiconductor triode; 2、Basic common-emitter amplifier circuits; 3、Analysis of amplification circuits - Graphical method; 4、Analysis of amplification circuits - Small signal model method;

	5、Stability of the static operating point of an amplifier circuit; Common collector amplifier circuits and common base amplifier circuits, combined amplifier circuits. Chapter 5: Field-Effect Transistors and Their amplification Circuits (6 contact hours, 15 self-study hours) 1、Metal-oxide-semiconductor (MOS) field-effect transistors; 2、MOSFET basic common-source amplifier circuit; 3、Graphical analysis method; 4、Small-signal model method; 5、Common drain and common gate amplifier circuits. Chapter 6: Frequency Response (6 contact hours, 10 self-study hours) 1、Frequency response of a single time constant RC circuit; 2、Low-frequency response of single-tube amplification circuits; 3、High-frequency response of single-tube amplification circuits 4、Methods for extending the passband of amplification circuits. Chapter 7: Analog Integrated Circuits (4 contact hours, 8 self-study hours) 1、Dc bias techniques in analog integrated circuits; 2、Differential amplification circuits and their transmission characteristics; 3、Integrated circuit operational amplifiers; Main parameters of an actual integrated operational amplifier. Chapter 8: Feedback Amplifier Circuits (4 contact hours, 8 self-study hours) 1、Basic concepts and classifications of feedback; Voltage series, voltage parallel negative feedback amplifier circuits; 2、Current series and current parallel negative feedback amplification circuits; General expression for the gain of a negative feedback amplifier circuit; 3、The effect of negative feedback on the performance of amplification circuits; Approximate calculations under deep negative feedback conditions; 4、Negative feedback amplification circuit design; Frequency response of negative feedback amplification circuits; Stability of negative feedback amplification circuits.

	Chapter 9: Power Amplification Circuits (4 contact hours, 8 self-study hours) 1、General issues with power amplifier circuits; Emitter output - An example of a Class A amplifier; 2、Class B dual power supply complementary symmetrical power amplifier circuit; 3、Class A and B complementary symmetrical power amplifier circuit; Integrated power amplifier Chapter 10: Signal Processing and Signal Generation Circuits (2 contact hours, 4 self-study hours) 1、The basic concepts and classification of filter circuits; First-order active filter circuits; 2、Oscillation conditions for sinusoidal oscillation circuits; RC bridge sinusoidal oscillation circuit; 3、LC bridge sine wave oscillation circuit; Non-sinusoidal signal generating circuit Chapter 11: DC Regulated Power Supply (2 contact hours, 4 self-study hours) 1、Low-power rectifier filter circuits; 2、Series feedback regulator circuit. **Experimental teaching (16 contact hours, 32 self-study hours)** Experiment Item 1: Basic operational circuits for integrated operational amplifiers. (4 contact hours, 8 self-study hours) Experiment Content: Familiarize yourself with the functions of the LM324 integrated operational amplifier chip, the distribution of external leads, and judge whether it is good or bad. Connection and testing of inverting proportional operation circuits. Connection and testing of inverse addition operation circuits. Testing of in-phase proportional operation circuits. Connection and testing of subtraction circuits. Experiment Item 2: Testing of a single-tube common-beam amplifier circuit. (4 contact hours, 8 self-study hours) Experiment Content: Measurement and debugging of static operating points. Measure the voltage amplification factor A_{u1} of the amplification circuit. Observe the effect of the static operating point on the output voltage waveform of the amplification circuit. Measure the input and output resistances.

	Experiment Item 3: Testing of Common-emitter and common-current two-stage amplification circuits. (4 contact hours, 8 self-study hours) Experiment: Adjust and test the static operating point of the emitter output. Measure voltage amplification factor. Measurement of negative feedback circuits. Observe the phase relationship of the waveforms at each level. Experiment Item 4: DC Regulated Power Supply. (4 contact hours, 8 self-study hours) Experiment Content: Get to know the general structure of a DC regulated power supply through the experiment, and further establish the concepts of rectification, filtering and voltage regulation. Test the bridge rectifier circuit. Test the bridge rectifier capacitor filter circuit.
Study and examination requirements and forms of examination	1. Learning attitude (10%) : Basic course requirements (no lateness, no early departure, no unjustified absence, and active interaction in class). 2. Online video (10%) : Rain Classroom. 3. Experiment (10%) : Experiment report. 4. Unit Quiz (10%) : In-class test in the Rain Class. 5. Final assessment (60%) : final exam.
Media employed	Multimedia computer, projector, laser pointer, blackboard, chalk, Multisim software, analog circuit experiment box
Reading list	1. Textbooks [1] H. Kang, L. Zhang, et al. Electronic Technology Simulation Part[M]. 7st ed. Beijing: Higher Education Press, 2021. 2. Reference books [1] Ch. Hua, Sh. Tong. Fundamentals of Electronic Technology (Simulation Part)[M]. 6st ed. Beijing: Higher Education Press, 2023. [2] D. Chen. Fundamentals of Electronic Technology Experiment (Electronic Circuit Experiment, Design, Simulation) [M]. 2nd ed. Beijing: Higher Education Press, 2000.

“Analog Electronic Technology” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Introduction	1. Signal classification, spectrum concepts; 2. Amplification circuit model; 3. Performance indicators of amplification circuits.	2	4	1. Characteristics and differences of "analog signal vs. digital signal"; 2. Derive the definitions of voltage gain $A_u=U_o/U_i$ and input resistance $R_i=U_i/I_i$; 3. Read Section 1.5 of the textbook and organize the case of "Passband matching with signal bandwidth".	1. Rain Classroom publishes quizzes; 2. Classroom spot check: Briefly describe "Why the bandwidth of the amplification circuit needs to cover the signal bandwidth".

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Operational amplifiers	1. Integrated operational amplifier structure, LM324 pin functionality; 2. Ideal operational amplifier "virtual short" and "virtual break" characteristics; 3. Basic operational amplifier circuits.	6	10	1. Review the LM324 datasheet and organize the pin definitions for the power supply and input/output terminals; 2. Derive the inverting proportional circuit A_u=-R_f/R_1 based on "virtual short".	1. Classroom spot check: On-site derivation of the in-phase proportional circuit A_u=1+R_f/R_1; 2. Submit the assignment: Calculate the A_u of the given circuit.
3. Diodes and their circuits	1. PN junction formation, unidirectional conductivity, reverse breakdown; 2. Diode characteristic curves, parameters; 3. Diode circuits.	6	10	1. Analyze the effect of temperature on the forward voltage drop of the diode; 2. Draw the schematic diagram of the bridge rectifier circuit and calculate the average output voltage U_o=0.9U_2 (U_2=12V).	1. Submit the "Temperature Impact" analysis notes online; 2. Classroom spot check: Determine the output polarity of a given rectifier circuit.
4. Mosfets and their amplification circuits	1. N-channel enhancement MOSFET structure, characteristic curve; 2. Static operating point of common-source amplification circuit = calculation; 3. Small signal model and A_u, R_i, R_o analysis.	6	10	1. Compare the differences between MOSFET and BJT, and organize the characteristic parameter table; 2. Read Section 4.5 of the textbook and sort out the application scenarios of "high input resistance and low output resistance" in the common leakage circuit.	1. Check the comparison table of MOSFET and BJT; 2. Classroom spot check: Briefly describe the voltage following characteristics of the source follower.
5. BJT and its amplification circuit	1. BJT structure (NPN type), current distribution relationship; 2. Calculation of static operating point for common-emitter amplifier	6	15	1. Derive r_{be}=300+(1+β)×26mV/I_{EQ} (β=100, I_{EQ}=1mA); 2. Given the circuit (V_{CC}=12V, R_b=200kΩ, R_c=2kΩ), calculate the static operating point;	1. Rain Classroom publishes quizzes; 2. Classroom spot check: Calculate the I_{BQ} of a given circuit on the spot.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	circuits; 3. Small signal model and A_u, R_i analysis; 4. Comparison of common-set/common-base circuit characteristics.				
6. Frequency response	1. RC high/low circuit frequency response; 2. Low frequency response, high frequency response of single-tube common radio circuits; 3. Passband extension methods.	6	10	1. Draw the low-frequency equivalent circuit considering the capacitance effect (usually using a simplified hybrid π model or h-parameter model and retaining the capacitance); 2. Compare the reasons, key components, analytical methods, and extension approaches for low-frequency and high-frequency responses; 3. Illustrate an actual circuit for "negative feedback to extend the passband" (such as an audio amplifier).	1. Submit notes on the "Junction Capacitance effect" analysis; 2. Classroom spot check: Explain the impact of the Miller effect on high-frequency responses.
7. Analog integrated circuits	1. DC bias technique; 2. Differential amplifier circuit; 3. Integrated operational amplifier internal structure (LM741), parameters.	4	8	1. How can bias techniques (current sources) be used in differential circuits? How does a differential circuit serve as the input stage of an operational amplifier? 2. Compare the input stage, intermediate stage,	1. Ask the LM741 parameter list on the spot; 2. Classroom spot-check notes.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				and output stage of an integrated operational amplifier with the discrete component basic amplifier circuit (common-emitter, common-collector, differential) learned earlier to understand the design concept of its "performance-optimized version". 3. Make A parameter table and think "If I want to improve this parameter, which part of the internal circuit should I optimize?" for each important parameter (such as A_{od}, R_{id}, K_{CMR}, S_R).	
8. Feedback amplification circuit	1. Feedback judgment; 2. The influence of negative feedback on the performance of amplification circuits; 3. Approximate calculations under deep negative feedback conditions.	4	8	1. Organize the "Four-step Feedback Type Judgment Method" to determine the type of five typical circuits; 2. Practice deep negative feedback circuit analysis.	1. Rain Classroom posts quizzes; 2. Submit the "Feedback Type Judgment" assignment (5 circuits); 3. Classroom spot check: Determine the feedback type of a given circuit on the spot.
9. Power amplifier circuits	1. Comparison of power amplifier circuit types and efficiencies; 2. For Class B complementary symmetrical circuits (OCL), maximum output power $P_{om}=V_{CC}^2/(2R_L)$, efficiency	4	8	1. Organize the "Class A/Class B/Class A/B" conduction Angle and efficiency comparison table; 2. Derive the Pom formula for OCL circuits; 3. Consult the LM386 datasheet and hand-draw the application circuit with a gain of 20dB.	1. Check the amplification type comparison table and the P_{om} derivation manuscript; 2. Rain Classroom publishes Quiz: Calculate the P_{om} for a given OCL circuit.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	η_{max}≈78.5%; 3 Typical applications of integrated power amplifiers (LM386).				
10. Signal Processing and Generation	1. Active filter circuits; 2. Oscillation conditions for sinusoidal oscillation circuits; 3. RC bridge oscillation circuit, square wave generation circuit.	2	4	1. Derive the voltage transfer function of the first-order active low-pass filter circuit; 2. Analyze the phase characteristics of the RC series-parallel frequency-selective network; 3. Given the RC parameters, calculate the oscillation frequency f_o and verify the phase balance.	1. Spot-check the derivation process of the transfer function in the filter circuit in class; 2. Submit the f_o calculation assignment for RC oscillation circuits;
11. Dc regulated power supply	1. Bridge rectifier + capacitor filter circuit; 2. Series feedback regulator circuit; 3. Three-terminal regulator (W7805) application.	2	4	1. Calculate the output of the bridge rectifier + filter circuit and analyze the impact of load variation on U_O; 2. Design the W7805 application circuit (input 12V, output 5V, including input filter capacitor C_1=1000μF, output filter capacitor C_2=0.1μF).	1. Randomly check the calculation process of the rectifier filter circuit UO in class; 2. Classroom spot check: Explain the functions of the input and output capacitors of W7805.
(Theoretical Instruction) Little calculation		48	96		
Practical teaching					
Experiment 1: Basic Operational Circuits for Integrated operational Amplifiers	1. LM324 chip identification and quality judgment; 2. Inverting/non-inverting ratio, sum circuit connection and testing;	4	8	1. Read Section 1.3 of the experiment report and organize the LM324 terminal function table (pin 4 +12V, pin 11 -12V, non-inverting pin 3, inverting pin 2);	1. Submit a preview report before the experiment (the experiment can only be conducted after approval); 2. Spot-check the LM324 pin

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	3. Observe the input/output waveforms with an oscilloscope to verify the Au relationship.			2. Write a preview report: including the purpose, principle, steps, and expected data of the experiment; 3. Design a data record sheet (recording U_i, U_o measurements, theoretical values, errors).	identification (indicate the power terminal, input/output terminal on site); 3. On-site acceptance of the test results.
Experiment 2: Test of Single-tube common-beam amplification circuit	1. Measurement of the static operating point of the voltage divider bias circuit; 2. Voltage amplification factor $A_u=U_o/U_i$ measurement; 3. Observation on the Influence of Static Operating Point on Waveform Distortion (cut-off/Saturation)	4	8	1. Read Section 2.3 of the experiment report and derive the formula for calculating the static operating point; 2. Preview the method of "adjusting RB1 to change the static operating point" specified in the report; 3. Draw the schematic diagram of the experimental circuit and mark the static potential measurement points.	1. Demonstrate the steps for calculating the static operating point; 2. Pre-experiment spot-check: Describe "How to judge cut-off distortion with an oscilloscope"; 3. On-site acceptance of the experimental results.
Experiment 3: Test of Common-emitter - Common-emitter Two-stage amplification circuit	1. Debugging the static operating point of the common-collector circuit; 2. Measurement of total voltage amplification factor $A_u=A_{u1}\times A_{u2}$ for two-stage circuits; 3. Tests on the impact of negative feedback on A_u stability.	4	8	1. Read Section 3.3 of the experiment report and organize the "voltage following" characteristics of the common circuit; 2. Preview the analysis in the report of the advantages of the two-stage amplification of "common-emitter + common-emitter" (high input resistance + low output resistance); 3. Design a waveform recording table (recording the amplitudes and phases of U_i, U_{o1},	1. Pre-experiment spot-check: Explain the reason for the "high input resistance of the common circuit"; 2. On-site acceptance of the test results.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				and U_{o2}).	
Experiment 4: DC Regulated Power Supply	1. Output test of bridge rectifier + capacitor filter circuit; 2. Three-terminal regulator W7805 output voltage (5V) test; 3. Measurement of output ripple of the voltage regulator circuit.	4	8	1. Read Section 4.3 of the experiment report and calculate the output of the rectifier filter circuit (U_O=1.2U_2=9.6V when U_2=8V); 2. Preview the clear function of the W7805 pin in the report; 3. Design the data record sheet (record U_2, U_O rectification, U_O filtering, U_O stabilization values).	1. Check the W7805 pin connections before the experiment (avoid reversing input/output); 2. On-site acceptance of the results of the experiment. 3. Submit the experiment report.
(Practical Teaching) Small scheme		16	32		
Total		64	128	Total hours =192 hours	
Credits (ECTS)		6.4			

Digital Electronic Technology

Competence field	Engineering basics
Curriculum designation	Digital Electronic Technology
Curriculum code	9061313031
Semester(s) in which the curriculum is taught	3th Semester
Person responsible for the curriculum	Laixiu Zhou
Lecturer	Laixiu Zhou, Yue Tan, Jie Xiong
Language	Chinese
The relationship between the curriculum and the major	"Digital Electronic Technology" is one of the engineering application courses for the major of Electronic Information Engineering. The course mainly covers fundamental knowledge of digital logic, logic gates, analysis and design of combinational logic circuits, flip-flops, analysis and design of sequential logic circuits, memory devices, pulse waveform transformation and generation, digital-to-analog (D/A) conversion, and analog-to-digital (A/D) conversion. Meanwhile, the course emphasizes practical application, guiding students to conduct demand analysis, scheme design, and implementation for specific problems. It effectively enhances students' professional literacy and competitiveness, laying a solid foundation for subsequent professional courses such as "Principles of Single-Chip Microcomputers", "Digital Signal Processing", and "Digital Communication", as well as for electronic circuit design practice.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Method: Theoretical Teaching + Experiments Teaching hours (Contact hours): 56 hours Including: Theoretical Teaching: 48 hours Experiment/Practice Teaching: 8 Hours Class Size: 4 classes with approximately 160 students
Workload	Total Workload = 125 hours Contact Hours = 56 hours Self-Study Hours = 69 hours
Credit points (ECTS)	4.2
Requirements according to the examination regulations	Only students with an attendance rate of over two-thirds and a homework completion rate of over two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics, Circuit Analysis, Analog Electronic Technology

Curriculum objectives /Expected learning outcomes	**Learning Outcomes:** The main task of this course is to enable students to master the basic theories, fundamental knowledge, and essential skills of digital electronic technology; familiarize themselves with the principles, functions, characteristics, and parameters of typical and commonly used integrated circuits and digital devices in digital circuits; and grasp the analysis and design methods of digital circuits. The specific objectives include: **Knowledge:** 1. Master the concepts of digital circuits, fundamentals of logic algebra, gate circuits, and flip-flops; 2. Proficiency in the analysis and design of combinational logic circuits, sequential logic circuits, and pulse circuits; 3. Familiarity with currently widely used digital circuit chips. **Skills:** 1. Learn computer-aided design methods using software such as Multisim; 2. Skillfully operate experimental instruments including oscilloscopes, signal generators, digital multimeters, and digital circuit experiment boxes; 3. Design and implement simple digital circuits based on digital electronic technology, such as buzzers, digital clocks, and frequency meters. **Ability:** 1. Ability to abstract practical logical problems into truth tables or state transition diagrams using digital electronic technology, and design corresponding logic circuits—i.e., possessing certain abilities in analyzing and solving problems; 2. Ability to complete circuit design and debugging of a certain complexity using innovative thinking-i.e., possessing certain engineering practice capabilities; 3. Ability to proficiently analyze experimental phenomena and troubleshoot experimental faults using logical thinking under the guidance of digital electronic technology theories; and write experimental reports that meet engineering practice requirements-i.e., possessing certain capabilities in summarization, engineering expression, and communication.
Contents	**Theoretical Teaching (48 Contact Hours, 53 Self-Study Hours)** Chapter 1: Introduction to Digital Logic (4 Contact Hours, 1 Self-Study Hour) 1. Digital signals and digital circuits; 2. Number systems and code systems; 3. Binary codes, binary logic variables, basic logic operations, logic functions and their representation methods, etc.

	Chapter 2: Logic Algebra (6 Contact Hours, 5 Self-Study Hours) 1. Basic laws and rules of logic algebra; 2. Forms of logic function expressions; 3. Algebraic simplification of logic functions; 4. Karnaugh map simplification of logic functions. Chapter 3: Logic Gate Circuits (6 Contact Hours, 5 Self-Study Hours) 1. Basic CMOS logic gate circuits; 2. Different output structures and parameters of CMOS logic gate circuits; 3. TTL logic gate circuits; 4. Several issues in logic description. Chapter 4: Combinational Logic Circuits (10 Contact Hours, 10 Self-Study Hours) 1. Analysis of combinational logic circuits; 2. Design of combinational logic circuits; 3. Competition and hazard in combinational logic circuits; 4. Encoders; 5. Decoders/data distributors; 6. Data selectors, magnitude comparators, and arithmetic operation circuits. Chapter 5: Latches and Flip-Flops (4 Contact Hours, 4 Self-Study Hours) 1. SR latches; 2. D latches; 3. Circuit structure and working principle of flip-flops; 4. Logic functions of flip-flops. Chapter 6: Sequential Logic Circuits (12 Contact Hours, 12 Self-Study Hours) 1. Basic concepts of sequential logic circuits, analysis of synchronous sequential logic circuits; 2. Design of synchronous sequential logic circuits; 3. Analysis of asynchronous sequential logic circuits; 4. Several typical sequential logic circuits. Chapter 7: Pulse Waveform Transformation and Generation (6 Contact Hours, 4 Self-Study Hours) 1. Monostable flip-flops, Schmitt triggers, astable multivibrators; 2. 555 timers and their applications.

	Experimental Teaching (8 Contact Hours, 16 Self-Study Hours) Experiment 1: Design and Testing of Combinational Logic Circuits (3 Contact Hours, 6 Self-Study Hours) Experimental Content: Master the analysis and design methods of combinational logic circuits; deepen the understanding of the use of basic gate circuits. Experiment 2: Flip-Flops and Their Applications (2 Contact Hours, 4 Self-Study Hours) Experimental Content: Master the logic functions of basic RS, JK, T, and D flip-flops; grasp the functions and usage methods of integrated flip-flops; familiarize with the mutual conversion methods between flip-flops. Experiment 3: Counters and Their Applications (3 Contact Hours, 6 Self-Study Hours) Experimental Content: Learn the method of constructing counters using integrated circuits; master the usage and function testing methods of medium-scale integrated counters; use integrated counters to construct 1/N frequency dividers.
Study and examination requirements and forms of examination	1. Attendance (10%): Meet the basic course requirements (no lateness, no early departure, no unexcused absence). 2. Homework (10%): Completion and submission of homework assignments. 3. Experiments (20%): Experimental operation performance and experimental reports. 4. Final Assessment (60%): Final written examination.
Media employed	Multimedia Computer, Projector, Laser Pointer, Blackboard, Chalk, Multisim Software, Digital Circuit Experiment Box
Reading list	1. Textbooks [1] H. Kang, Fundamentals of Electronic Technology: Digital Part (7th Edition). Beijing: Higher Education Press, 2021. 2. Reference book [1] Y. Tan, L. Zhou, et al., Digital Electronic Technology. Harbin: Harbin Institute of Technology Press, 2022. [2] S. Yan, Fundamentals of Digital Electronic Technology (6th Edition). Beijing: Tsinghua University Press, 2016.

"Digital Electronic Technology" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Introduction to Digital Logic	1. Digital signals and digital circuits; 2. Number systems and code systems; 3. Binary codes, binary logic variables, basic logic operations, logic functions and their representation methods, etc.	4	1	Complete exercises on number system conversion, code system conversion, basic logic operations, and logic functions.	Exercise Correction

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Logic Algebra	1. Basic laws and rules of logic algebra; 2. Forms of logic function expressions; 3. Algebraic simplification of logic functions; 4. Karnaugh map simplification of logic functions.	6	5	1. Pre-class preview (2 Self-Study Hours); 2. After-class assignments (2 Self-Study Hours); 3. After-class quiz (1 Self-Study Hour).	1. Exercise correction; 2. Quiz: Conduct an online quiz (via YUKETANG) or a written mini-quiz upon completion of this chapter.
3. Logic Gate Circuits	1. Basic CMOS logic gate circuits; 2. Different output structures and parameters of CMOS logic gate circuits; 3. TTL logic gate circuits; 4. Several issues in logic description.	6	5	1. Pre-class preview (2 Self-Study Hours); 2. After-class assignments (2 Self-Study Hours); 3. After-class quiz (1 Self-Study Hour).	1. Exercise correction; 2. Quiz: Conduct an online quiz (via YUKETANG) or a written mini-quiz upon completion of this chapter.
4. Combinational Logic Circuits	1. Analysis of combinational logic circuits; 2. Design of combinational logic circuits; 3. Competition and hazard in combinational logic circuits; 4. Encoders; 5. Decoders/data distributors; 6. Data selectors, magnitude	10	10	1. Pre-class preview (2 Self-Study Hours); 2. After-class assignments (2 Self-Study Hours); 3. After-class quiz (1 Self-Study Hour).	1. Exercise correction; 2. Quiz: Conduct an online quiz (via YUKETANG) or a written mini-quiz upon completion of this chapter.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	comparators, and arithmetic operation circuits.				
5. Latches and Flip-Flops	1. SR latches; 2. D latches; 3. Circuit structure and working principle of flip-flops; 4. Logic functions of flip-flops.	4	4	1. Pre-class preview (2 Self-Study Hours); 2. After-class assignments (2 Self-Study Hours); 3. After-class quiz (1 Self-Study Hour).	1. Exercise correction; 2. Quiz: Conduct an online quiz (via YUKETANG) or a written mini-quiz upon completion of this chapter.
6. Sequential Logic Circuits	1. Basic concepts of sequential logic circuits, analysis of synchronous sequential logic circuits; 2. Design of synchronous sequential logic circuits; 3. Analysis of asynchronous sequential logic circuits; 4. Several typical sequential logic circuits.	12	12	1. Pre-class preview (2 Self-Study Hours); 2. After-class assignments (2 Self-Study Hours); 3. After-class quiz (1 Self-Study Hour).	1. Exercise correction; 2. Quiz: Conduct an online quiz (via YUKETANG) or a written mini-quiz upon completion of this chapter.
7. Pulse Waveform Transformation and Generation	1. Monostable flip-flops, Schmitt triggers, astable multivibrators; 2. 555 timers and their applications.	6	4	1. Pre-class preview (2 Self-Study Hours); 2. After-class assignments (2 Self-Study Hours); 3. After-class quiz (1 Self-Study Hour).	1. Exercise correction; 2. Quiz: Conduct an online quiz (via YUKETANG) or a written mini-quiz upon completion of this chapter.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
7. Final Examination	Student Review & Exam Preparation	0	12	1. Review key knowledge points and consolidate difficult concepts; 2. Review in-class experiments and related practice content.	1. Form study groups for peer supervision: Group members agree on daily study schedules and tasks with each other, establish WeChat groups, and check in daily for record-keeping. 2. Instructor supervision: Set fixed offline or online consultation hours. Assess the overall review progress of the class based on the frequency and depth of students' questions. 3. Counselor supervision: Visit students' dormitories during the review week to supervise and inspect their review progress.
(Theoretical Teaching) Subtotal		48	53		
Practical Teaching					
1. Experiment 1 (Design-Oriented)	Design and Testing of Combinational Logic Circuits	3	6	1. Preview the principles and applications of corresponding components, and complete the scheme design as required. (2.5 Self-Study Hours); 2. Complete circuit connection and practical	1. Pre-class document inspection: Submit the design process, introduction of intended components, and draw the designed logic circuit diagram before class;

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				debugging on the digital circuit experiment box. (2.5 Contact Hours); 3. Submit an experimental report, including experimental purposes and requirements, experimental principles, experimental instruments and equipment, experimental content, pre-experimental requirements, designed circuit diagrams, and experimental analysis. (1 Self-Study Hour).	2. On-site acceptance of experimental results; 3. Evaluation of experimental reports.
2. Experiment 2 (Verification-Oriented)	Flip-Flops and Their Applications	2	4	1. Preview the principles and applications of corresponding components, and complete the design of experimental tables as required. (1 Self-Study Hour); 2. Complete circuit connection on the digital circuit experiment box, conduct functional tests of various flip-flops, record observed phenomena in self-designed tables, and complete functional conversion tests of flip-flops. (2 Contact Hours); 3. Submit an experimental report, including experimental purposes and requirements, experimental principles, experimental instruments and equipment, experimental content, pre-experimental requirements,	1. Pre-class document inspection: Submit the introduction of intended components, draw experimental tables, and logic circuit diagrams for flip-flop functional conversion before class; 2. On-site acceptance of experimental results; 3. Evaluation of experimental reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				designed circuit diagrams, and experimental analysis. (1 Self-Study Hour).	
3. Experiment 3 (Comprehensive)	Counters and Their Applications	3	6	1. Preview the principles and applications of corresponding components, and complete the scheme design as required. (2.5 Self-Study Hours); 2. Complete circuit connection and practical debugging on the digital circuit experiment box. (2.5 Contact Hours); 3. Submit an experimental report, including experimental purposes and requirements, experimental principles, experimental instruments and equipment, experimental content, pre-experimental requirements, designed circuit diagrams, and experimental analysis. (1 Self-Study Hour).	1. Pre-class document inspection: Submit the design process, introduction of intended components, and draw the designed logic circuit diagram before class; 2. On-site acceptance of experimental results; 3. Evaluation of experimental reports.
(Practical Teaching) Subtotal		8	16		
Total		56	69	Total Class Hours = 125 hours	
Credit points (ECTS)		4.2			

Signals and Systems

Competence field	Engineering basics
Curriculum designation	Signals and Systems
Curriculum code	9061313041
Semester(s) in which the curriculum is taught	4th Semester
Person responsible for the curriculum	Fei He
Lecturer	Fei He, Zhengchun Zhao, Yaqi Deng, Lin Lin
Language	Chinese
The relationship between the curriculum and the major	"Signals and Systems" is a core foundational course for majors such as Electronics, Electrical Engineering, Automation, Measurement & Control Technology, and related fields. It builds upon prerequisite courses including Advanced Mathematics, Engineering Mathematics, Linear Algebra, and Circuit Analysis. Teaching Objectives: Develop an initial understanding of establishing mathematical models for signals and systems, and mastering analytical methods to solve these models in the time domain or frequency domain. Interpret the physical significance of analytical results and cultivate the ability to analyze and design solutions for problems related to signal processing and basic communication theories. Lay a solid foundation for subsequent courses in communication, control, information processing, and the engineering application of signal processing technologies.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Method: Theoretical Teaching + Experiments Teaching hours (Contact hours): 64 hours Including: Theoretical Teaching: 48 hours Experiment/Practice Teaching: 16 Hours Class Size: 4 classes with approximately 160 students
Workload	Total Workload = 132 hours Contact Hours = 64 hours Self-Study Hours = 68 hours
Credit points (ECTS)	4.4
Requirements according to the examination regulations	Only students with an attendance rate of over two-thirds and a homework completion rate of over two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics, Engineering Mathematics, Linear Algebra, Complex Analysis, Fundamentals of Circuit Analysis, MATLAB and System Simulation

Curriculum objectives /Expected learning outcomes	**Learning Outcomes:** Through the implementation of teaching, discussion, experiment, and other teaching links in this course, students will achieve the following objectives: **Knowledge:** 1. Master basic signals and their fundamental operations, grasp the methods of Laplace transform and Z-transform for signals, and be able to describe Linear Time-Invariant (LTI) systems in engineering problems using mathematical equations and block diagrams. 2. Understand the basic theories and methods of continuous-time and discrete-time invariant systems in the time domain, S-domain, and Z-domain; be capable of establishing mathematical models of systems in these domains, solving system responses through the models, and analyzing system characteristics. 3. Master the calculation methods of Fourier transform for continuous and discrete signals, comprehend the purpose of converting time-domain signals to frequency-domain signals, and be able to analyze signal spectra. **Skills:** 1. Master the theories and methods of system frequency-domain analysis, conduct frequency-domain analysis and related calculations for systems. 2. Establish models for key links in signal processing (such as sampling and filtering), and analyze the impacts of key parameters (such as sampling frequency and bandwidth). **Ability :** 1. Proficiency in using MATLAB for time-domain and frequency-domain simulation experiments and analysis of signals and systems. 2. Ability to design simulation experimental schemes and programs, record, analyze, and interpret data, draw valid conclusions, and write experimental reports.
Contents	**Theoretical Teaching (48 Contact Hours, 60 Self-Study Hours)** Chapter 1: Basic Concepts of Signals and Systems (6 Contact Hours, 5.5 Self-Study Hours) Basic concepts and classification of signals and systems; operations on signals; Definitions and properties of step functions and impulse functions; Linear time-invariance (LTI) and causality/stability; mathematical models and block diagrams of LTI systems. Chapter 2: Time-Domain Analysis of Continuous-Time Systems (6 Contact Hours, 6.5 Self-Study Hours) Establishment and classical solution of differential equations; state

	transition from 0^- to 0^+; Zero-input response and zero-state response; Impulse response and step response; Convolution integral and its properties. Chapter 3: Time-Domain Analysis of Discrete-Time Systems (6 Contact Hours, 3.5 Self-Study Hours) Classical solution of difference equations; Zero-input response and zero-state response; Unit impulse response; convolution sum and its properties. Chapter 4: Fourier Transform and Frequency-Domain Analysis of Systems (10 Contact Hours, 12 Self-Study Hours) Decomposition of periodic signals into trigonometric series and exponential series; Frequency spectrum of periodic signals; Fourier transform of aperiodic signals; Properties of Fourier transform; Fourier transform of periodic signals; sampling theorem; Distortionless transmission; response of ideal low-pass filters; Modulation and demodulation; recovery of sampled signals. Chapter 5: S-Domain Analysis of Continuous-Time Systems (8 Contact Hours, 8.5 Self-Study Hours) Laplace transform and its basic properties; Inverse Laplace transform; S-domain analysis of continuous-time systems and S-domain models of circuits. Chapter 6: Z-Domain Analysis of Discrete-Time Systems (8 Contact Hours, 8.5 Self-Study Hours) Definition and basic properties of Z-transform; Inverse Z-transform; Z-domain analysis of discrete-time systems. Chapter 7: System Function (4 Contact Hours, 3.5 Self-Study Hours) System function and system characteristics; Signal flow graphs and system structures. **Experimental Teaching (16 Contact Hours, 8 Self-Study Hours)** Experiment 1: Representation and Operation of Continuous/Discrete-Time Signals; Time-Domain Analysis of Continuous-Time LTI Systems (4 Contact Hours, 2 Self-Study Hours)

	Experimental Content: Program to implement common signals and their operations; calculate continuous linear convolution; solve zero-state response, impulse response, and step response of continuous systems. Experiment 2: Frequency Characteristics and Frequency-Domain Analysis of Continuous-Time LTI Systems (4 Contact Hours, 2 Self-Study Hours) Experimental Content: Program to calculate Fourier coefficients of periodic signals and Fourier transform of aperiodic signals; solve frequency response of continuous systems; implement amplitude modulation of signals using properties of Fourier transform. Experiment 3: Laplace Transform (LT) and Complex Frequency-Domain Analysis of Continuous-Time LTI Systems (4 Contact Hours, 2 Self-Study Hours) Experimental Content: Program to implement Laplace transform and its properties; solve inverse Laplace transform; calculate complex-frequency domain system functions and plot their frequency spectra; analyze complex-frequency domain characteristics of continuous systems based on zero-pole distribution of system functions. Experiment 4: Z-Transform and Z-Domain Analysis of Discrete-Time Systems (4 Contact Hours, 2 Self-Study Hours) Experimental Content: Program to solve zero-state response, convolution sum, unit sequence response, and unit step sequence response of discrete-time LTI systems; implement Z-transform and inverse Z-transform of sequences; analyze relationships between zero-pole distribution of system functions, system time-domain characteristics, and system stability.
Study and examination requirements and forms of examination	1. Attendance (10%): Meet the basic course requirements (no lateness, no early departure, no unexcused absence). 2. Course Assignments (30%): Including experimental reports. 3. Final Assessment (60%): Closed-book final examination.
Media employed	Multimedia computers, projectors, laser pointers, MATLAB software

Reading list	1. Textbooks [1] D. Wu, et al., Analysis of Signals and Linear Systems (5th Edition). Beijing: Higher Education Press, 2019. 2. Reference book [1] J. Zheng, W. Yang, Q. Ying, et al., Signals and Systems. Beijing: Higher Education Press, 2008. [2] A. Oppenheim, A. Willsky, Signals & Systems (English Photocopy Edition). Beijing: Tsinghua University Press, 2015. [3] S. Wang, Y. Zhang, B. Guo, et al., Study Guide and Exercise Solutions for Analysis of Signals and Linear Systems (4th Edition). Beijing: Higher Education Press, 2022.

"Signals and Systems" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Basic Concepts of Signals and Systems	1. Basic concepts and classification of signals and systems; operations on signals; 2. Definitions and properties of step functions and impulse functions; 3. Linear time-invariance (LTI) and causality/stability; mathematical models and block diagrams of LTI systems.	6	5.5	1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (3 Self-Study Hours); 2. After-class assignments: Calculations: Operations on signals; definitions and properties of impulse functions. (1 Self-Study Hour); Judgments: Linear time-invariance and system causality/stability. (0.5 Self-Study Hours); Diagram drawing: Draw block diagrams based on mathematical models of LTI systems. (1 Self-Study Hour).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Assignment correction: Grade homework exercises for this chapter; 3. Chapter quiz: Conduct a mini-quiz on operations on signals, definitions and properties of impulse functions, characteristics of linear time-invariance, and LTI system models upon completion of this chapter.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Time-Domain Analysis of Continuous-Time Systems	1. Establishment and classical solution of differential equations; state transition from 0^- to 0^+; 2. Zero-input response and zero-state response; 3. Impulse response and step response; 4. Convolution integral and its properties.	6	6.5	1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (3.5 Self-Study Hours); After-class assignments: 2. Calculations: Classical solution of differential equations; solution of zero-input response and zero-state response; solution of impulse response; solution of zero-state response using convolution integral. (3 Self-Study Hours).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Assignment correction: Grade homework exercises for this chapter; 3. Chapter quiz: Conduct a mini-quiz upon completion of this chapter, covering the establishment and classical solution of second-order differential equations, concepts and solutions of zero-input response and zero-state response for continuous-time LTI systems, definition and solution of impulse response, and calculation of zero-state response via convolution integral as well as the application of its properties.
3. Time-Domain Analysis of Discrete-Time Systems	1. Classical solution of difference equations; 2. Zero-input response and zero-state response; 3. Unit impulse response; convolution sum and its properties.	6	3.5	1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (2 Self-Study Hours); 2. After-class assignments: Calculations: Classical solution of difference equations; solution of zero-input response and zero-state response; solution of unit impulse response; solution of zero-state response using convolution sum. (1.5 Self-Study Hours).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Assignment correction: Grade homework exercises for this chapter; 3. Chapter quiz: Conduct a mini-quiz upon completion of this chapter, covering the establishment and classical solution of second-order difference equations, concepts and solutions of zero-input

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
					response and zero-state response for discrete-time LTI systems, definition and solution of unit sequence response, and calculation of zero-state response via convolution sum as well as the application of its properties.
4. Fourier Transform and Frequency-Domain Analysis of Systems	1. Decomposition of periodic signals into trigonometric series and exponential series; 2. Frequency spectrum of periodic signals; Fourier transform of aperiodic signals; 3. Properties of Fourier transform; 4. Fourier transform of periodic signals; sampling theorem; 5. Distortionless transmission; response of ideal low-pass filters; 6. Modulation and demodulation; recovery of	10	12	1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (6 Self-Study Hours); 2. After-class assignments: Calculations: Decompose periodic signals into trigonometric and exponential series; perform Fourier transform and spectral analysis for aperiodic signals; calculate the response of ideal low-pass filters. (4 Self-Study Hours); Judgments: Identify distortionless transmission systems; determine the conditions for recovery of sampled signals. (2 Self-Study Hours).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Assignment correction: Grade homework exercises for this chapter; 3. Chapter quiz: Conduct a mini-quiz upon completion of this chapter, covering the physical significance of Fourier series decomposition of periodic signals, Fourier transform and its properties for aperiodic signals, as well as frequency-domain analysis of continuous-time systems such as distortionless transmission systems and ideal low-pass filters.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	sampled signals.				
5. S-Domain Analysis of Continuous-Time Systems	1. Laplace transform (LT) and its basic properties; 2. Inverse Laplace transform ($L^{-1}T$); 3. S-domain analysis of continuous-time systems and S-domain models of circuits.	8	8.5	1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (3.5 Self-Study Hours); 2. After-class assignments: Calculations: Flexibly apply Laplace transform and its properties to perform complex-domain transformation of continuous-time signals; conduct S-domain analysis of continuous-time systems using Laplace transform and inverse Laplace transform. (4 Self-Study Hours); Diagram drawing: Draw S-domain block diagrams of continuous-time systems and conduct analysis. (1 Self-Study Hour).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Assignment correction: Grade homework exercises for this chapter; 3. Chapter quiz: Conduct a mini-quiz upon completion of this chapter, covering Laplace transform and its basic properties, inverse Laplace transform, and S-domain analysis of continuous-time systems.
6. Z-Domain Analysis of Discrete-Time Systems	Definition and basic properties of Z-transform (ZT); Inverse Z-transform ($Z^{-1}T$); Z-domain analysis of discrete-time systems.	8	8.5	1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (3.5 Self-Study Hours); 2. After-class assignments: Calculations & Analysis: Flexibly apply Z-transform and its properties to perform Z-domain transformation of discrete-time signals; conduct Z-domain analysis of discrete-time systems using Z-transform (ZT)	1. YUKETANG Platform: Automatically record video viewing progress; 2. Assignment correction: Grade homework exercises for this chapter; 3. Chapter quiz: Conduct a mini-quiz upon completion of this chapter, covering the definition and basic properties of Z-transform, inverse Z-transform, and

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				and inverse Z-transform ($Z^{-1}T$). (4 Self-Study Hours); Diagram Drawing: Draw Z-domain block diagrams of discrete-time systems and conduct analysis. (1 Self-Study Hour).	Z-domain analysis of discrete-time systems.
7. System Function	1. System function and system characteristics; 2. Signal flow graphs and system structures.	4	3.5	1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (2 Self-Study Hours); 2. After-class assignments: Analysis & Judgment: Analyze system characteristics (e.g., system causality and stability) based on the system function. (1.5 Self-Study Hours).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Assignment correction: Grade homework exercises for this chapter; 3. Chapter quiz: Conduct a mock quiz covering the entire semester's learning content upon completion of this chapter.
8. Final Examination	Student Review for Exams	0	12	1. Review key knowledge points and consolidate difficult concepts; 2. Review in-class experiments and related practice content.	1. Form study groups for peer supervision: Group members agree on daily study schedules and tasks with each other, establish WeChat groups, and check in daily for record-keeping. 2. Instructor supervision: Set fixed offline or online consultation hours. Assess the overall review progress of the class based on the frequency and depth of students' questions.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
					3. Counselor supervision: Visit students' dormitories during the review week to supervise and inspect their review progress.
(Theoretical Teaching) Subtotal		48	60		
Practical Teaching					
1. Experiment 1 (Verification-Oriented)	1. Representation and Operation of Continuous/Discrete-Time Signals 2. Time-Domain Analysis of LTI Systems	4	2	Implementation Method: MATLAB Programming Experimental Content: 1. Common signals and their operations; 2. Calculation of continuous linear convolution and discrete convolution sum; 3. Solution of zero-state response, impulse response, and step response of continuous-time LTI systems; 4. Solution of zero-state response, unit sequence response, and unit step sequence response of discrete-time LTI systems.	1. Pre-class document inspection: MATLAB simulation programs for signals and their operations, zero-state response/impulse response of continuous systems, and zero-state response/unit sequence response/unit step sequence response of discrete systems; 2. On-site acceptance of experimental results; 3. Evaluation of experimental reports.
2. Experiment 2 (Design-Oriented)	Frequency Characteristics and Frequency-Domain Analysis of Continuous-Time LTI	4	2	Implementation Method: MATLAB Programming Experimental Content: 1. Calculation method of Fourier coefficients	1. Pre-class document inspection: Submit the introduction of intended components, draw experimental tables, and logic circuit diagrams for flip-flop functional

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	Systems			for periodic signals; 2. Fourier transform of aperiodic signals and its calculation method; 3. Solution method of frequency response for continuous systems; 4. Application of Fourier transform properties to implement amplitude modulation of signals.	conversion before class; 1. Pre-class document inspection: MATLAB simulation programs for Fourier transform and its calculation, as well as frequency response of continuous systems; 2. On-site acceptance of experimental results; 3. Evaluation of experimental reports.
3. Experiment 3 (Design-Oriented)	Laplace Transform (LT) and Complex Frequency-Domain Analysis of Continuous-Time LTI Systems	4	2	1. Operational methods and properties of Laplace transform; 2. Solution of inverse Laplace transform; proficiently solve complex-frequency domain system functions and plot their frequency spectra; 3. Analyze complex-frequency domain characteristics of continuous-time systems using the zero-pole distribution of complex-frequency domain system functions.	1. Pre-class document inspection: MATLAB simulation programs for Laplace transform and inverse Laplace transform operations, complex-frequency domain system functions and their frequency spectra, as well as zero-pole distribution; 2. On-site acceptance of experimental results; 3. Evaluation of experimental reports.
4. Experiment 4 (Comprehensive)	Z-Transform and Z-Domain Analysis of Discrete-Time Systems	4	2	Implemented via MATLAB programming: 1. Methods for Z-transform and inverse Z-transform of sequences; 2. Relationships between the zero-pole distribution of system functions, system	1. Pre-class Document Inspection: MATLAB simulation programs for Z-transform, inverse Z-transform of sequences, and zero-pole distribution of system functions;

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				time-domain characteristics, and system stability.	2. On-site Acceptance of Project Achievements; 3. Project Report Evaluation.
(Practical Teaching) Subtotal		16	8		
Total		64	68	Total Class Hours = 132 hours	
Credit points (ECTS)		4.4			

Communication Fundamentals

Competence field	Engineering basics
Curriculum designation	Communication Fundamentals
Curriculum code	9062313021
Semester(s) in which the curriculum is taught	6th Semester
Person responsible for the curriculum	Yangbao Deng
Lecturer	Yangbao Deng, Hai Hu
Language	Chinese
The relationship between the curriculum and the major	"Communication Fundamentals" is one of the engineering application courses for the major of Electronic Information Engineering. This course mainly teaches the basic concepts, fundamental theories, and typical technologies of information transmission. By elaborating on the working principles of communication systems, the impact of noise on communication systems, and the analysis of wired and wireless communication systems, students will systematically understand and master the relevant theories, implementation technologies, and design ideas of modern communication. The course requires students to grasp the principles of communication in depth and systematically. Additionally, through experiments, students will gain an understanding of the basic concepts, fundamental principles, core viewpoints, and essential methods of communication principles. This course effectively enhances students' professional literacy and competitiveness, laying a solid foundation for their future career development in the field of Electronic Information Engineering.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Method: Theoretical Teaching + Experiments Teaching hours (Contact hours): 56 hours Including: Theoretical Teaching: 40 hours Experiment/Practice Teaching: 16 Hours Class Size: 4 classes with approximately 160 students
Workload	Total Workload = 128 hours Contact Hours = 56 hours Self-Study Hours = 72 hours
Credit points (ECTS)	4.3
Requirements according to the examination regulations	Only students with an attendance rate of over two-thirds and a homework completion rate of over two-thirds are eligible to take the exam.

Prerequisite curriculum	Advanced Mathematics, Circuit Analysis, Analog Electronics Technology, Digital Electronics Technology
Curriculum objectives /Expected learning outcomes	**Learning Outcomes:** The main task of this course is to enable students to deeply understand the principles of communication and master the working principles of communication systems, as well as the relevant theories, implementation technologies, and design ideas of modern communication. Specific objectives include: **Knowledge:** 1. Grasp the working principles of communication systems; familiarize yourself with the basic concepts, fundamental theories, and typical modulation/demodulation technologies of information transmission, including deterministic signals, random processes, channels, etc. 2. Understand the impact of noise on communication systems; be familiar with noise analysis and comparison of anti-noise performance under various communication systems. 3. Comprehend the analysis of wired and wireless communication systems; master the relevant theories, implementation technologies, and design ideas of each communication system, such as analog modulation systems (AM, DSB, SSB, VSB), digital bandpass transmission systems (2ASK, 2FSK, 2PSK/DPSK), and source coding (PCM, DPCM, ΔM), etc. **Skills:** 1. Learn to configure functional modules and set jumpers of communication experiment boxes; be proficient in detecting and debugging signals of various communication systems using oscilloscopes. 2. Understand the working principles and circuit composition of each communication system, as well as the principles and implementation methods of signal modulation and demodulation. 3. Understand the generation methods of carrier frequency signals and the working processes of various communication systems. **Ability:** 1. Be able to apply communication principles and technologies to conduct systematic demand analysis, scheme design, and implementation for specific requirements. 2. Possess the ability to debug and optimize communication systems, and effectively solve various problems arising during system operation. 3. Be able to combine practical application scenarios, apply innovative thinking to design and implement innovative communication application systems, so as to improve system performance and reliability.

Contents	**Theoretical Teaching (40 Contact Hours, 62 Self-Study Hours)** Chapter 1: Introduction (2 Contact Hours, 2 Self-Study Hours) Basic concepts, system models, and classification of communication; Information and its measurement; Main performance indicators of communication systems. Chapter 2: Deterministic Signals (2 Contact Hours, 4 Self-Study Hours) Types of deterministic signals; Frequency-domain properties of deterministic signals; Time-domain properties of deterministic signals. Chapter 3: Random Processes (6 Contact Hours, 8 Self-Study Hours) Basic concepts of random processes; stationary random processes and their transmission through LTI systems; Gaussian random processes; Narrowband random processes; Gaussian white noise. Chapter 4: Channels (2 Contact Hours, 4 Self-Study Hours) Classification of channels; Mathematical models of channels; Channel characteristics and channel capacity. Chapter 5: Analog Modulation Systems (6 Contact Hours, 8 Self-Study Hours) AM, DSB, SSB, VSB; Anti-noise performance analysis of linear modulation systems; FM, PM; Anti-noise performance analysis of frequency modulation systems. Chapter 6: Digital Baseband Transmission Systems (8 Contact Hours, 8 Self-Study Hours) Digital baseband signals and their spectral characteristics; common codes for baseband transmission; Transmission of digital baseband signals and intersymbol interference; Baseband transmission characteristics without intersymbol interference; anti-noise performance analysis of baseband transmission systems; Partial response systems; time-domain equalization. Chapter 7: Digital Bandpass Transmission Systems (6 Contact Hours, 8 Self-Study Hours)

	Modulation principles of 2ASK, 2FSK, 2PSK, and 2DPSK; Anti-noise performance and performance comparison of 2ASK, 2FSK, 2PSK, and 2DPSK; Modulation principles and anti-noise performance of MASK, MFSK, MPSK, and MDPSK. Chapter 8: Source Coding (8 Contact Hours, 8 Self-Study Hours) Sampling of analog signals; analog pulse modulation; Uniform quantization; non-uniform quantization; PCM, DPCM, ΔM. **Experimental Teaching (16 Contact Hours, 10 Self-Study Hours)** Experiment 1: 2ASK and 2FSK Modulation & Demodulation (6 Contact Hours, 3 Self-Study Hours) Experimental Content: Familiarize yourself with digital bandpass transmission systems and the modulation/demodulation principles of 2ASK and 2FSK. Understand the functional module configuration and jumper settings of 2ASK and 2FSK; proficiently use oscilloscopes to detect and debug 2ASK and 2FSK signal waveforms. Through the experiment, comprehend the working principles and circuit composition of 2ASK and 2FSK modulation, as well as the principles and implementation methods of 2ASK and 2FSK demodulation using phase-locked loops (PLL). Experiment 2: 2PSK (2DPSK) Modulation & Demodulation (6 Contact Hours, 4 Self-Study Hours) Experimental Content: Familiarize yourself with digital bandpass transmission systems and the modulation/demodulation principles of 2PSK and 2DPSK. Understand the functional module configuration and jumper settings of 2PSK and 2DPSK; proficiently use oscilloscopes to detect and debug 2PSK and 2DPSK signal waveforms. Through the experiment, comprehend the working principles and circuit composition of binary PSK (DPSK) modulation and demodulation, understand the generation methods of carrier frequency signals, and master the conversion methods between binary absolute codes and relative codes. Experiment 3: Pulse Code Modulation (PCM) (4 Contact Hours, 3 Self-Study Hours) Experimental Content: Familiarize yourself with source coding and the principles of Pulse Code Modulation (PCM). Understand the functional module configuration and jumper settings of PCM; proficiently use oscilloscopes to detect and debug PCM signal waveforms. Through the experiment, deepen the understanding of

	the PCM encoding process, familiarize yourself with the functions and usage methods of dedicated PCM encoding and decoding integrated chips, and understand the working process of PCM systems.
Study and examination requirements and forms of examination	1. Attendance (10%): Meet the basic course requirements (no lateness, no early departure, no unexcused absence). 2. Course Assignments (30%): Including experimental reports. 3. Final Assessment (60%): Closed-book final examination.
Media employed	Multimedia computers, projectors, laser pointers, blackboards, chalk, Principles of Communication experiment boxes, oscilloscopes
Reading list	1. Textbooks [1] C. Fan, L. Cao, Principles of Communication (7th Edition). Beijing: National Defense Industry Press, 2012. 2. Reference book [1] T. Song, et al., Principles of Communication. Beijing: Posts & Telecommunications Press, 2023. 3. Teaching Website https://www.icourse163.org/course/XIDIAN-1449262162

"Communication Fundamentals" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Introduction	1. Basic concepts, system models, and classification of communication; 2. Information and its measurement; 3. Main performance indicators of communication systems.	2	2	Pre-Class Preparation & After-Class Tasks: 1. After-class assignment: Complete exercises on information and its measurement. (2 Self-Study Hours)	Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Deterministic Signals	1. Types of deterministic signals; 2. Frequency-domain properties of deterministic signals; 3. Time-domain properties of deterministic signals.	2	4	1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (2 Self-Study Hours); 2. After-class assignment: Complete exercises on energy signals and power signals. (2 Self-Study Hours).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Exercise correction.
3. Random Processes	1. Basic concepts of random processes; stationary random processes and their transmission through LTI systems; 2. Gaussian random processes; 3. Narrowband random processes; 4. Gaussian white noise.	6	8	Pre-Class Preparation & After-Class Tasks: 1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (4 Self-Study Hours); 2. After-class assignment: Complete exercises on random processes. (4 Self-Study Hours).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Exercise correction; 3. In-class random quiz: Verify review effectiveness.
4. Channels	1. Classification of channels; 2. Mathematical models of channels; 3. Channel characteristics and channel capacity.	2	4	Pre-Class Preparation & After-Class Tasks: 1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (2 Self-Study Hours); 2. After-class assignment: Complete exercises on channels (discrete channels and continuous channels). (2 Self-Study Hours).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
5. Analog Modulation Systems	1. AM, DSB, SSB, VSB; 2. Anti-noise performance analysis of linear modulation systems; 3. FM, PM; 4. Anti-noise performance analysis of frequency modulation systems.	6	8	Pre-Class Preparation & After-Class Tasks: 1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (3.5 Self-Study Hours); 2. After-class assignment: Complete exercises on analog modulation systems. (4 Self-Study Hours); 3. Experiment preparation: Understand and master the experimental content and procedures of analog modulation systems. (0.5 Self-Study Hours).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Exercise correction; 3. In-class random quiz: Verify review effectiveness.
6. Digital Baseband Transmission Systems	1. Digital baseband signals and their spectral characteristics; common codes for baseband transmission; 2. Transmission of digital baseband signals and intersymbol interference; 3. Baseband transmission characteristics without intersymbol interference; anti-noise performance analysis of baseband transmission systems; 4. Partial response systems; time-domain equalization.	8	8	Pre-Class Preparation & After-Class Tasks: 1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (4 Self-Study Hours); 2. After-class assignment: Complete exercises on digital baseband transmission systems. (4 Self-Study Hours).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Exercise correction; 3. In-class random quiz: Verify review effectiveness.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
7. Digital Bandpass Transmission Systems	1. Modulation principles of 2ASK, 2FSK, 2PSK, and 2DPSK; 2. Anti-noise performance and performance comparison of 2ASK, 2FSK, 2PSK, and 2DPSK; 3. Modulation principles and anti-noise performance of MASK, MFSK, MPSK, and MDPSK.	6	8	Pre-Class Preparation & After-Class Tasks: 1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (3.5 Self-Study Hours); 2. After-class assignment: Complete exercises on digital bandpass transmission systems. (4 Self-Study Hours); 3. Experiment preparation: Understand and master the experimental content and procedures of digital bandpass transmission systems. (0.5 Self-Study Hours).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Exercise correction; 3. In-class random quiz: Verify review effectiveness.
8. Source Coding	1. Sampling of analog signals; analog pulse modulation; 2. Uniform quantization; non-uniform quantization; 3. PCM, DPCM, ΔM.	8	8	Pre-Class Preparation & After-Class Tasks: 1. Pre-class preview: Watch microlecture videos on YUKETANG and preview lecture PPTs. (3.5 Self-Study Hours); 2. After-class assignment: Complete exercises on source coding. (4 Self-Study Hours); 3. Experiment preparation: Understand and master the experimental content and procedures of source coding (PCM) experiments. (0.5 Self-Study Hours).	1. YUKETANG Platform: Automatically record video viewing progress; 2. Exercise correction; 3. In-class random quiz: Verify review effectiveness.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
9. Final Examination	Student Review & Exam Preparation	0	12	1. Review key knowledge points and consolidate difficult concepts; 2. Review in-class experiments and related practice content.	1. Form study groups for peer supervision: Group members agree on daily study schedules and tasks with each other, establish WeChat groups, and check in daily for record-keeping. 2. Instructor supervision: Set fixed offline or online consultation hours. Assess the overall review progress of the class based on the frequency and depth of students' questions. 3. Counselor supervision: Visit students' dormitories during the review week to supervise and inspect their review progress.
(Theoretical Teaching) Subtotal		40	62		
Practical Teaching					
1. Experiment 1 (Verification-Oriente	2ASK and 2FSK Modulation & Demodulation	6	3	Pre-Experiment Preparation & Experimental Tasks: 1. Familiarize with digital bandpass transmission	1. On-site acceptance of experimental results;

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
d)				systems and the modulation/demodulation principles of 2ASK and 2FSK. (1 Hour) 2. Understand the functional module configuration and jumper settings of 2ASK and 2FSK; proficiently use an oscilloscope for detecting and debugging 2ASK and 2FSK signal waveforms. (1 Hour) 3. Through the experiment, comprehend the working principles and circuit composition of 2ASK and 2FSK modulation, as well as the principles and implementation methods of 2ASK and 2FSK demodulation using a phase-locked loop (PLL). (1 Hour)	2. Evaluation of experimental reports.
2. Experiment 2 (Verification-Oriented)	2PSK (2DPSK) Modulation & Demodulation	6	4	Pre-Experiment Preparation & Experimental Tasks: Familiarize with digital bandpass transmission systems and the modulation/demodulation principles of 2PSK and 2DPSK. (1 Hour) Understand the functional module configuration and jumper settings of 2PSK and 2DPSK; proficiently use an oscilloscope for detecting and debugging 2PSK and 2DPSK signal waveforms. (1 Hour) Through the experiment, comprehend the working principles and circuit composition of binary PSK (DPSK) modulation and demodulation, understand the generation methods of carrier frequency signals,	1. On-site acceptance of experimental results; 2. Evaluation of experimental reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				and master the conversion methods between binary absolute codes and relative codes. (2 Hours)	
3. Experiment 3 (Verification-Oriented)	Pulse Code Modulation (PCM)	4	3	Pre-Experiment Preparation & Experimental Tasks: 1. Familiarize with source coding and the principles of Pulse Code Modulation (PCM). (1 Hour) 2. Understand the functional module configuration and jumper settings of PCM; proficiently use an oscilloscope for detecting and debugging PCM signal waveforms. (1 Hour) 3. Through the experiment, deepen the understanding of the PCM encoding process, familiarize with the functions and usage methods of dedicated PCM encoding and decoding integrated chips, and understand the working process of PCM systems. (1 Hour)	1. On-site acceptance of experimental results; 2. Evaluation of experimental reports.
(Practical Teaching) Subtotal		16	10		
Total		56	72	Total Class Hours = 128 hours	
Credit points (ECTS)		4.3			

Module Descriptions - Engineering application

PCB Design and Drawing

Competence field	Engineering application
Curriculum designation	PCB Design and Drawing
Curriculum code	9061312010
Semester(s) in which the curriculum is taught	5th Semester
Person responsible for the curriculum	Wenguo Li
Lecturer	Jinlin Peng
Language	Chinese
The relationship between the curriculum and the major	"PCB Design and Drawing" is a discipline foundation course for the electronic information Engineering major. Through this course, students can master the basic knowledge and skills of circuit design and printed circuit board manufacturing, understand common circuit components and peripheral application circuits, understand the composition and manufacturing process of printed circuit boards, Learn the commonly used circuit design and board making software, master the basic usage methods and techniques of Altium Designer circuit design software, and lay the foundation for the design and application implementation of electronic systems.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + experiment Teaching hours (Contact hours): 32 hours Among them: Theoretical instruction: 16 class hours Laboratory/practical teaching: 16 hours Class size: Four classes with approximately 180 students
Workload	Total workload = 60 class hours; Contact hours = 32 hours; Self-study hours = 28 hours;
Credit points (ECTS)	2.0
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Circuit Analysis
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to master the fundamentals of PCB design, be proficient in using EDA tools for schematic drawing and PCB layout and routing, and have basic circuit analysis and debugging skills. The specific objectives include: **Knowledge:** 1. PCB Design Principles: Understand the fundamental principles of circuit board design, including the selection of layers, material

	properties, signal integrity analysis, etc. 2. EDA tool operation: Proficient in using electronic design automation software such as Altium Designer and Jialichuang for schematic design and PCB layout and routing. 3. Layout and routing rules: Understand and follow the layout and routing rules for PCB design, including considerations such as electromagnetic compatibility, thermal design, and signal integrity. **Skills:** 1. Learn to install software such as Altium Designer, configure the environment, debug, etc. 2. Choose the right EDA tools for schematic design and PCB layout and routing; 3. Build your own circuit board using equipment or online tools and solder it with the right components to get a terminal device that works properly. **Ability:** 1. Schematic drawing ability: Be able to accurately draw circuit schematics using EDA tools, including the placement of component symbols, the drawing of connection lines, and the checking of electrical rules. 2. PCB layout ability: Arrange component positions on the PCB according to circuit function and electrical requirements, optimize space utilization, and consider heat dissipation and electromagnetic interference issues. 3. Wiring skills: Proficient in PCB wiring, including the layout of signal lines, power lines, and ground lines, as well as handling special wiring requirements for high-speed signals and analog signals.
Contents	**Theoretical instruction (16 contact hours, 12 self-study hours)** Chapter 1: Overview and Preparatory Knowledge (2 contact hours, 2 self-study hours) 1. History and Development of PCB; 2. Installation and parameter configuration of Altium Designer software. Chapter 2: Drawing Circuit Diagrams (4 contact hours, 2 self-study hours) 1. Placing and removing components; 2 Edit component properties and locations; 3. Schematic Routing - Connections and network labels; 4. Placement and modification of other graphic elements; 5. Draw examples of circuit diagrams. Chapter 3: Creating a Schematic Component Library (2 contact hours, 2 self-study hours)

	1. Management of the schematic component library; 2. Create schematic components; 3. Calls and modifications to an existing library of schematic components. Chapter Four: PCB Design (4 Contact hours, 2 Self-study hours) 1. Basic knowledge of PCB; 2. Component layout; 3. Automatic routing versus manual routing; 4. PCB copper plating and tear drop filling; 5. Customize the shape of the PCB. Chapter 5: Creating a PCB Package Library (2 contact hours, 2 self-study hours) 1. Create a new component package; 2 Create a package library using existing packages; 3 Generate, replace package instances. Chapter 6: Drawing Schematics and PCBS using Jialichuang (2 contact hours, 2 self-study hours) 1. Draw a schematic diagram using a power bank power board as an example; 2. Draw the PCB diagram and properly position the components; 3. Make your circuit board using the free prototyping feature from Caltron. **Experimental teaching (16 contact hours, 16 self-study hours)** Experiment Item 1: AD software installation and simple circuit diagram drawing. (4 contact hours, 4 self-study hours) Experimental content: 1. Master the functions of AD software such as installation and environment configuration; 2. Master the drawing of more complex circuit schematics; 3. Master the use of traces, network labels, colored pens, and text. Experiment Item 2: Making and Distributing AD Component Libraries - taking CD4017 as an example. (4 contact hours, 4 self-study hours) Experiment Content: 1. Understand the schematic shapes of devices such as chips and the shapes of devices on PCBS, and master the drawing of more complex circuit schematics and PCBS; 2. Master the method of packaging devices (diagrams and PCBS); 3 Use bus ports in the schematic diagram and connect the

	components via the bus; 4. In the PCB, neatly arrange the components using alignment, etc. Experiment Item 3: Use Jialichuang to draw the circuit board schematic diagram and PCB and perform soldering. (4 contact hours, 4 self-study hours) Experiment Content: 1. Draw circuit board schematic diagrams and PCBS using Jialichuang; 2. Make circuit boards using the free prototyping feature of Jialichuang; 3. Solder the components correctly onto the PCB according to the circuit diagram. Experiment Item 4: Drawing Complex circuit Schematics and PCBS. (4 contact hours, 4 self-study hours) Experiment Content: 1. Use AD software to master how to draw the schematic diagram of a more complex circuit, and beautify the diagram to make it easy to read; 2. Position the devices accurately, connect them manually or automatically, and cut the board size precisely.
Study and examination requirements and forms of examination	1. Attendance rate (20%) : Basic course requirements (no lateness, no early departure, no unjustified absence). 2. Assignments (20%) : In-person experiments and experiment reports. 3. Final assessment (60%) : final exam.
Media employed	Multimedia computers, projectors, laser Pointers, Altium Designer software, Altium software, computer lab
Reading list	1. Textbooks [1] X. Sui, X. Liu, L. Shi. Altium Designer Schematic and PCB Design[M]. Beijing: Machinery Industry Press, September 2019. 2. Reference Books [1] Altium China Technical Support Center. Altium Designer 19 PCB Design Official Guide. Beijing:Tsinghua University Press, 2020. [2] China's MOOC. [Online]. Available: https://www.icourse163.org/course/JSIT-1206734803

“PCB Design and Drawing” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Overview and Preparatory knowledge	1. History and Development of PCB; 2. Installation and parameter configuration of Altium Designer software.	2	2	1. Homework: Installation and parameter configuration of the software. (2 class hours)	1. Students check each other to see if the relevant software is installed and the environment is set up on their computers.
2 Draw the circuit schematic diagram	1. Place and remove components; 2. Edit component properties and locations; 3. Schematic Routing - Connections and network labels; 4. Placement and modification of other graphic elements; 5. Draw examples of circuit diagrams.	4	2	1. Homework: Submit simple examples of circuit diagrams online. (2 class hours)	1. Exercise correction. 2. Quiz: Assign students to present their learning outcomes in front of the podium in the next class.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
3 Create a library of schematic components	1. Management of the schematic component library; 2. Create schematic components; 3. Invocation and modification of existing schematic component libraries.	2	2	1. Pre-class preview: Preview the lecture PPT. (1 class hour) 2. After-class assignment: Generate a schematic component library and distribute it to other students. (1 class hour)	1. Form study groups and supervise each other.
4. PCB design	1. Basic knowledge of PCB; 2. Component layout; 3. Automatic routing versus manual routing; 4. PCB copper plating and tear drop filling; 5. Customize the shape of the PCB.	4	2	1. Pre-class preview: Watch the MOOC video and preview the lecture PPT. (2 class hours)	1. The Rain Classroom platform automatically records video views. 2. Classroom random quizzes. 3. The Rain Classroom platform automatically records video views.
5 Create a PCB package library	1. Create a new component package; 2. Create a package library using existing packages; 3. Generate, replace package instances.	2	2	1. Pre-class preview: Watch the video recorded by the teacher and preview the teaching PPT. (2 class hours)	1. The Rain Classroom platform automatically records video views.
6 Draw schematics and PCBS using Jialichuang	1. Draw a schematic diagram using a power bank power board as an example; 2. Draw the PCB diagram and position the components appropriately; 3. Make the circuit board using the free prototyping feature of Jialichuang.	2	2	1. Install the Jialichuang EDA software and configure the environment while watching the introductory tutorial video. (2 class hours)	1. Form study groups and supervise each other. 2. The Rain Classroom platform automatically records video views.
(Theoretical teaching) Tips		16	12		

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical teaching					
1. Experiment One (Confirmatory)	AD software installation and simple circuit diagram drawing: 1. Master the installation, environment configuration and other functions of the AD software; 2. Master the drawing of more complex circuit schematics; 3. Master the use of traces, network labels, colored pens, and text.	4	4	1. Install the AD software and configure the environment; (1 class hour) 2. Draw the circuit diagram as required by the experiment. (2 class hours) 3 Submit the experiment report. (1 class hour)	1. Check the software before class; 2. On-site acceptance of experimental results; 3. Review of experimental reports; 4. On-site Q&A.
2. Experiment Two (Verification	Production and distribution of AD component libraries - taking CD4017 as an example: 1. Understand the schematic shape of devices such as chips and the shape of devices on PCBS, and master the drawing of more complex circuit schematics and PCBS; 2. Master the method of device (schematic and PCB) packaging; 3. Use bus ports and bus connections for components in the schematic diagram; 4. In the PCB, neatly arrange the components using alignment, etc.	4	4	1. Make and distribute the CD4017 component library. (1 class hour) 2. Draw the NE555+CD4017 circuit diagram as required by the experiment. (2 class hours) 3 Submit the experiment report. (1 class hour)	1. On-site acceptance of experimental results; 2. Review of experimental reports. 3. On-site Q&A.
3. Experiment 3 (Design)	Drawing circuit board schematics and PCBS using Jilichuang and soldering: 1. Use Jialichuang to draw circuit board schematic	4	4	1. Reproduce the schematic diagram and PCB according to the circuit board. (2 class hours)	1. Check the soldering effect of the device; 2. On-site acceptance of

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	diagrams and PCBS; 2. Make circuit boards using the free prototyping feature of Jialichuang; 3. Solder the components correctly onto the PCB according to the circuit diagram.			2. Solder the circuit board according to the circuit schematic diagram. (1 class hour) 3. Submit the experiment report. (1 class hour)	experimental results; 3. Review of experimental reports. 4. On-site Q&A.
4. Experiment Four (Comprehensive)	Complex circuit schematic and PCB drawing: 1. Use AD software to master how to draw the schematic of more complex circuits and beautify the diagram to make it easy to read; 2. Position the devices accurately, connect them manually or automatically, and cut the board size precisely.	4	4	1. Draw the schematic diagram and PCB of the complex circuit as required by the task book. (3 class hours) 2. Submit the experiment report. (1 class hour)	1. On-site acceptance of experimental results; 2. Review of experimental reports. 3. On-site Q&A.
(Practical Teaching) Tips		16	16		
Total		32	28	Total hours = 60 hours	
Credits (ECTS)		2			

C++ Programming Language

Competence field	Engineering application
Curriculum designation	C++ Programming Language
Curriculum code	9061312031
Semester(s) in which the curriculum is taught	2nd Semester
Person responsible for the curriculum	Wenguo Li
Lecturer	Jinlin Peng, Peng Zhong
Language	Chinese
The relationship between the curriculum and the major	"C++ Programming Language" is a compulsory professional course for electronic information engineering and artificial intelligence. It is an applied course that integrates knowledge of software technology, development tools, etc. Teaching Objectives of this course: Based on their existing professional knowledge, students will learn to understand the object-oriented programming ideas of the C++ language, learn and master the methods of procedural and object-oriented programming, be proficient in developing C++ applications based on classes and objects, and improve their practical ability in programming and development. It lays a solid foundation for the future use of advanced tools such as Python and Matlab.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + experiment Teaching hours (Contact hours): 48 hours Among them: Theoretical instruction: 32 class hours Laboratory/practical teaching: 16 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 105 class hours; Contact hours = 48 hours; Self-study hours = 57 hours;
Credit points (ECTS)	3.5
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	C Language Programming, Data Structure
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to enable students to gain an in-depth understanding of the principles and applications of object-oriented programming in C++ and master the design and development methods of C++ programs. The specific objectives include:

	Knowledge: 1 Master the basic syntax of C++ and the core concepts of object-oriented programming, including classes and objects, inheritance, polymorphism, and encapsulation; 2 Be familiar with common features in the C++ standard library, such as string processing, input/output streams, dynamic memory management, etc. 3 Understand advanced features in C++ such as templates, exception handling, the application of the STL standard template library, as well as the basics of API, MFC, and GUI. **Skills:** 1. Learn to write, compile, debug and run programs using the C++ Integrated Development Environment (IDE); 2 Be able to design and implement object-oriented programs based on C++, such as simple class design, object creation and management; 3 Master exception handling and debugging skills in C++ programs and be able to write robust and maintainable code. **Ability :** 1. Be capable of using object-oriented methodology to conduct systematic requirements analysis, solution design and implementation for specific requirements; 2. Have the ability to debug and optimize C++ programs, and be able to effectively solve various problems that arise during program execution; 3. Be capable of integrating practical application scenarios, applying innovative thinking, designing and implementing innovative C++ application systems to enhance the performance and reliability of the systems. 4. Be able to deeply understand advanced functions and applications of C++, such as multithreading programming, network programming, database connection, etc., and use these technologies to solve complex engineering problems and enhance the intelligence and automation level of the system.
Contents	**Theoretical instruction (32 contact hours, 30 self-study hours)** Chapter 1: Introduction to C++ (2 exposure hours, 3 self-study hours) 1. Learn about the development history, features and application areas of C++ 2. Master namespaces 3. Master console input/output 4. Master type enhancement in C++ 5. Master the default parameters

	6. Master function overloading 7. Master references 8. Master the string class 9. Master the new/delete operators 10. Understand forced type conversion. Chapter 2: Classes and Objects (5 contact hours, 4 self-study hours) 1. Understand the concept of object-oriented programming 2. Master the definition of classes and the creation of objects 3. Master the this pointer 4. Master the constructor 5. Master constructor overloading 6. Master the destructor 7. Master deep copy and shallow copy 8. Know the const keyword and the static keyword 9. Master friend functions and friend classes. Chapter 3: Operator Overloading (4 contact hours, 5 self-study hours) 1. Master the syntax and rules of operator overloading 2. Master the way operators are overloaded 3. Master input/output operator overloading 4. Master assignment operator overloading 5. Master subscript operator overloading 6. Understand type conversions. Chapter Four: Inheritance and Derivation (5 Contact hours, 2 Self-study hours) 1. The concept of inheritance and ways of inheritance 2. Type compatibility 3. Derived class constructors and destructors 4. Hide base class member functions in a derived class 5. Multiple inheritance methods 6. Inherit the constructor and destructor of a derived class 7. The ambiguity problem of multiple inheritance 8. Virtual inheritance. Chapter 5: Polymorphism and Virtual Functions (4 contact hours, 3 Self-study hours) 1. The concept of polymorphism 2. Virtual functions 3. Virtual functions implement polymorphism mechanisms 4. Virtual destructors

	5. Pure virtual functions 6. Abstract classes. Chapter 6: Template (3 Contact hours, 4 Self-study hours) 1. Master the concept of templates 2. Master the definition and instantiation of function templates 3. Master overloading of function templates 4. Master the definition and instantiation methods of class templates 5. Master module class template derivation 6. Master class templates and friend functions 7. Master the parameters of function templates 8. Master function template specialization. Chapter 7: STL Standard Template Library (4 contact hours, 3 Self-study hours) 1. Learn about the components of STL 2. Master the definition of sequence containers and related operations 3. Master the definition and related operations of associative containers 4. Understand how container adapters are used 5. Learn about the classification of iterators 6. Master common algorithms. Chapter 8: I/O Stream (3 Contact hours, 3 Self-study hours) 1. Learn about the I/O stream class library 2. Master the use of standard input and standard output streams 3. Master the creation of file stream objects 4. Master how to open and close files 5. Master the reading and writing of files 6. Master random reading and writing of files 7. Understand string streams. Chapter 9: Exceptions (2 contact hours, 3 self-study hours) 1. Learn how to handle exceptions 2. Understand stack unspinning 3. Understand standard exceptions 4. Understand static assertions **Experimental teaching (16 contact hours, 27 self-study hours)** Experiment Item 1: Verification Experiments of classes and Objects. (2 contact hours, 3 self-study hours)

	Experiment Content: Master the definitions of classes and objects, and be able to complete simple programming by calling member functions through objects. Experimental Item 2: Design Experiment on Operator Overloading. (2 contact hours, 3 self-study hours) Experiment Content: Master common operator overloading methods; Rules for overloading monocular and binocular operators; Operators are overloaded as member and friend functions of a class. Experiment Item 3: A Design Experiment on Inheritance and Polymorphism. (2 contact hours, 3 self-study hours) Experiment Content: Master how to write base classes and how to write derived classes by inheriting the properties and functions of the base class; How to call the member functions of the base class within the member functions of the derived class. Experiment Item 4: Design Experiments for File Manipulation (File Copy, File Write, and File Read). (2 contact hours, 4 self-study hours) Experiment Content: Master C++ file operation methods, master file reading and writing methods; C++ string clipping, insertion, and other functions. Experiment Item 5: A Comprehensive Experiment with a Simple Window (4 contact hours, 7 self-study hours) Experiment Content: Mastering the establishment of basic window programs; Master the way Pointers to class and object members are called. Experiment Item 6: Comprehensive Experiment - Design a Simple Parking Management System (including three modules: car information, general user, and administrator user). (4 contact hours, 7 self-study hours) Experiment Content: Comprehensive and in-depth mastery of the integrated application of classes and objects. Design classes for each module based on the functionality of the module as needed. Ordinary users can only view car information, and only administrator users can add, modify, and delete car information. Users and administrator users have the function to return to the main menu.

Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Homework (30%) : After-class assignments, lab reports. 3. Final assessment (60%) : final exam.
Media employed	Multimedia computers, projectors, laser Pointers, blackboards, chalk, PPT, Rain Classroom, CodeBlocks, Visual Studio and other software
Reading list	1. Textbooks [1] H. Tan, C++ Object-Oriented Programming, 4th ed., Beijing: Tsinghua University Press, 2023. 2. Reference book [1] R. Zhou, Fundamentals of C++ Programming, 6th ed., Beijing: Publishing House of Electronics Industry, 2021. [2] Dark Horse Programmers, Ed., C++ Programming Tutorial, 2nd ed., Beijing: Posts & Telecom Press, 2020. [3] S. B. Lippman, C++ Primer, Beijing: Posts & Telecom Press, 2006.

"C++ Programming Language" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Overview and Preparatory knowledge	Understand the features of the C++ language and the basic composition of C++ programs; Understand the way C++ programs are written; Master writing simple programs in C++.	2	0.5	1. Homework: Complete exercises on basic C++ programs. (0.5 class hours)	1. Exercise correction.
2.C++ functions	Recursion and Overloading functions, namespaces.	2	2	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (1 class hour) 2. Homework after class. (1 class hour)	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Test: Equip students with the ability to define and call functions, and use functions

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
					to achieve specified functions.
3. Arrays	Pointer arrays, dynamic storage vector classes, string classes	5	2	1. Pre-class preview: Watch the micro-lesson videos of Rain Classroom and preview the teaching PPT. (1 class hour) 2. Homework: Complete the corresponding exercises. (1 class hour)	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Random test answers in class: To test the effectiveness of review. 4. Master the usage of the new and delete statements 5. Get a preliminary understanding of how objects are called and master the relevant programming skills.
4. Bit operations and Structures	Bitwise operations; Structures and Linked Lists;	4	1.5	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (1 class hour) 2. Homework: Complete the relevant exercises. (0.5 class hours)	1. The Rain Classroom platform automatically records video views. 2. Exercise correction. 3. Master the principles and methods of bitwise operations and be able to implement them through programming. 4. Master the creation of C++ structures, understand the common properties of structures and the meaning of the "->" symbol.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
5. Classes and Objects	Class and object creation and invocation	3	4	1. Pre-class preview: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (2 class hours) 2. Homework after class: Complete relevant exercises. (0.5 class hours) 3 Reproduce and comment on code. (1 credit hour) 4 Understand the relationship between classes and objects, the similarities and differences between class and struct types, and master the creation and invocation methods of classes and objects. (0.5 class hours)	1. The Rain Classroom platform automatically records video views. 2. Exercise modification. 3. Code comment review: Randomly spot-check submitted after-class program code to assess the detail and accuracy of the comments.
	Constructors and destructors	3	5	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (2 class hours) 2. Homework: Complete the relevant exercises. (1 class hour) 3 Reproduction and commenting Code (1 credit hour) 4 Understand the characteristics of constructors and destructors, master the rules and programming methods of constructors and destructors (1 class hour)	1. The Rain Classroom platform automatically records video views. 2. Exercise modification. 3. Code comment review: Randomly spot-check submitted after-class program code to assess the detail and accuracy of the comments.
	Other members of the class	3	5	1. Pre-class preview: Watch the Rain Classroom micro-lesson video and preview the teaching PPT.	1. The Rain Classroom platform automatically records video views.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				(2 class hours) 2. Homework after class: Complete relevant exercises. (1 class hour) 3 Reproduction and commenting Code (1 credit hour) 4 Understand the meanings and usage of constant members, static members, and friends. (1 class hour)	2. Exercise modification. 3. Code comment review: Randomly spot-check submitted after-class program code to assess the detail and accuracy of the comments.
	Inclusion of classes	3	4.5	1. Pre-class preview: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (2 class hours) 2. Homework: Complete the relevant exercises. (0.5 class hours) 3 Reproduce and comment on code. (1 credit hour) 4 Master the order in which the constructors and destructors of object members and objects themselves are executed. (1 class hour)	1. The Rain Classroom platform automatically records video views. 2. Exercise modification. 3. Code comment review: Randomly spot-check submitted after-class program code to assess the detail and accuracy of the comments.
6. Inheritance	Relationships between classes: Base classes and derived classes	4	3.5	1. Pre-class preview: Watch the micro-lesson videos of Rain Classroom and preview the teaching PPT. (1.5 class hours) 2. After-class assignment: Complete exercises related to the extension. (1 class hour) 3. Master the principles of public and private inheritance, and understand the execution order of	1. The Rain Classroom platform automatically records video views. 2. Exercise modification. 3. Random test answers in class: To test the effectiveness of review.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				constructors and destructors of base classes and derived classes. (1 class hour)	
7. Examples of virtual functions and polymorphisms	Function templates and class templates Basic knowledge of file handling	3	2	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (1 class hour) 2. After-class assignment: Complete exercises related to the extension. (1 class hour)	1. Understand the basic uses of the template and the specific code lookup. 2. Understand the specific process of computer file manipulation.
(Theoretical Instruction) Tips		32	30		
Practical teaching					
1. Experiment One (Confirmatory)	Classes and Objects	4	6	Master the definitions of classes and objects and be able to do simple programming by calling member functions through objects	1. Pre-class file check; 2. On-site acceptance of experimental results; 3. Review of experimental reports.
2. Experiment Two (Design-oriented)	Operator overloading & file operations	4	6	1. Master common operator overloading methods; Rules for overloading monocular and binocular operators; Operators are overloaded as member and friend functions of a class. 2 Master C++ file manipulation methods, master	1. Pre-class file checks; 2. On-site acceptance of experimental results; 3. Review of experimental reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				file reading and writing methods; C++ string clipping, insertion, and other functions.	
3. Experiment 3 (Design)	Inheritance and polymorphism	4	6	Master how to write base classes and how to write derived classes by inheriting the properties and functions of the base class; How to call the member functions of the base class within the member functions of the derived class.	1. Pre-class file checks; 2. On-site acceptance of experimental results; 3. Review of experimental reports.
4. Experiment Four (Comprehensive)	Simple Window Calculator	4	9	1. Master the creation of basic window programs; Master the way Pointers to class and object members are called. 2. Submit a project summary report: including project background, design plan, implementation process, test results, etc.	1. Pre-class document review; 2. On-site acceptance of project outcomes; 3. Review of the project summary report.
(Practical Teaching) Small plan		16	27		
Total		48	57	Total hours = 105 hours	
Credits (ECTS)		3.5			

High Frequency Electronic Circuits

Competence field	Engineering application
Curriculum designation	High Frequency Electronic Circuits
Curriculum code	9061313051
Semester(s) in which the curriculum is taught	4th Semester
Person responsible for the curriculum	Jie Xiong
Lecturer	Jie Xiong
Language	Chinese
The relationship between the curriculum and the major	"High Frequency Electronic Circuits" is a compulsory course for the electronic information Engineering major and is a core professional foundation course. This course aims to study the analysis and design methods of high-frequency electronic circuits, enabling students to master the basic concepts of high-frequency electronic circuits; Master the structural form, circuit composition, working principle and performance index calculation of the basic unit circuits of high-frequency electronic circuits; Have the ability to read and analyze high-frequency electronic circuit diagrams, and be able to analyze the functions of general high-frequency electronic circuit schematic diagrams and estimate their performance indicators; Have the ability to select and design circuits, and be able to choose appropriate circuits based on functional requirements and design circuit parameters. After taking this course, students will have a complete understanding of communication systems and will be able to design, install and debug transmitter and receiver circuits in analog communication systems.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + experiment Teaching hours (Contact hours): 56 hours Among them: Theoretical instruction: 40 hours Laboratory/practical teaching: 16 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 142 class hours; Contact hours = 56 hours; Self-study hours = 86 hours;
Credit points (ECTS)	4.7
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics, Circuit Analysis, Analog Electronic Technology, Digital Signal Processing

Curriculum objectives /expected learning outcomes	**Learning outcomes:** The "High Frequency Electronic Circuits" course, through the study of the essential basic knowledge and key technologies in high-frequency electronic circuits and the completion of relevant experimental verification, enables students to understand and master the key knowledge of high-frequency electronic circuits and achieve the goal of cultivating students' relevant abilities in communication circuit design. The specific objectives include: **Knowledge:** 1. Master the working principles of unit circuits such as high-frequency small signal amplifiers, high-frequency power amplifiers, and sine wave oscillators; 2. Master the characteristics and calculations of amplification circuits at high frequencies; 3. Master the application of high-frequency electronic circuits and the high-frequency characteristics of common transistors; 4. Master the basic knowledge of circuits such as oscillation, detection, mixing, modulation and demodulation. **Skills:** 1、Learn to read, draw and simply design high-frequency electronic circuits; 2、Be able to use the basic principles of high-frequency electronic circuits to analyze the rationality of solutions. 3 Learn the ability to analyze and solve practical problems in high-frequency electronic circuits and cultivate the spirit of innovative practice. **Ability :** 1. Be capable of using common high-frequency electronic circuit unit circuits, along with auxiliary circuits, to design high-frequency electronic circuits and their systems that meet the actual engineering requirements. 2. Be capable of completing the construction and debugging of communication circuits and systems based on the fundamental principles of high-frequency electronic circuits, or conducting simulation verification. 3. Have an initial ability to analyze and design major circuits in high-frequency electronic circuits, and be capable of designing specific circuits.
Contents	**Theoretical instruction (40 contact hours, 55 self-study hours)** Chapter 1: Introduction (2 contact hours, 2 self-study hours) 1. History of radio development; 2. Principles of Radio signal transmission; 3. Medium for communication segment transmission.

	Chapter 2: Frequency Selection Networks (6 contact hours, 8 self-study hours) 1. Series-parallel resonant circuits; 2. Equivalent interchangeability of series-parallel impedances and impedance transformation at circuit taps; 3. Coupled loop. Chapter 3: High-frequency Small Signal Amplifiers (8 contact hours, 7 self-study hours) 1. Single-tuned loop resonant amplifiers; 2. Multistage single-tuned loop resonant amplifier; 3. Stability of resonant amplifiers and stabilization measures; 4. Noise in the amplifier. Chapter 4: Nonlinear Circuits, Time-varying Parameter Circuits, and frequency Converters (4 contact hours, 3 self-study hours) 1. Characteristics and analysis methods of nonlinear circuits and time-varying parameter circuits; 2. The working principle and specific circuit of the frequency converter; 3. Interference in the mixer and its calculation. Chapter 5: High-frequency Power Amplifiers (8 contact hours, 9 self-study hours) 1. The working principle of high-frequency power amplifiers and the polyline approximation method; 2. High-frequency characteristics of high-frequency power amplifiers; 3. Circuit composition of high-frequency power amplifiers; 4. Transistor frequency doubler. Chapter 6: Sine Wave Oscillator (6 contact hours, 6 self-study hours) 1. Basic working principles of LC oscillators; 2. Feedback type LC oscillator circuit; 3. Quartz crystal oscillator; 4. RC oscillator. Chapter 7: Amplitude Modulation and Demodulation (6 contact hours, 8 self-study hours) 1. The properties of amplitude modulation waves 2. Specific amplitude modulation circuits; 3. Envelope detection and synchronous detection.

	Final exam (0 contact hours, 12 self-study hours) 1. Students prepare and review for the exam. **Experimental teaching (16 contact hours, 31 self-study hours)** Experiment Item 1: High-frequency Small Signal tuning Amplifier (4 contact hours, 7 self-study hours) Experimental content: (1) Basic working principle of monotonic harmonic dual-tuned amplifiers (2) Engineering calculation and design of small-signal resonant amplifiers (3) Circuit debugging of small-signal resonant amplifiers and measurement of main performance indicators (4) Method for measuring amplitude-frequency characteristics of amplifiers. Experiment Item 2: High-frequency Resonant Power Amplifier (3 contact hours, 6 self-study hours) Experiment Content: (1) Working principle of Class C resonant power amplifier (2) Tuning and adjustment of Class C resonant power amplifier (3) Effects of input excitation voltage, collector power supply voltage and load changes on the working state of the amplifier. Experiment Item 3: Sine Wave Oscillator (3 contact hours, 6 self-study hours) Experiment Content: (1) Basic working principle of capacitor three-point LC oscillation circuit and crystal oscillator, familiar with the functions of its components (2) Influence of power supply voltage variation on oscillation amplitude and frequency of the oscillator (3) Influence of static operating point on the operation of the crystal oscillator. Experiment Item 4: Mixer. (3 contact hours, 6 self-study hours) Experiment Content: (1) Basic working principles of transistor mixers and integrated mixers. (2) Methods for achieving mixing Experiment Item 5: Amplitude Modulation (3 contact hours, 6 self-study hours) Experiment Content: (1) How amplitude modulation works (2) How to implement AM and DSB and study the relationship between modulated waves and modulated signals and carriers (3) how to measure the amplitude modulation coefficient using an oscilloscope
Study and examination requirements and forms of examination	1. Attendance rate (4%) : Students are required to participate in all parts of the course and are not allowed to be absent. Students who are absent will be deducted points based on the situation. 2. Homework (12%) : Completing unit assignments with quality

	and quantity, each assignment is scored separately, weighted by the set weights, and also includes pre-class preview, post-class review, learning, etc. 3. In-class quizzes (12%) : Quizzes based on chapters are conducted in an online open-book format, with a time limit. Each quiz is scored separately and the total score is weighted according to the set weight. 4. Experiments (12%) : Design experimental schemes using modern tools and scientific methods, record, analyze, interpret data, draw valid conclusions and write experimental reports. Grade is given based on progress, independence of completion, correctness of the plan and completion of the report. 5. Final assessment (60%) : Final exam.
Media employed	Multimedia computer, projector, Multisim software, high-frequency electronic circuit test box, oscilloscope, multimeter
Reading list	1. Textbooks [1] S. Zhang, et al. High-Frequency Electronic Circuits[M]. 5th ed. Beijing: Higher Education Press, 2012. [2] W. Jin, et al. High-Frequency Electronic Circuits[M]. Beijing: Tsinghua University Press, 2020. 2. Reference Books [1] X. Zeng, N. Liu, et al. Principles and Analysis of High-Frequency Circuits[M]. 6th ed. Xi'an: Xi'an University of Electronic Science and Technology Press, 2017. [2] G. Yan, et al. Communication Electronic Circuits[M]. 2nd ed. Beijing: Science Press, 2015. [3] H. Yu, G. Wang, et al. Communication Electronic Circuits[M]. 4th ed. Beijing: Tsinghua University Press, 2024.

“High Frequency Electronic Circuits” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Introduction	1. History of radio development; 2. Principles of Radio signal transmission; 3. Medium for communication segment transmission.	2	2	1. Homework after class. (1 class hour) 2. Preview the teaching videos on the Classroom website before class and preview the lecture PPT(1 class hour)	1. Correction of exercises. 2. Classroom Pie automatically records video and courseware viewing levels
2. Frequency-selective networking	1. Series-parallel resonant circuits; 2. Equivalent interchangeability of series-parallel impedances and impedance transformation at circuit taps; 3. Coupled loop.	6	8	1. Homework after class. (2 class hours) 2. Preview the teaching videos on the Classroom website and preview the teaching PPT before class. (4 class hours) 3. Complete the introduction and frequency selection network tests on the Classroom Pai website. (2 class hours)	1. Correction of exercises. 2. Classroom Pie automatically records video and courseware viewing levels 3. Quizzes: Graded on the course website.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
3. High-frequency small signal amplifier	1. Single-tuned loop resonant amplifier; 2. Multi-stage single-tuned loop resonant amplifier; 3. Stability of resonant amplifiers and stability measures; 4. Noise in the amplifier.	8	7	1. Homework after class. (2 class hours) 2. Preview the teaching videos on the Classroom website and preview the teaching PPT before class. (5 class hours)	1. Exercise correction. 2. Classroom Pie automatically records video and courseware viewing levels
4. Nonlinear circuits, time-varying parameter circuits and frequency converters	1. Characteristics and analysis methods of nonlinear circuits and time-varying parameter circuits; 2. Working principles and specific circuits of frequency converters; 3. Interference in the mixer and its calculation.	4	3	1. Preview the teaching video on the Classroom Pie website before class and preview the teaching PPT. (3 class hours)	1. The Classroom Pie website automatically records video and courseware viewing levels
5. High-frequency power amplifier	1. Working principle of high-frequency power amplifiers and polyline approximation analysis method; 2. High-frequency characteristics of high-frequency power amplifiers; 3. Circuit composition of high-frequency power amplifiers; 4. Transistor frequency doubler.	8	9	1. Homework after class. (2 class hours) 2. Preview the teaching videos on the Classroom website and preview the teaching PPT before class. (5 class hours) 3. Complete tests of high-frequency small-signal amplifiers and power amplifiers on the Classroom Pie website. (2 class hours)	1. Correction of exercises. 2. Classroom Pie automatically records video and courseware viewing levels 3. Quizzes: Graded on the course website

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
6. Sine wave oscillator	1. Basic working principle of LC oscillators; 2. Feedback type LC oscillator circuit; 3. Quartz crystal oscillator; 4. RC oscillator.	6	6	1. Homework after class. (2 class hours) 2. Preview the teaching videos on the Classroom website and preview the teaching PPT before class. (4 class hours)	1. Exercise correction. 2. Classroom Pie automatically records video and courseware viewing levels
7. Amplitude Modulation and Demodulation	1. Properties of amplitude-modulated waves; 2. Specific amplitude modulation circuits; 3. Envelope detection and synchronous detection.	6	8	1. Homework after class. (2 class hours) 2. Preview the teaching videos on the Classroom website and preview the teaching PPT before class. (4 class hours) 3. Complete tests on the sinusoidal oscillator and spectrum shift circuit on the Classroom Pie website. (2 class hours)	1. Correction of exercises. 2. Classroom Pie automatically records video and courseware viewing levels 3. Quizzes: Graded on the course website
8. Final exams	Students prepare and review	0	12	1. Review key knowledge points and consolidate difficult points; 2. Review class experiments, etc.	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, establish wechat groups, and check in daily for record. 2. Teacher supervision: Set up fixed offline or online Q&A sessions. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by counselors: Visiting

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
					student dormitories during the review week to supervise and inspect.
(Theoretical teaching) Tips		40	55		
Practical teaching					
1. Experiment One	High-frequency small signal tuning amplifier	4	7	1. Pre-class preview: Familiarize yourself with the purpose, principle, circuit and method of the high frequency small signal tuning amplifier experiment; (1 class hour) 2. Experimental circuit simulation. (4 class hours) 3. Submit experiment Report: Including Experiment purpose, experiment principle, experiment data record, experiment result analysis and experiment experience.(2 class hours)	1. Submit simulation files and results 2. On-site acceptance of experimental results; 3. Review of experimental reports.
2. Experiment Two	High-frequency resonant power amplifier	3	6	1. Pre-class preview: Familiarize yourself with the purpose, principle, circuit and method of the high-frequency resonant power amplifier experiment; (1 class hour) 2. Experimental circuit simulation. (3	1. Submit simulation files and results 2. On-site acceptance of experimental results; 3. Review of experimental reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				class hours) 3. Submit the experiment report: including the purpose of the experiment, the principle of the experiment, the data record of the experiment, the analysis of the experiment results, and the experience of the experiment.(2 class hours)	
3. Experiment 3	Sine wave oscillator	3	6	1. Pre-class preview: Familiarize yourself with the purpose, principle, circuit and method of the sinusoidal oscillator experiment; (1 class hour) 2. Experimental circuit simulation. (3 class hours) 3. Submit the experiment report: including the purpose of the experiment, the principle of the experiment, the data record of the experiment, the analysis of the experiment results, and the experience of the experiment.(2 class hours)	1. Submit simulation files and results 2. On-site acceptance of experimental results; 3. Review of experimental reports.
4. Experiment Four	Mixer	3	6	1. Pre-class preview: Familiarize yourself with the purpose, principle, circuit and method of the mixer experiment; (1 class hour) 2. Experimental circuit simulation. (3	1. Submit simulation files and results 2. On-site acceptance of experimental results; 3. Review of experimental reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				class hours) 3 Submit the experiment report: including the purpose of the experiment, the principle of the experiment, the data record of the experiment, the analysis of the experiment results, and the experience of the experiment.(2 class hours)	
5. Experiment 5	Amplitude modulation	3	6	1. Preview before class: Familiarize yourself with the purpose, principle, circuit and method of the amplitude modulation experiment; (1 class hour) 2. Experimental circuit simulation. (3 class hours) 3. Submit the experiment report: including the purpose of the experiment, the principle of the experiment, the data record of the experiment, the analysis of the experiment results, and the experience of the experiment.(2 class hours)	1. Submit simulation files and results 2. On-site acceptance of experimental results; 3. Review of experimental reports.
(Practical Teaching) Tips		16	31		
Total		56	86	Total hours = 142 hours	
Credits (ECTS)		4.7			

Digital Signal Processing

Competence field	Engineering application
Curriculum designation	Digital Signal Processing
Curriculum code	9061313061
Semester(s) in which the curriculum is taught	5th Semester
Person responsible for the curriculum	Fei He
Lecturer	Fei He, Zhengchun Zhao, Yaqi Deng, Lin Lin
Language	Chinese
The relationship between the curriculum and the major	"Digital Signal Processing" is a core course for undergraduate students majoring in electronic information engineering. With advanced mathematics, complex Functions and integral transformations, and signals and Systems as the leading courses, it provides the basic knowledge and theoretical background for the study of courses such as Principles of communication, DSP technology and applications, digital image processing, communication technology, and embedded systems, including the basic theories, fundamental analytical methods and algorithms of digital signal processing. **The teaching objectives are:** Through this course, students will need to understand the basic composition of digital signal processing systems and the characteristics of digital signal processing, understand the basic concepts of time-domain discrete signals and systems, master the definitions and properties of Z-transform and discrete-time Fourier transform (DTFT), master the definitions and properties of discrete Fourier transform (DFT), Master the principles of the Fast Fourier Transform (FFT) algorithm and be able to flexibly **apply** the **knowledge learned** for signal spectrum analysis and design appropriate digital **filters** according to the actual engineering requirements**. Through** this course, students will learn the analytical methods and experimental means of digital signal processing, acquire the relevant knowledge of digital signal processing required for engineering technology, exercise and enhance the ability of mathematical simulation, modeling and design of digital filters, and be able to flexibly apply the thinking of digital **signal processing** to think about problems in engineering.

Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + experiment Teaching hours (Contact hours): 56 hours Among them: Theoretical instruction: 40 class hours Laboratory/practical teaching: 16 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 120 class hours; Contact hours = 56 hours; Self-study hours = 64 hours;
Credit points (ECTS)	4.0
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics, Functions of Complex Variables, Signals and Systems, MATLAB and System Simulation
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The following objectives were achieved through the implementation of teaching, discussion and experimentation in this course: **Knowledge:** Master the time-domain characteristics of discrete-time signals, be able to analyze the characteristics of linear shifting invariant systems, and be able to calculate the relevant performance parameters in the signal sampling recovery process. Master the transformation domain analysis method for discrete-time signals, deeply understand the intrinsic connection between continuous and discrete signals, and be able to analyze the relationship between the Z-transform of sequences and the Laplace transform and Fourier transform of continuous signals. Master the principles and properties of Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT) algorithms, be proficient in analyzing the process of approximating the continuous-time Fourier transform using DFT, and be able to calculate the relevant performance parameters; Have a deep understanding of how the FFT algorithm improves the effectiveness of the DFT algorithm, understand computational optimization methods, and be able to make performance comparisons. **Skills:** Master the design theory and methods of digital filters; Be proficient in analyzing the differences and application methods of using FIR filters and IIR filters, and be able to select

	appropriate schemes to design digital filters. **Ability:** Master the basic analytical and research methods of digital signal processing, design simulation or experimental schemes using simulation tools, record, analyze, interpret data, draw valid conclusions and write experimental reports. To provide students with rigorous training in scientific experimental ability, computational ability and abstract thinking ability; Develop students' ability to analyze and solve problems independently, improve their scientific literacy, and lay the foundation for subsequent courses and research related to information processing.
Contents	**Theoretical instruction (40 contact hours, 53 self-study hours)** Chapter 1: Introduction (2 contact hours, 2 self-study hours) 1. Overview (including course introduction) Chapter 2: Time-Domain Discrete Signals and Time-domain Discrete Systems (6 contact hours, 5 self-study hours) 1. The concept of sequences and common sequences; Time-domain discrete system description methods and basic properties; 2. Digital processing of analog signals. Chapter 3: Frequency Domain Analysis of Time-domain Discrete Signals and Time-domain Discrete Systems (6 contact hours, 5.5 self-study hours) 1. Z-transform, Fourier transform of sequences and their properties; 2 Use the Z-transform to analyze the frequency response characteristics of signals and systems. Chapter 4: Discrete Fourier Transform (DFT)(8 contact hours, 9.5 self-study hours) 1. Fourier series (DFS) of periodic sequences and their properties; 2 Discrete Fourier Transform (DFT) and its properties; 3. Frequency-domain sampling Theory and applications; 4. Calculating the Fourier transform of analog signals using DFT. Chapter 5: Fast Fourier Transform (FFT) (6 contact hours, 7 self-study hours) 1. Base-2 FFT algorithms extracted by time;

	2. Frequency-drawn base-2FFT algorithm. 3. Other fast algorithms. Chapter 6: Network Structures for Discrete-time Systems (4 contact hours, 4.5 self-study hours) 1. Basic Network Structure of IIR and its characteristics 2. Basic network structure and characteristics of FIR Chapter 7: Design Methods for Infinity-length Unit Impulse Response (IIR) Digital Filters (8 contact hours, 9 self-study hours) 1. Methods for Designing IIR Digital Filters using Analog Filters 2. Impulse response invariance and bilinear transformation methods 3. Design methods for obtaining the corresponding bandpass and high-pass filters from the low-pass prototype filter; Commonly simulate the characteristics of low-pass filters. Chapter 8: Final exams (0 contact hours, 10.5 self-study hours) Students are preparing for exams and reviewing **Experimental teaching (16 contact hours, 11 self-study hours)** Experiment Item 1: Generation of Multiple Signals and spectral analysis of signals using FFT (4 contact hours, 2 self-study hours) Experiment: Program (1) the generation of common sequences using MATLAB; (2) Be able to select the transformation intervals of the FFT to perform spectral analysis on the signal and conduct comparative analysis of its amplitude-frequency characteristic curves. Experiment Item 2: Time-domain sampling and frequency-domain sampling (4 contact hours, 2 self-study hours) Experiment Content: Program with MATLAB to implement (1) amplitude characteristics of the signal at different time-domain sampling frequencies, plot and display, observe and analyze spectral aliasing distortion, verify and summarize the time-domain sampling theory; (2) Amplitude spectra of signals at different frequency domain sampling points, plot their waveforms, compare and analyze them, verify and

	summarize the frequency domain sampling theory. Experiment Item 3: Design and Software Implementation of IIR DF (4 contact hours, 3 self-study hours) Experiment Content: Programming with MATLAB (1) through spectral analysis of composite signals; (2) By analyzing their spectra, design appropriate IIR digital filters to achieve the separation of composite signals. Experiment Item 4: Design and Software Implementation of FIR DF (4 contact hours, 4 self-study hours) Experiment Content: Program with MATLAB (1) Spectral analysis of the noisy signal; (2) By analyzing its spectrum, design an appropriate FIR digital filter to achieve the filtering of the noisy signal.
Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Course Assignment (30%) : Experiment Report. 3. Final assessment (60%) : final exam.
Media employed	Multimedia computers, projectors, laser Pointers and MATLAB software, etc
Reading list	1. Textbooks [1] X. Gao, Y. Ding, et al. Digital Signal Processing[M]. 4th ed. Xi'an: Xi'an University of Electronic Science and Technology Press, 2016. 2. Reference Books [1] X. Gao, Y. Ding, et al. Learning Guide for Digital Signal Processing[M]. 3rd ed. Xi'an: Xi'an University of Electronic Science and Technology Press, 2008. [2] N. Xue, Application of MATLAB in Digital Signal Processing[M]. Beijing: Tsinghua University Press, 2008.

“Digital Signal Processing” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Introduction	1. Basic concepts and characteristics of digital signal processing; 2. Components of digital signal processing systems. 3. Development and application of digital signal processing	2	2	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (1 class hour) 2. Homework after class: Review materials to summarize the development and application of digital signal processing (1 class hour)	1. Rain Classroom Platform: Automatically record video viewing. 2. Summary report.
2 Time-domain analysis of discrete signals and systems in the time domain	1. Concepts of sequences and common sequences; 2. Description methods and basic properties of time-domain discrete systems;	6	5	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (2 class hours) 2 Homework after class: Be able to calculate: Operations on typical	1. Rain Classroom Platform: Automatically record video viewing. 2. Homework correction: Correction of exercises in this chapter. Chapter quizzes: Quizzes on operations

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	3. Digital processing of analog signals.			sequences; (0.5 class hours) Be able to judge: linear time invariance of time-domain discrete systems and causal stability of systems; (1 class hour) Be able to analyze: the sampling theorem and recovery conditions of analog signals and apply them to engineering practice. (1.5 class hours)	of sequences and judgments of characteristics of discrete systems in the time domain at the end of this chapter.
3. Frequency domain analysis of discrete signals and systems in the time domain	1. Z-transform of sequences, Fourier transform of sequences and their properties; 2 Use the Z-transform to analyze the frequency response characteristics of signals and systems.	6	5.5	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (3 class hours) 2. Homework after class: Be able to calculate: the Z-transform of sequences, the Fourier transform of sequences and analyze their relationships. (1.5 class hours) Be capable of analysis: Utilize Z-transform to analyze the frequency response characteristics of signals and systems. Be able to analyze the causal stability of the system using the pole distribution of the system. (1 class hour)	1. Rain Classroom Platform: Automatically record video viewing. 2. Homework correction: Correction of exercises in this chapter. 3. Chapter Quiz: A quiz at the end of this chapter on the definition, properties, physical meaning of FT and ZT sequences and their analysis of signals and systems.
4. Discrete Fourier Transform (DFT)	1. Fourier series (DFS) and properties of periodic	8	9.5	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview	1. Rain Classroom Platform: Automatically record video viewing.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	sequences; 2 Discrete Fourier Transform (DFT) and its properties; 3. Frequency Domain Sampling Theory and Applications 4 Calculate the Fourier transform of analog signals using DFT and perform spectral analysis.			the teaching PPT. (3.5 class hours) 2 Homework after class: Be able to analyze: the relationship between DFT and FT, DFS, ZT; (1 class hour) Be able to apply: frequency-domain sampling theory for engineering application analysis; (1 class hour) Be able to calculate: Be able to perform DFT on finite-length sequences; Be able to use DFT and its properties to calculate the Fourier transform of analog signals and perform spectral analysis. (4 class hours)	2. Homework correction: Correction of exercises in this chapter. Chapter Quiz: A quiz on the definition, properties, and applications of the DFT at the end of this chapter.
5. Fast Fourier Transform (FFT)	1. Base-2 FFT algorithm extracted by time; 2. Frequency-drawn base-2FFT algorithm; 3. Other fast algorithms.	6	7	1. Pre-class preview: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (2.5 class hours) 2. Homework after class Be able to draw: the butterfly operation flow diagram of the base-2FFT algorithm drawn by time and the base-2FFT algorithm drawn by frequency, and analyze the computational load. (2.5 class hours) Be able to apply: Base-2 FFT algorithms for engineering applications (2 credits)	1. Rain Classroom Platform: Automatically record video viewing. 2. Homework correction: Correction of exercises in this chapter. 3. Chapter Quiz: At the end of this chapter, A quiz on the basic principles of the Base-2 FFT algorithm, the basic butterfly operation flow diagram, the computational load of the algorithm, and its characteristics and applications.
6 Network structures of	1. Basic network structure of	4	4.5	1. Preview before class: Watch the Rain	1. Rain Classroom Platform: Automatically record video viewing.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Discrete-time systems	IIR and its characteristics; 2. Basic network structure and characteristics of FIR.			Classroom micro-lesson video and preview the teaching PPT. (2.5 class hours) 2. Homework after class: Be able to draw: Basic network structures of IIR and FIR, and analyze them. (2 class hours)	2. Homework correction: Correction of exercises in this chapter. 3. Chapter Quiz: Draw IIR at the end of this chapter A quiz on the basic network structure and FIR basic network structure, along with characteristic analysis.
7. Design methods for infinity-length unit impulse response (IIR) digital filters	1. Methods for designing IIR digital filters with analog filters; 2. Impulse response invariance method and bilinear transformation method; 3. Design methods for obtaining the corresponding bandpass and high-pass filters from the low-pass prototype filter; Commonly simulate the characteristics of low-pass filters.	8	9	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (4 class hours) 2. Homework after class: Be able to design: Butterworth ALPF and Chebysheve ALPF; (1.5 credit hours) Design: Design DLPF using impulse response invariance and bilinear transformation methods; (1.5 class hours) Design: Other types of DF. (2 class hours)	1. Rain Classroom Platform: Automatically record video viewing. 2. Homework correction: Correction of exercises in this chapter. 3. Chapter Quiz: At the end of this chapter, (1) Basic principles and characteristics of impulse response invariance and bilinear transformation methods, and a quiz on designing ALPF and DLPF using MATLAB; (2) Conduct mock tests on the content learned this semester.
8. Final exams	Students are preparing for exams and reviewing	0	10.5	1. Review key points and consolidate difficult points; 2. Review class experiments, etc.	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, establish wechat groups, and check in daily for record. 2. Teacher supervision: Set up fixed

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
					offline or online Q&A sessions. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by counselors: Visiting student dormitories during the review week to supervise and inspect.
(Theoretical teaching) Tips		40	53		
Practical teaching					
1. Experiment One (Confirmatory)	1. Generation of multiple signals; 2. Spectral analysis of the signal using FFT.	4	2	Program with MATLAB 1. Be able to write the generation program for common sequences; 2. Be able to select different transformation intervals of FFT for spectral analysis of signals and compare and analyze their amplitude-frequency characteristic curves.	1. Pre-class document review: (1) Typical sequences, FFT transform principles The generation of common sequences (2) MATLAB simulation programs for spectral analysis of signals in different transform intervals of FFT; 2. On-site acceptance of experimental results; 3. Review of experimental reports.
2. Experiment Two (Confirmatory)	1. Validation of the time-domain sampling theory; 2. Validation of the frequency-domain sampling	4	2	1. Calculate the amplitude characteristics of the signal at different time-domain sampling frequencies, program in MATLAB, plot and display, observe and analyze spectral	1. Pre-class document review: (1) Time-domain sampling theory and frequency-domain sampling theory; (2) Time-domain sampling theory and

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	theory.			aliasing distortion, verify and summarize the time-domain sampling theory; 2. Calculate the amplitude spectra of signals at different frequency domain sampling points, program them in MATLAB, plot their waveforms, compare and analyze them, verify and summarize the frequency domain sampling theory.	frequency-domain sampling theory Verified MATLAB simulation program; 2. On-site acceptance of experimental results; 3. Review of experimental reports.
3. Experiment 3 (Design)	The design and software implementation of IIR DF	4	3	1. Methods for directly designing IIR digital filters; 2. Implement spectral analysis of composite signals using MATLAB programming; 3. Separate the composite signal by analyzing its spectrum and designing an appropriate DF filter.	1. Pre-class document check: (1) Chebysheve's direct method for designing IIR digital filters; (2) Spectral analysis of the composite signal and design of an appropriate DF filter, a MATLAB simulation program for the separation of the composite signal; 2. On-site acceptance of the experimental results; 3. Review of experimental reports.
4. Experiment 4 (Design)	Design and software implementation of FIR DF	4	4	1. Principles for designing FIR DF using the window function method and the equal-wave optimal approximation method; 2. Implement spectral analysis of the noisy signal using MATLAB programming, and	1. Pre-class file check: (1) Principles for designing FIR DF using the window function method and the equal-wave optimal approximation method;

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				design FIR DF for noise filtering using the window function method and the isowavy optimal approximation method.	(2) MATLAB simulation program for filtering analysis of noisy signals; 2. On-site acceptance of project achievements; 3. Project report review.
(Practical Teaching) Small project		16	11		
Total		56	64	Total hours = 120 hours	
Credits (ECTS)		4.0			

Principle and Application of Microcontroller

Competence field	Engineering application
Curriculum designation	Principle and Application of Microcontroller
Curriculum code	9061313081
Semester(s) in which the curriculum is taught	4th Semester
Person responsible for the curriculum	Wenguo Li
Lecturer	Wenguo Li, Yue Tan, Lin Lin, Shiying Mo, Xiongjie Liu
Language	Chinese
The relationship between the curriculum and the major	"Principle and Application of Microcontroller" is one of the engineering application courses for the Electronic Information Engineering major. This course introduces the basic architecture, working principle and configuration of internal resources of microcontrollers, such as timers, interrupt systems, serial communication, etc. Meanwhile, the course emphasizes practical application, including demand analysis, scheme design and system implementation for specific application scenarios, which effectively improves students' professional literacy and competitiveness, laying a solid foundation for their future career development in the field of Electronic Information Engineering.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Methods: Theoretical Teaching + Experiments Teaching Hours (Contact Hours): 56 hours Including: Theoretical Teaching: 40 hours Experimental/Practical Teaching: 16 hours Class Size: Approximately 160 students in four classes
Workload	Total Workload = 132 class hours; Contact Hours = 56 hours; Self-study Hours = 76 hours;
Credit points (ECTS)	4.4
Requirements according to the examination regulations	Only students with an attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics, Circuit Analysis, Analog Electronic Technology, Digital Electronic Technology
Curriculum objectives /expected learning	**Learning Outcomes:** The main task of this course is to enable students to deeply understand the principles and applications of microcontrollers, and master the design

outcomes	and development methods of microcontroller systems. Specific objectives include: **Knowledge:** 1. Master the basic architecture and working principle of microcontrollers, and understand the characteristics and application scenarios of different types of microcontrollers; 2. Be familiar with the working principles and configuration methods of internal resources of microcontrollers, such as I/O ports, timers, interrupts, serial communication, etc.; 3. Understand the interface technologies for microcontrollers to interact with the external world, such as ADC, DAC, PWM, DMA, etc., and be able to apply these technologies for data acquisition and processing. **Skills:** 1. Learn to use microcontroller development environments and tools, such as Keil, for program writing, compilation, burning and debugging; 2. Be able to design and implement simple control systems based on microcontrollers, such as LED blinking, key input processing, etc.; 3. Master the application of microcontrollers in embedded systems, and be able to complete simple hardware interface design and software programming. **Ability:** 1. Be able to use microcontroller principles and technologies to conduct systematic demand analysis, scheme design and implementation for specific needs; 2. Possess the ability to debug and optimize microcontroller systems, and effectively solve various problems arising during system operation; 3. Be able to combine practical application scenarios, use innovative thinking to design and implement innovative microcontroller application systems, so as to improve system performance and reliability; 4. Be able to deeply understand the advanced functions and applications of microcontrollers, such as Real-Time Operating Systems (RTOS), low-power design, wireless communication technologies, etc., and apply these technologies to solve complex engineering problems, improving the intelligence and automation level of systems.
Contents	**Theoretical Teaching (40 contact hours, 55 self-study hours)** Chapter 1: Overview and Preliminary Knowledge (2 contact hours, 0.5 self-study hours) 1. Development and application of microcontrollers; 2. Microcontroller models; 3. Number systems, code systems, etc. Chapter 2: Hardware Structure of Microcontrollers (4 contact hours, 3 self-study hours) 1. Overall structure and internal resources;

	2. Power supply and external pins, control pins, input/output pins; 3. Clock circuit, reset circuit and timing sequence; 4. Data memory, program memory. Chapter 3: Instruction Set and Assembly Language Programming (8 contact hours, 7 self-study hours) 1. Assembly language instruction format; 2. Assembly pseudo-instructions; 3. Addressing modes; 4. Instruction set and application; 5. Assembly language programming. Chapter 4: Introduction to C51 Language for Microcontrollers (3 contact hours, 4.5 self-study hours) 1. C51 data types and storage methods, storage types and storage relationships; 2. Definition method of C51 interrupt service functions; 3. Mixed programming of assembly language and C51; 4. Environment setup. Chapter 5: Hardware Resources and Applications (17 contact hours, 20 self-study hours) 1. Parallel I/O ports and their applications; 2. Interrupt system and control, interrupt programming and applications; 3. Basic structure and principle of timers/counters, designing application programs related to timers/counters; 4. Serial interface technology and serial communication application programs. Chapter 6: Parallel Expansion Interface Technology (6 contact hours, 8 self-study hours) 1. Bus parallel expansion methods, memory interface expansion; 2. Input/output parallel interface expansion, designing programs related to interface expansion; 3. Display and keyboard interface expansion, designing human-computer interaction programs. Chapter 7: Final Exam (0 contact hours, 12 self-study hours) 1. Students review for the exam. **Experimental Teaching (16 contact hours, 21 self-study hours)** Experimental Project 1: Application of I/O Ports and Interface Technology: Key-Controlled Running Lights and Buzzer (4 contact hours, 4 self-study hours)

	Experimental Content: Familiarize with the Keil operating environment, write, debug and execute programs. Understand the structure and functions of microcontroller I/O ports, and learn how to configure and use I/O ports. Control the level state of I/O ports through programming to realize the control of external devices. Experimental Project 2: Application of External Interrupts: Key-Controlled LED Lights and Digital Display (4 contact hours, 4 self-study hours) Experimental Content: Program to set the trigger mode of external interrupts, familiarize with the configuration of interrupt enable registers and interrupt priority registers, and write external interrupt service programs to realize key-controlled LED lights and digital display. Experimental Project 3: Application of Timers and Interrupts (4 contact hours, 5 self-study hours) Experimental Content: Configure timer-related registers (such as IE, TMOD, TCON, TH0, TL0, etc.) to set the initial value, working mode, interrupt enable and interrupt priority of timers. Use timers to generate timing signals to realize the normal display of electronic stopwatches. Experimental Project 4: Microcontroller-Based Electronic Organ, Calendar, Traffic Lights, Serial Communication (Optional) (4 contact hours, 8 self-study hours) Experimental Content: Conduct project demand analysis and formulate detailed design schemes, including hardware circuit design and software program design. Build hardware circuits according to the design scheme, including the connection of microcontrollers, sensors and other components. Write microcontroller programs according to the design scheme to realize various functions of the project. Debug and test the hardware circuit and software program to ensure the normal operation of the project and meet the design requirements. Write a project summary report, including project background, design scheme, implementation process, test results, etc.
Study and examination requirements and forms of examination	1. Attendance Rate (10%): Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Homework (30%): Pre-class preview homework, post-class homework, experimental reports. 3. Final Assessment (60%): Final exam.
Media employed	Multimedia computers, projectors, Keil and Proteus software, microcontroller experiment kits

Reading list	1. Textbooks [1] H. Yang, H. Huang, et al., Principle and Application of Microcontroller, Xiangtan: Xiangtan University Press, 2013. 2. Reference Books [4] W. Xie, J. Yang, et al., Principle and Application of Microcontroller and C51 Programming, Beijing: Tsinghua University Press, 2019. [5] Z. Ma, et al., C Language Application Programming for Microcontrollers, Beijing: Beihang University Press, 2021. [6] R. Liu, et al., Principle and Application Tutorial of Microcontroller, Beijing: China Machine Press, 2021.

"Principle and Application of Microcontroller"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Overview and Preliminary Knowledge	1. Development and application of microcontrollers; 2. Microcontroller models; 3. Number system and code system conversion, etc.	2	0.5	1. Post-class homework: Complete exercises on number system and code system conversion. (0.5 class hour)	1. Homework correction.
2. Hardware Structure of Microcontrollers	1. Overall structure and internal resources; 2. Power supply and external pins, control pins, input/output pins; 3. Clock circuit, reset circuit and timing sequence; 4. Data memory, program memory.	4	3	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (2 class hours) 2. Post-class homework: Submit hand-drawn minimum system circuit diagrams and data memory space distribution diagrams. (1 class hour)	1. Rain Classroom Platform automatically records video viewing progress. 2. Homework correction. 3. Quiz: Conduct an online or written quiz on pin functions and memory structure after the chapter ends.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
3. Instruction Set	1. Assembly language instruction format; 2. Assembly pseudo-instructions; 3. Addressing modes; 4. Instruction set and application; 5. Introduction to assembly language programming.	8	7	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (5 class hours) 2. Post-class homework: Complete exercises corresponding to the instruction set. (2 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Homework correction. 3. In-class random quiz: Test review effectiveness.
4. C51 Language Basics	1. C51 data types and storage methods, storage types and storage relationships; 2. Definition method of C51 interrupt service functions; 3. Mixed programming of assembly language and C51; 4. Environment setup	3	4.5	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (2 class hours) 2. Post-class homework: Complete exercises related to C51 program structure and interrupt service functions. (0.5 class hour) 3. Environment setup: Install Keil software and Proteus software, and learn basic software knowledge. (2 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Homework correction. 3. Check whether students have completed the installation of relevant software and environment setup on their computers.
5. Hardware Resources and Applications	Parallel I/O Ports and Their Applications	4	4	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (2 class hours) 2. Post-class homework: Complete exercises related to I/O ports. (0.5 class hour) 3. Reproduce and annotate code: Light up LEDs, control LED flipping with keys (1.5 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Homework revision. 3. Code comment review: Randomly check submitted after-class program codes to evaluate the detail and accuracy of comments.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	Interrupt System	4	5	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (2 class hours) 2. Post-class homework: Complete exercises related to the interrupt system. (1 class hour) 3. Reproduce and annotate code: Realize LED flipping with external interrupts (2 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Homework revision. 3. Code comment review: Randomly check submitted after-class program codes to evaluate the detail and accuracy of comments.
	Timers/Counters	4	5.5	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (2 class hours) 2. Post-class homework: Complete exercises related to timers. (1 class hour) 3. Reproduce and annotate code: Output square waves with timer interrupts. (2.5 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Homework revision. 3. Code comment review: Randomly check submitted after-class program codes to evaluate the detail and accuracy of comments.
	Serial Interface and Serial Communication	5	5.5	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (2 class hours) 2. Post-class homework: Complete exercises related to timers. (0.5 class hour) 3. Reproduce and annotate code: Dual-machine communication. (3 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Homework revision. 3. Code comment review: Randomly check submitted after-class program codes to evaluate the detail and accuracy of comments.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
6. Parallel Expansion Interface Technology	1. Bus parallel expansion methods, memory interface expansion; 2. Input/output parallel interface expansion, designing programs related to interface expansion; 3. Display and keyboard interface expansion.	6	8	1. Pre-class preview: Watch microlecture videos on Rain Classroom and preview lecture PPTs. (6 class hours) 2. Post-class homework: Complete exercises related to interface expansion. (2 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Homework revision. 3. In-class random quiz: Test review effectiveness.
7. Final Exam	Students review for the exam	0	12	1. Review key knowledge points and consolidate difficult points; 2. Review in-class experiments, etc.	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, establish WeChat groups, and check in daily for record. 2. Instructor supervision: Set fixed offline or online consultation hours. Judge the overall review situation of the class through the frequency and depth of students' questions. 3. Counselor supervision: Visit student dormitories during the review week to supervise and check.
Subtotal (Theoretical Teaching)		40	55		

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical Teaching					
1. Experiment 1 (Confirmatory)	Application of I/O Ports and Interface Technology: Key-Controlled Running Lights and Buzzer	4	4	1. Draw hardware schematic diagrams and preview the principles of corresponding components; (1 class hour) 2. Draw program flowcharts according to experimental requirements, build project frameworks in Keil, and write core functions for the corresponding experiments. (2 class hours) 3. Submit experimental reports: Including experimental purposes, hardware schematic diagrams, program flowcharts, core codes. Detailedly record at least 1-2 problems encountered, and explain how to analyze and solve them. (1 class hour)	1. Pre-class document check: Require submission of hardware Proteus simulation files, Keil programs and flowchart files before class; 2. On-site acceptance of experimental results; 3. Experimental report review.
2. Experiment 2 (Design-Oriented)	Application of External Interrupts: Key-Controlled LED Lights and Digital Display	4	4	1. Draw hardware schematic diagrams and preview the principles of corresponding components; (1 class hour) 2. Draw program flowcharts according to experimental requirements, build project frameworks in Keil, and write core functions for the corresponding experiments. (2 class hours) 3. Submit experimental reports: Including experimental purposes, hardware schematic	1. Pre-class document check: Require submission of hardware Proteus simulation files, Keil programs and flowchart files before class; 2. On-site acceptance of experimental results; 3. Experimental report review.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				diagrams, program flowcharts, core codes. Detailedly record at least 1-2 problems encountered, and explain how to analyze and solve them. (1 class hour)	
3. Experiment 3 (Design-Oriented)	Application of Timer Interrupts: Generate Timing Signals with Timers to Realize Normal Display of Electronic Stopwatches	4	5	1. Draw hardware schematic diagrams and preview the principles of corresponding components; (1 class hour) 2. Draw program flowcharts according to experimental requirements, build project frameworks in Keil, and write core functions for the corresponding experiments. (3 class hours) 3. Submit experimental reports: Including experimental purposes, hardware schematic diagrams, program flowcharts, core codes. Detailedly record at least 1-2 problems encountered, and explain how to analyze and solve them. (1 class hour)	1. Pre-class document check: Require submission of hardware Proteus simulation files, Keil programs and flowchart files before class; 2. On-site acceptance of experimental results; 3. Experimental report review.
4. Experiment 4 (Comprehensive)	Free Project Design: Electronic Organ, Calendar, Traffic Lights, Serial Communication (Optional)	4	8	1. Conduct project demand analysis and formulate detailed design schemes, including hardware circuit design and software program design. Draw program flowcharts, build project frameworks in Keil, and write core functions for the corresponding experiments. (5 class hours) 2. Draw hardware schematic diagrams and learn	1. Pre-class document check: Require submission of hardware Proteus simulation files, Keil programs and flowchart files before class; 2. On-site acceptance of project results; 3. Project summary report review.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				the principles of corresponding components; (2 class hours). 3. Submit project summary reports: Including project background, design scheme, implementation process, test results, etc. (1 class hour)	
Subtotal (Practical Teaching)		16	21		
Total		56	76	**Total Hours = 132 class hours**	
Credit points (ECTS)		4.4			

STM32 Electronic System Design and Engineering Application

Competence field	Engineering application
Curriculum designation	STM32 Electronic System Design and Engineering Application
Curriculum code	9061324010
Semester(s) in which the curriculum is taught	5th Semester
Person responsible for the curriculum	Wenguo Li
Lecturer	Wenguo Li, Maolin Li, Xiongjie Liu
Language	Chinese
The relationship between the curriculum and the major	"STM32 Electronic System Design and Engineering Application" is a professional independent development elective course integrating theory and practice for the Electronic Information Engineering major. It is an applied course that synthesizes knowledge of hardware technology, software technology, interface technology and development tools. Through this course, students will be able to understand and master the theories and knowledge involved in ARM embedded systems, proficiently use the software development environment and program debugging methods of STM32 processors, master the programming methods of GPIO, interrupts, serial ports, timers and other basic peripheral interfaces, and learn the transplantation of embedded real-time operating systems on STM32 and the development methods of multi-task application programs. Finally, students will have the ability to develop, design, analyze and debug STM32-based embedded electronic systems, thereby laying a technical foundation for future research training, science and technology competitions, product research and development, comprehensive graduation training, on-the-job internships and other work related to "intelligent perception and control".
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Methods: Theoretical Teaching + Experiments Teaching Hours (Contact Hours): 32 hours Including: Theoretical Teaching: 16 hours Experimental/Practical Teaching: 16 hours Class Size: Approximately 160 students in four classes
Workload	Total Workload = 102.5 class hours; Contact Hours = 32 hours; Self-study Hours = 70.5 hours;
Credit points (ECTS)	3.4

Requirements according to the examination regulations	Only students with an attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible for assessment.
Prerequisite curriculum	Principle and Application of Microcontroller/Principle and Interface Technology of Microcomputers, C Language Programming
Curriculum objectives /expected learning outcomes	**Learning Outcomes:** The main task of this course is to enable students to master the principles, programming and application development of STM32 microcontrollers, and to possess the ability to independently design and implement STM32-based electronic systems. Specific objectives include: **Knowledge:** 1. Deeply understand the basic principles and internal structure of STM32 microcontrollers. Familiarize with various peripherals of STM32, such as GPIO, ADC, PWM, timers, etc. Master the working principles, configuration methods and application scenarios of these peripherals. 2. Learn to use the development environment and programming language of STM32, familiarize with its programming framework, and master the writing and debugging of common peripherals of STM32 and their driver programs. 3. Understand the communication interfaces and protocols between STM32 and other peripheral devices, such as I2C, SPI, USART, etc., laying a foundation for communication design in practical applications. **Skills:** 1. Be able to proficiently use mainstream embedded development tools, such as Keil, master the C language programming method of STM32, and be able to compile, simulate and debug programs. 2. Be able to apply and practice peripherals based on the peripheral modules of STM32, such as LED light control, temperature and humidity monitoring, motor drive, etc., and master the interface circuit design and program design methods of related peripherals. 3. Be able to conduct overall system scheme design, hardware design and software design according to system requirements, and possess initial capabilities in practical project development. **Ability:** 1. Through course learning and practice, students will be able to cultivate the ability to analyze and solve problems, and

	propose effective solutions to practical problems. 2. Understand the basic principles, development models and methods of embedded system design, and cultivate systematic thinking. 3. Be able to exert innovative awareness, explore new applications and methods of STM32 in electronic system design, and possess initial innovative capabilities.
Contents	**Theoretical Teaching (16 contact hours, 34.5 self-study hours)** Lecture 1: Introduction (2 contact hours, 1 self-study hour) 1. Overview of embedded systems, introduction to ARM architecture; 2. Introduction to STM32 series microcontrollers and development boards; 3. Development and application of microcontrollers; Lecture 2: Internal Structure and Working Principle of STM32 (2 contact hours, 3 self-study hours) 1. Interpretation of STM32 chip resources; 2. Development environment setup and program download methods; 3. New project templates (based on firmware library, based on registers). Lecture 3: Working Principle and Register Configuration of GPIO (4 contact hours, 5 self-study hours) 1. Basic structure and working methods of GPIO; 2. GPIO-related registers and library functions; 3. GPIO application examples (running light experiments based on library functions, registers and bit operations). Lecture 4: Working Principle and Application of STM32 System Clock (2 contact hours, 3 self-study hours) 1. Clock system block diagram, functions and definitions of clock configuration-related registers; 2. SystemInit clock system initialization function; 3. Calculation method of register addresses mapped by register address names. Lecture 5: Interrupt System (2 contact hours, 3.5 self-study hours) 1. Basic concepts of interrupts, interrupt management methods, interrupt priority setting; 2. I/O port mapping relationship of external interrupts in STM32, setting of external interrupt library functions; 3. Design ideas and configuration process of external interrupts; 4. Interrupt application examples. Lecture 6: STM32 Timers (2 contact hours, 3 self-study hours) 1. Counter modes: up-counting, down-counting, up/down counting modes; 2. Timer working process and concepts of four registers in the time base unit;

	3. Timer function setting and timer interrupt implementation steps; 4. Timer application examples. Lecture 7: Comprehensive Design of Electronic Information Systems Based on STM32 (2 contact hours, 6 self-study hours) 1. Explain the basic process of practical case design of STM32 embedded systems, including project topic selection, scheme design, hardware construction, software programming, debugging and testing, summary report, etc. 2. Select typical practical cases for analysis, such as calendar, traffic lights, etc. Explain the design ideas, implementation process and key technical points of the cases. 3. Require students to freely design an STM32-based electronic product system. Students are required to formulate a detailed design scheme, including hardware circuit design and software program design. And write a project summary report, including project background, design scheme, implementation process, test results, etc. Final examination: (0 contact hours, 10 self-study hours) Design an STM32-based electronic product system, including: online information retrieval, formulating detailed design schemes, hardware circuit design, software program design, test schemes and test results, design reports (including project background, design schemes, software and hardware design, testing and conclusions, etc.). **Experimental Teaching and Practice (16 contact hours, 36 self-study hours)** Experimental Project 1: Running Lights and Key Input Experiment (4 contact hours, 5 self-study hours) Experimental Content: Familiarize with Keil and other development environments for program writing, compilation, download and debugging, learn to create new projects and write programs using library functions. Master the GPIO configuration methods of STM32 microcontrollers, including port, input or output mode and other related configurations. Control the level state of I/O ports through programming to realize the control of external devices. Experimental Project 2: External Interrupt Experiment (4 contact hours, 4 self-study hours) Experimental Content: GPIO pin initialization, external interrupt initialization, configure external interrupt (EXTI) lines, set interrupt trigger modes (such as rising edge, falling edge or double edge trigger), and enable interrupt lines. Configure interrupt priority and enable interrupt channels through NVIC. Write interrupt service programs and conduct program debugging and testing. Experimental Project 3: Timer Interrupt Experiment (4 contact hours, 5 self-study hours) Experimental Content: Initialize the general timer of STM32, including setting the auto-reload value (ARR) and prescaler

	value (PSC). Configure the interrupt type of the timer and enable the timer interrupt, set the priority of the timer interrupt through NVIC, and enable the timer interrupt channel. Write interrupt service functions and conduct program debugging and testing. Experimental Project 4: PWM Output Experiment (4 contact hours, 7 self-study hours) Experimental Content: Configure the timer of the STM32 microcontroller to generate PWM signals and control their frequency and duty cycle. Call corresponding functions or configure registers to initialize PWM output parameters of the timer, such as PWM mode, output polarity, output state, etc. Adjust the duty cycle of the PWM signal by modifying the capture/compare register (CCRx) value. Other Practices (0 contact hours, 15 self-study hours): 1. College Students' Innovation and Entrepreneurship Training Program (Embedded System Design) 2. Disciplinary Competitions (National and Hunan Provincial Electronic Design Competitions, National Embedded System Design and Application Competitions, etc.)
Study and examination requirements and forms of examination	1. Attendance Rate (10%): Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Homework (30%): Experimental reports. 3. Final Assessment (60%): Design an STM32-based electronic product system and write a report.
Media employed	Multimedia computers, projectors, laser pointers, blackboards, chalk, Keil and ALIENTEK Battleship STM32 Development Boards
Reading list	1. Textbooks [1] Y. Zhang, et al., Atomic Teaches You to Play STM32 (Library Function Version), Beijing: Beihang University Press, 2019. 2. Reference Books [7] J. Liu, B. Chen, et al., STM32 Case Studies, Beijing: Beihang University Press, 2021. [8] Y. Zhang, J. Liu, et al., Mastering STM32F4-Library Function Version, Beijing: Beihang University Press, 2015.

"STM32 Electronic System Design and Engineering Application"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
1. Introduction and Preliminary Knowledge	1. Overview of embedded systems, introduction to ARM architecture; 2. Introduction to STM32 series microcontrollers and development boards; 3. Development and application of STM32.	2	1	1. Retrieval of STM32 series microcontroller datasheets and price research and search. (1 class hour)	1. Teacher-student interaction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Internal Structure and Working Principle of STM32	1. Interpretation of STM32 chip resources; 2. Development environment setup and program download methods; 3. New project templates (based on firmware library, based on registers).	2	3	1. Pre-class preview: Watch Rain Classroom microlecture videos and preview lecture PPTs. (1 class hour) 2. Development environment setup: Installation of MDK5 and program download software. (1 class hour) 3. Post-class practical homework: Create new project templates (1 class hour)	1. Rain Classroom Platform automatically records video viewing progress. 2. Check whether students have completed the installation of relevant software and environment setup on their computers before class. 3. Check whether students have created new project templates on their computers before class.
3. Working Principle and Register Configuration of GPIO	1. Basic structure and working methods of GPIO; 2. GPIO-related registers and library functions; 3. GPIO application examples (running light experiments based on library functions, registers and bit operations)	4	5	1. Pre-class preview: Watch Rain Classroom microlecture videos and preview lecture PPTs. (2 class hours) 2. Post-class practical homework: Simulation of complex pattern running lights. (3 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Verify simulation effectiveness through group discussions and teacher-student interaction.
4. Working Principle and Application of STM32 System Clock	1. Clock system block diagram, functions and definitions of clock configuration-related registers; 2. SystemInit clock system initialization function; 3. Calculation method of register	2	3	1. Pre-class preview: Watch Rain Classroom microlecture videos and preview lecture PPTs. (1 class hour) 2. Post-class homework: Interpret example source code (2 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Check mastery of source code-related algorithms through questioning and interaction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	addresses mapped by register address names.				
5. Interrupt System	1. Basic concepts of interrupts, interrupt management methods, interrupt priority setting; 2. I/O port mapping relationship of external interrupts in STM32, setting of external interrupt library functions; 3. Design ideas and configuration process of external interrupts; 4. Interrupt application examples.	2	3.5	1. Pre-class preview: Watch Rain Classroom microlecture videos and preview lecture PPTs. (1 class hour) 2. Post-class practical homework: Simulate lighting LEDs and controlling LED flipping with keys in interrupt mode (2.5 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Randomly check the simulation effect of interrupt practical homework (simulation).
6. STM32 Timers	1. Counter modes: up-counting, down-counting, up/down counting modes; 2. Timer working process and concepts of four registers in the time base unit; 3. Timer function setting and timer interrupt implementation steps; 4. Timer application examples.	2	3	1. Pre-class preview: Watch Rain Classroom microlecture videos and preview lecture PPTs. (1 class hour) 2. Post-class practical homework: Control LED on/off or motor start/stop in timing mode. (2 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Randomly check the simulation effect of timer control.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
7. Comprehensive Design of Electronic Information Systems Based on STM32	1. Explain the basic process of practical case design of STM32 embedded systems, including project topic selection, scheme design, hardware construction, software programming, debugging and testing, summary report, etc. 2. Select typical practical cases for analysis, such as calendar, traffic lights, etc. Explain the design ideas, implementation process and key technical points of the cases. 3. Require students to freely design an STM32-based electronic product system.	2	6	1. Pre-class preview: Watch Rain Classroom microlecture videos and preview lecture PPTs. (1 class hour) 2. Post-class practical homework: Freely design a simple STM32-based electronic product system (5 class hours)	1. Rain Classroom Platform automatically records video viewing progress. 2. Randomly select some students for on-site defense to verify completion effect.
8. Final examination	Systematic design	0	10	1. Require students to freely design an STM32-based electronic product system, including: online information retrieval, formulating detailed design schemes, hardware circuit design, software program design, test schemes and test results, design reports (including project background, design schemes, software and hardware design, testing and conclusions, etc.).	1. Instructor on-site defense: Students demonstrate and conduct on-site defense. 2. Instructor: Evaluate design reports
Subtotal (Theoretical Teaching)		16	34.5		

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical Teaching					
1. Experiment 1 (Confirmatory)	Running Lights and Key Input Experiment: Familiarize with Keil and other development environments for program writing, compilation, download and debugging, learn to create new projects and write programs using library functions. Master the GPIO configuration methods of STM32 microcontrollers, including port, input or output mode and other related configurations. Control the level state of I/O ports through programming to realize the control of external devices.	4	5	1. Familiarize with the development environment; (1 class hour) 2. Draw program flowcharts according to design ideas, build project frameworks in Keil 5, and write core functions for the corresponding experiments. (2 class hours) 3. Submit experimental reports: Including experimental purposes, hardware schematic diagrams, program flowcharts, core codes. Detailedly record at least 1-2 problems encountered, and explain how to analyze and solve them. (1 class hour)	1. Pre-class document check: Require submission of hardware Proteus simulation files, Keil programs and flowchart files before class; 2. On-site acceptance of experimental results; 3. Experimental report review.
2. Experiment 2 (Design-Oriented)	External Interrupt Application: GPIO pin initialization, external interrupt initialization, configure external interrupt lines, set interrupt trigger modes, and enable interrupt lines. Configure interrupt priority and enable interrupt channels through NVIC. Write interrupt service programs and conduct program	4	4	1. Read example source code and draw hardware schematic diagrams; (1 class hour) 2. Draw program flowcharts according to experimental requirements, build project frameworks in Keil 5, and write core functions for the corresponding experiments. (2 class hours) 3. Submit experimental reports: Including	1. Pre-class document check: Require submission of hardware Proteus simulation files, Keil 5 programs and flowchart files before class; 2. On-site acceptance of experimental results; 3. Experimental report review.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	debugging and testing.			experimental purposes, hardware schematic diagrams, program flowcharts, core codes. (1 class hour)	
3. Experiment 3 (Design-Oriented)	Timer Interrupt Application: Initialize the general timer of STM32, enable the timer interrupt, set the priority of the timer interrupt through NVIC, and enable the timer interrupt channel. Write interrupt service functions and conduct program debugging and testing.	4	5	1. Read example source code and draw hardware schematic diagrams; (1 class hour) 2. Draw program flowcharts according to experimental requirements, build project frameworks in Keil, and write core functions for the corresponding experiments. (3 class hours) 3. Submit experimental reports: Including experimental purposes, hardware schematic diagrams, program flowcharts, core codes. (1 class hour)	1. Pre-class document check: Require submission of hardware Proteus simulation files, Keil programs and flowchart files before class; 2. On-site acceptance of experimental results; 3. Experimental report review.
4. Experiment 4 (Comprehensive)	Free Project Design: Digital Voltmeter, Simple Frequency Meter, Calendar, Traffic Lights, Serial Communication (Optional)	4	7	1. Conduct project demand analysis, formulate detailed design schemes, including hardware circuit design and software program design. Draw program flowcharts, build project frameworks in Keil, and write core functions for the corresponding experiments. (3 class hours) 2. Draw hardware schematic diagrams and complete software frameworks; (3 class hours).	1. Pre-class document check: Require submission of hardware Proteus simulation files, Keil programs and flowchart files before class; 2. On-site acceptance of project results; 3. Project summary report review.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				3. Submit project summary reports: Including project background, design schemes, implementation processes, test results, etc. (1 class hour)	
5. College Students' Innovation and Entrepreneurship Training Program and Disciplinary Competitions	1. College Students' Innovation and Entrepreneurship Training Program (Embedded System Design) 2. Disciplinary Competitions (National and Hunan Provincial Electronic Design Competitions, National Embedded System Design and Application Competitions, etc.)	0	15	1. Project application, design and completion (average 6 class hours per student). 2. Independent practice in disciplinary competition laboratories (average 9 class hours per student).	1. Completion certificates of College Students' Innovation and Entrepreneurship Training Programs 2. Award certificates of national, provincial and university-level competitions
Subtotal (Practical Teaching)		16	36		
Total		32	70.5	**Total Hours = 102.5 class hours**	
Credit points (ECTS)		3.4			

Robot Development

Competence field	Engineering application
Curriculum designation	Robot Development
Curriculum code	9061324020
Semester(s) in which the curriculum is taught	5th Semester
Person responsible for the curriculum	Lincheng Zhang
Lecturer	Lincheng Zhang, Depeng Chen, Wenguo Li
Language	Chinese
The relationship between the curriculum and the major	"Robot Development" is an elective course on the professional platform for electronic information Engineering. This course focuses on the basic mathematical foundations of robotics, kinematic and dynamic principles, robot control principles, robot trajectory planning, robot sensors and robot programming, etc. It emphasizes the basic structure, basic principles and related development techniques of simple robots, and its task is to enable students to learn the basic knowledge of robots from both theoretical learning and application perspectives. Understand the working principles and cutting-edge development trends of robots, master their application theories and technologies, establish the overall concept of robot application and development, be familiar with robot development methods and processes, initially master the design methods of robot development from the combination of theory and practice, and initially possess the ability to analyze, apply, design and develop robot systems.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + experiment Teaching hours (Contact hours): 48 hours Among them: Theoretical instruction: 32 class hours Laboratory/practical teaching: 16 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 105 class hours; Contact hours = 48 hours; Self-study hours = 57 hours;
Credit points (ECTS)	3.5
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics A(1), Advanced Mathematics A(2), C Language Programming A, College Physics

Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is for students to learn the basic knowledge of robots from both theoretical and practical perspectives, understand the working principles and cutting-edge development trends of robots, master their application theories and technologies, establish an overall concept of robot application and development, familiarize themselves with robot development methods and processes, and initially master the design methods of robot development from the combination of theory and practice. Have an initial ability to analyze, apply, design and develop robot systems. **Knowledge:** Understand the basic structure, fundamental principles, and basic methods of robots. Including basic mathematical knowledge of robots, robot kinematics, robot dynamics, control of robot force and position, robot sensors, robot trajectory planning, and robot programming, etc. **Skills:** 1. Be able to understand and master the most popular or newly launched new types of robots and related technologies in the market, related software debugging tools, and basic methods of related development and design; Be able to propose overall solutions based on complex engineering problems and design robot units or processes that meet specific requirements. 2 Be able to design reasonable experimental steps according to the experimental plan, be able to use the relevant software of the robot correctly, complete the relevant design and development of simple robots through professional and mature robot development platforms, be able to debug, analyze the experimental results and draw reasonable and effective conclusions; Have the ability to summarize, organize and express the purpose, principle, content, steps, results and analysis of experiments in writing, and be able to write experimental reports and design documents for embedded systems and applications. **Ability:** Be able to design, develop, debug and test robot application products using robot software and hardware development platforms and related tools, enable students to master robot-related technologies, with application as the center, from the product perspective, master the cross-application of electronic technology, computer technology, software engineering and other technologies,

	establish the overall thinking and process of product development, Apply theory to practice and lay a technical foundation for students' future employment.
Contents	**Theoretical instruction (32 contact hours, 36 self-study hours)** Chapter 1 Introduction to Robotics (2 contact hours, 1 self-study hour) 1. Basic knowledge of robots; 2. Research fields related to robots; 3. The composition and characteristics of robots. Chapter 2 Mathematical Foundations (6 contact hours, 4 self-study hours) 1. Pose and coordinate system description; 2. Coordinate mapping; 3. Homogeneous coordinate transformation; 4. Object transformations and transformation equations; 5. General rotation transformations. Chapter 3 Kinematics of Robots (6 contact hours, 5 self-study hours) 1. Overview of Robot kinematics; 2. Representation of robot motion equations; 3. Solving the robot motion equation; 4. Examples of robot motion analysis; 5. Robot Jacobian matrix calculations. Chapter 4 Robot Dynamics (4 contact hours, 5 self-study hours) 1. Lagrange equations; 2. Newton-euler equation 3. The dynamic equation of the manipulator; 4. Dynamic characteristics of the robot; 5. Static characteristics of the manipulator. Chapter 5 Robot Position and Force Control (4 contact hours, 3 self-study hours) 1. Overview of Robot Control and Drives; 2. Position control; 3. Force and position hybrid control; 4. Decompose motion control. Chapter 6 Robot Sensors (4 contact hours, 3 self-study hours) 1. Overview of Robot sensors;

	2. Internal sensors; 3. External sensor; 4. Robot vision device. Chapter 7 Robot Trajectory Planning (4 contact hours, 3 self-study hours) 1. Overview of Robot Trajectory Planning; 2. Interpolation calculation of joint trajectories 3. Cartesian path trajectory planning; 4. Real-time generation of planned trajectories; Chapter 8 Robot Programming (2 contact hours, 4 self-study hours) 1. Programming requirements and language types; 2. Language systems and basic functions; 3. Common programming languages; 4. Offline programming for robots; Final review: (0 contact hours, 8 self-study hours) **Experimental teaching (16 contact hours, 21 self-study hours)** Experiment Item 1: Simulation of Robot Coordinate System transformation. (4 contact hours, 6 self-study hours) Experiment: Translation, rotation and coincidence transformation of the robot coordinate system through matlab simulation. Experiment Item 2: Representation and Solution of Kinematic Equations for robots. (8 contact hours, 12 self-study hours) Experiment Content: 1 Focus on learning to use the Link function to establish the DH parameter table of the link; 2 Focus on learning to use the Seria lLink function to build a serial robot model; 3 Learn to use teach for robot modeling teaching; 4 Learn to use the jtraj function for robot trajectory planning; 5 Learn to use the fkine function for robot forward kinematics simulation; 6 Learn to use ikine functions to solve the inverse kinematics of robots Experiment Item 3: Robot Trajectory Planning. (4 contact hours, 3 self-study hours) Experiment Content: 1 Be familiar with polynomial

	interpolation methods for joint spatial trajectories; 2. Master interpolation calculations for joint spatial trajectories - cubic polynomial interpolation and linear interpolation with parabolic transitions 3. Program for trajectory planning based on the requirements of the joint spatial trajectory.
Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. In-class interaction (5%) : answering questions in class, etc 3. Assignments and experiments (25%) : Experiment reports. 4. Final assessment (60%) : final exam.
Media employed	Multimedia computers, projectors, laser Pointers, blackboards, chalk, matlab, etc
Reading list	1. Textbooks [1] Z. Cai, Ed., Robotics, Beijing: Tsinghua University Press, 2022. 2. Reference book [1] K. Chen, Robot Technology and Application, Beijing: Tsinghua University Press, 2006.

“Robot Development” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Introduction to Robotics	1. Basic knowledge of robots; 2. A field of study related to robotics; 3. The composition and characteristics of robots.	2	1	1. Pre-class information search: What do you think are the most cutting-edge technologies and application areas in the field of robotics in the past five years? (1 class hour)	1. Random interactive questions and answers in class.
2. Mathematical and physical foundations	1. Pose and coordinate system description; 2. Coordinate mapping; 3. Homogeneous coordinate transformation; 4. Object transformations and transformation equations; 5. General rotation	6	4	1. Pre-class preview: Review the knowledge related to matrices in advanced mathematics and coordinate mapping, and preview the lecture PPT 2. Complete self-study of robot equivalent general rotation transformation. (2 class hours) 3. After-class assignment: Submit exercises related to coordinate transformation. (2 class hours)	1. Random interactive questions and answers in class. 2. Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	transformations.				
3 Kinematics of robots	1. Overview of robot kinematics; 2. Representation of robot motion equations; 3. Solving the robot motion equation; 4. Examples of robot motion analysis; 5. Robot Jacobian matrix calculations.	6	5	1. Query and study the common methods of robot modeling and their corresponding advantages and disadvantages (1 class hour) 2. Pre-class preview: Preview the lecture PPT. (3 class hours) 3. Homework: Complete the corresponding exercises on robot kinematics. (1 class hour)	1. Random interactive questions and answers in class. 2. Exercise correction. 3. Random quizzes in class.
4. Robot dynamics	1. Lagrange equations; 2. Newton-euler equations; 3. The dynamic equation of the manipulator; 4. Dynamic characteristics of the robot; 5. Static characteristics of the manipulator.	4	5	1. Pre-class preview: Preview the lecture PPT. (1 class hour) 2. Complete the installation of the robot simulation software matlab (2 credits) 3. Complete self-study of simplified calculations for robot dynamics. (2 credits)	1. Random interactive questions and answers in class. 2. Check whether the students' computers have completed the installation of relevant software and the setup of the environment. 3. Random quizzes in class.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
5. Robot position and force control	1. Overview of Robot Control and Drives; 2. Position control; 3. Force and position hybrid control; 4. Decompose motion control.	4	3	1. Pre-class preview: Preview the lecture PPT. (1 class hour) 2. After-class tasks: Search and learn about the control structures and control types of common robots available on the market, and self-study the decomposition motion of robots. (2 class hours)	1. Classroom interactive questions and answers. 2. Random quizzes in the classroom.
6. Robot sensors	1. Overview of robot sensors; 2. Internal sensors; 3. External sensor; 4. Robot vision device.	4	3	1. Preview before class: Preview the teaching PPT. (1 class hour) 2. Pre-class information inquiry: Complete the research of all sensors on the sweeping robot and inquire about the working principle, parameters and uses of all sensors, etc. (2 class hours)	1. Classroom interactive questions and answers. 2. Random discussions in class.
7. Robot trajectory planning	1. Overview of Robot Trajectory planning; 2. Interpolation calculation of joint trajectories; 3. Cartesian path trajectory planning; 4. Real-time generation of planned trajectories;	4	3	1. Pre-class preview: Preview the lecture PPT. (1 class hour) 2. Design a relevant trajectory calculation experiment project for a multi-link robotic arm (1 credit hour) 3. Homework: Complete the calculation assignment related to robot trajectory planning. (1 class hour)	1. Classroom interactive questions and answers. 2. Random discussions in class. 3. Homework correction

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
8. Robot programming	1. Programming requirements and language types; 2. Language systems and basic functions; 3. Common programming languages; 4. Offline programming for robots	2	4	1. Pre-class preview: Preview the lecture PPT. (1 class hour) 2. Self-study basic knowledge of robot python programming (2 hours) 3. Look up programming examples of PUMA robots and reproduce them. (1 class hour).	1. Classroom interactive questions and answers. 2. Random discussions in class. 3. Homework correction
9. Final exams	Students prepare and review	0	8	1. Review key points and consolidate difficult points; 2. Review classroom experiments, etc.	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, establish wechat groups, and check in daily for record. 2. Teacher supervision: Set up fixed offline or online Q&A sessions. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by counselors: Visiting student dormitories during the review week to supervise and inspect.
(Theoretical teaching) Tips		32	36		

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical teaching					
1. Experiment One (Confirmatory)	Simulation of robot coordinate system transformation	4	6	1. Install matlab and reboot tool and master the basics of matlab programming (2 class hours) 2. Write a robot coordinate homogeneous transformation program and visualize it. (2 credits) 3. Submit the experiment report: including the purpose, principle, steps, results and core code of the experiment. And record in detail at least 1-2 problems encountered, explaining how they were analyzed and solved. (2 class hours)	1. Pre-class document check: The software and corresponding tools are required to be installed before class; 2. On-site acceptance of experimental simulation results; 3. Review of the experiment report.
2. Experiment Two (Design-oriented)	Representation and solution of kinematic equations for robots	8	12	1. Establish the PUMA six-link robot model using the reboot tool (2 class hours) 2. Derive the kinematic equations of the six-link robotic arm and write the corresponding program to simulate the forward kinematics of the robot; (4 class hours) 3. Derive the solution of the kinematic equation of the six-link robotic arm and write the corresponding program; (4 class hours) 4. 4 Submit the experiment report: including the purpose, principle, steps, results and core code of the experiment. And record in detail at least 1-2	1. On-site acceptance of experimental results; 2. Review of experimental reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				problems encountered, explaining how they were analyzed and solved. (2 class hours)	
3. Experiment 3 (Design)	Robot trajectory planning	4	3	1. Design the trajectory of a six-link robotic arm end effector, derive cubic polynomial interpolation and linear interpolation with parabolic transition formulas, and write the corresponding program (4 contact hours, 3 self-study hours) 2. Submit the experiment report: including the purpose, principle, steps, results and core code of the experiment. And record in detail at least 1-2 problems encountered, explaining how they were analyzed and solved. (1 class hour)	1. On-site acceptance of experimental results; 2. Review of experimental reports.
(Practical Teaching) Tips		16	21		
Total		48	57	Total hours = 105 hours	
Credits (ECTS)		3.5			

FPGA Principles and Applications

Competence field	Engineering application
Curriculum designation	FPGA Principles and Applications
Curriculum code	9061324040
Semester(s) in which the curriculum is taught	6th Semester
Person responsible for the curriculum	Yaqi Deng
Lecturer	Yaqi Deng, Lincheng Zhang
Language	Chinese
The relationship between the curriculum and the major	"FPGA Principles and Applications" is a self-developed elective course that combines theory with practice for the electronic information engineering major. This course covers knowledge of hardware technology, software technology, interface technology and development tools of FPgas. Through this course, students will master the structure of FPgas, the basic methods and statements of VHDL programming, understand and master the design methods of FPGA application systems, develop the ability to program based on the FPGA hardware platform, and have the basic qualities and abilities to engage in FPGA-based development and research work. Lay a solid foundation for the future use or design of FPGA application systems.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + experiment Teaching hours (Contact hours): 48 hours Among them: Theoretical instruction: 32 class hours Laboratory/practical teaching: 16 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 114 class hours; Contact hours = 48 hours; Self-study hours = 66 hours;
Credit points (ECTS)	3.8
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics A(1) Advanced Mathematics A(2), Circuit Analysis, Analog Electronic Technology, Digital Electronic Technology
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to enable students to gain an in-depth understanding of the principles and applications of

	FPgas and master the design and development methods of FPGA systems. The specific objectives include: **Knowledge:** 1 Understand the structure and principles of FPgas; 2. Master FPGA chip design and development skills; 3.Understand FPGA control systems and interface technology, and master application system configuration and interface technology; 4. Be able to compare and evaluate FPGA design schemes by integrating engineering knowledge and hardware languages such as VHDL. **Skills:** 1. Master programming knowledge and system utility programming; 2. Be able to propose systematic solutions to specific engineering problems, determine design goals, technical requirements indicators, development cycles and processes, etc. **Ability:** 1. Master the methods of simulating, analyzing and computer-aided design of FPGA control systems using professional software; 2. Conduct simple product development.
Contents	**Theoretical instruction (32 contact hours, 50 self-study hours)** Chapter 1: Overview of Programmable Logic Devices (2 contact hours, 0.5 self-study hours) 1. Basic structure and circuit representation of programmable logic devices; 2. Classification of PLDS. Chapter 2: Large-scale Programmable Logic Devices CPLD/FPGA (2 contact hours, 2 self-study hours) 1. Complex Programmable Logic Device (CPLD) structure principles; 2. Field Programmable Gate Array (FPGA) structure principles; 3. PLD Product introduction, programming, configuration. Chapter 3: Introduction to QuarusII Design Software (2 contact hours, 2.5 self-study hours) 1. Software features Introduction, Design Input, Project compilation and matching, Project simulation and timing analysis, device programming download;

	2. Introduction to Common Design Input Methods: Schematic design input method, Text Design input (VHDL) method Introduction, Waveform input Method Introduction, Hierarchical Design Input Method Introduction; 3 Basic Applications: Project design input, project compilation and adaptation, project functional simulation and timing analysis, pin reallocation and positioning, device download programming and hardware implementation. Chapter 4: Hardware Description Language VHDL (8 contact hours, 10 self-study hours) 1. Basic structure of VHDL language; 2. Basic knowledge of VHDL; 3. The main descriptive statements of VHDL: sequential statements, parallel statements; 4. Subroutines, packages, libraries, and configurations; 5. Examples of VHDL design. Chapter 5: Basic VHDL Descriptive Statements (8 exposure hours, 10 self-study hours) 1. Sequential statements: Algorithmic descriptions used to implement the model; 2. Parallel statements are used to indicate the connection relationship between the algorithm descriptions of each module. Chapter 6: VHDL Description of Common Circuits (8 contact hours, 10 self-study hours) 1. VHDL language pairs for combinational logic circuit design; 2. VHDL language for sequential logic circuit design 3 Design memory in VHDL language Chapter 7: VHDL Design Application Examples (2 contact hours, 3 self-study hours) 1 Use VHDL correctly to develop and design 8-bit adders; 2 Design the PWM signal generator using VHDL correctly; 3. Develop and design traffic light signal controllers using VHDL correctly. Chapter 8: Final Exam (0 contact hours, 12 self-study hours) 1. Students prepare and review for the exam. **Experimental teaching (16 contact hours, 16 self-study hours)**

	Experimental Project 1: An Introductory Experiment with a bit full adder design (using circuit diagram input method) (2 contact hours, 2 self-study hours) Experiment Content: Design a half-adder circuit using the Quartus II schematic input method, generate component symbols through comprehensive analysis, establish a top-level schematic circuit, and complete the design of a one-bit full adder circuit. On this basis, waveform simulation, pin allocation and downloading to the experimental equipment for logical function verification were carried out Experiment Item 2: Design of a 2-digit Decimal Counter (using circuit diagram input method) (2 contact hours, 2 self-study hours) Experiment Content: Design a 2-digit decimal counter using the Quartus II schematic input method, perform waveform simulation, pin allocation, and download to the experimental device for logical function testing. Experiment Item 3: Design of Display Decoder (2 contact hours, 2 self-study hours) Experiment: Design a 7-segment digital display decoder using the VHDL text design method in the Quartus II integrated environment. Based on the decoder's working characteristics, conduct waveform simulation and analysis, pin allocation, and download to the experimental device for functional testing. Experiment Item 4: Design of 8-bit adder (2 contact hours, 2 self-study hours) Experiment Content: Design an 8-bit adder using the VHDL text design method in the Quartus II integrated environment, perform waveform simulation, pin assignment, and download to the experimental device for logical function verification. Experiment Item 5: Design of 3-line - 8-line Decoders (2 contact hours, 2 self-study hours) Experiment Content: Design a 3-wire - 8-wire decoder using VHDL text design method in the Quartus II integrated environment, perform waveform simulation and analysis, pin assignment and download to the experimental device for functional testing. Experiment Item 6: Design of Decimal Addition Counter (2 contact hours, 2 self-study hours)

	Experiment Content: Design a decimal addition counter with synchronous counting enable and asynchronous reset function in the Quartus II environment, perform waveform simulation, pin allocation and download to the experimental device for logical function verification. Experiment Item 7: Design of a 4-bit Decimal Counting Display (2 contact hours, 2 self-study hours) Experiment Content: Based on the actual engineering problem, design, select and justify the scheme, first design the 4-digit decimal counter, then design the display decoder, and finally establish a top-level file to connect the first two. On this basis, waveform simulation, pin assignment and download to the experimental device for logical function verification. Experiment Item 8: State Machine Implementation Sequence Detector Design (2 contact hours, 2 self-study hours) Experimental content: Design a sequence detector for "01111110" Design and debug a pulse width numerical control modulation signal generator, perform waveform simulation, pin assignment and download it to the experimental equipment for logical function verification.
Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. Assignments (30%) : Assignments, lab reports. 3. Final assessment (60%) : final exam.
Media employed	Multimedia computer, projector, laser pointer, blackboard, chalk, Keil and Proteus software, single-chip microcomputer experiment box
Reading list	1. Youdaoplaceholder0 [1] W. Zhang, EDA Technology and FPGA Application Design, Beijing: Publishing House of Electronics Industry, 2023. 2. Reference book [1] H. Tan, EDA Technology and Applications, Xi'an: Xidian University Press, 2022. [2] H. Dong, H. Chen, and M. Tang, Fundamentals of Programmable Logic Devices, Beijing: Tsinghua University Press, 2018. [3] S. Zhou, FPGA/CPLD System Design and Application Development, Beijing: Publishing House of Electronics Industry, 2021. 3. educational website: http://www.intel.com.cn/

“FPGA Principles and Applications” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
1. Overview of Programmable Logic devices	1. Basic structure and circuit representation of programmable logic devices; 2. Classification of PLDS.	2	0.5	1. Homework: Complete exercises related to PLD classification, structure, and design process. (0.5 class hours)	1. Exercise correction.
2. Large-scale programmable logic devices (CPLD) /FPGA	1. Complex Programmable Logic Device (CPLD) structure principles; 2. Field Programmable Gate Array (FPGA) structure principles; 3. PLD Product introduction, programming, configuration.	2	2	1. Pre-class preview: Preview the teaching PPT. (1 class hour) 2. Homework: Complete exercises related to CPLD and FPGA. (1 class hour)	1. In-class questions: To test the effectiveness of previewing/reviewing. 2. Exercise correction.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
3. Introduction to QuarusII design software	1. Software features Introduction, Design input, project compilation and matching, Project simulation and timed analysis, device programming download; 2. Introduction to Commonly Used Design Input Methods: Schematic Design Input Method, Introduction to Text Design Input (VHDL) Method, Introduction to Waveform Input Method, Introduction to Hierarchical Design Input Method; 3 Basic Applications: Project design input, project compilation, project functional simulation and timing analysis, pin reallocation and positioning, device download programming and hardware implementation.	2	2.5	1. Pre-class preview: Preview the teaching PPT. (0.5 class hours) 2. Environment setup: Install Quartus II software and learn the basic knowledge of the software. (2 class hours)	1. In-class questions: To test the effectiveness of previewing/reviewing. 2 Check whether students' computers have completed the installation of relevant software and the setup of the environment.
4. Hardware Description Language VHDL	1. Basic structure of VHDL language; 2. Basic knowledge of VHDL; 3 Subroutines, packages, libraries, and configurations;	8	10	1. Pre-class preview: Preview the lecture PPT and review the corresponding digital circuit knowledge points. (4 class hours) 2. Homework: Complete exercises related to the basic components of VHDL and language elements. (3 class hours)	1. In-class questions: To test the effectiveness of previewing/reviewing. 2. Exercise correction. 3. Code comment review: Randomly review the program code after class to assess the detail and accuracy of the comments.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				3 Reproduce and comment on code, such as commenting on VHDL parameter sections, entity sections, struct sections, etc. (4 class hours)	
5. Basic description statements of VHDL.	1. Sequential statements: algorithmic descriptions used to implement the model; 2. Parallel statements are used to indicate the connection relationship between the algorithm descriptions of each module.	8	10	1. Pre-class preview: Preview the teaching PPT and review the corresponding digital circuit knowledge points. (4 class hours) 2. Homework: Complete exercises related to sequential and parallel statements in VHDL. (3 class hours) 3. Reproduction and annotation of code: VHDL sequential statements, parallel statements. (4 class hours)	1. In-class questions: To test the effectiveness of previewing/reviewing. 2. Exercise correction. 3. Code comment review: Randomly spot-check the program code to assess the detail and accuracy of the comments.
6. VHDL descriptions of common circuits	1. VHDL language for combinational logic circuit design; 2. VHDL language for sequential logic circuit design 3 Design memory in VHDL language	8	10	1. Pre-class preview: Preview the lecture PPT and review the corresponding digital circuit knowledge points. (4 class hours) 2. Homework: Complete exercises related to the VHDL description of common circuits. (3 class hours) 3. Reproduction and annotation of code: VHDL descriptive related code for common circuits. (4 class hours)	1. Classroom questioning: To test the effectiveness of previewing/reviewing. 2. Exercise correction. 3. Code comment review: Randomly spot-check the program code to assess the detail and accuracy of the comments.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
7. VHDL design application examples	1. Use VHDL correctly to develop and design an 8-bit adder; 2 Design the PWM signal generator using VHDL correctly; 3. Develop and design traffic light signal controllers using VHDL correctly.	2	3	1. Pre-class preview: Preview the lecture PPT and review the corresponding digital circuit knowledge points. (1 class hour) 2. Reproduction and annotation of code: VHDL design examples in class. (2 class hours)	1. In-class questions: To test the effectiveness of previewing/reviewing. 2. Code comment review: Randomly spot-check the program code to assess the detail and accuracy of the comments.
8. Final exam	Students prepare and review	0	12	1. Review key points and consolidate difficult points; 2. Review class experiments, etc.	1. Form study groups for peer supervision: Group members agree on daily study time and tasks with each other, establish wechat groups, and check in daily for record. 2. Supervision by the course instructor: Set up fixed offline/online Q&A times. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by the counselor: Visiting student dormitories during the review week to supervise and inspect.
(Theoretical teaching) Tips		32	50		

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical teaching					
1. Experiment One	1-bit full adder: Design a half-adder circuit using the Quartus II schematic input method, generate component symbols through comprehensive analysis, and establish a top-level schematic circuit to complete the 1-bit full adder circuit design.	2	2	1. Review the VHDL language, understand the principle described in VHDL, and write the core function for the corresponding experiment; (1 class hour) 2. Submit experiment reports: including schematic files, waveform simulation files, device programming results, and on-board logic function test results. And record in detail at least 1-2 problems encountered, explaining how they were analyzed and solved. (1 class hour)	1. Pre-class document check: Request to submit the underlying files of the schematic diagram before class; 2. Laboratory report review.
2. Experiment Two	2-digit Decimal counter: Design a 2-digit decimal counter using Quartus II schematic input.	2	2	1. Review the VHDL language, understand the principles described in VHDL, and write the core functions for the corresponding experiments; (1 class hour) 2. Submit experiment reports: including schematic files, waveform simulation files, device programming results, and on-board logic function	1. Pre-class document check: Schematic files are required to be submitted before class; 2. Laboratory report review.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				test results. And record in detail at least 1-2 problems encountered, explaining how they were analyzed and solved. (1 class hour)	
3. Experiment Three	Display Decoder: Design a 7-segment digital display decoder using the VHDL text design method in the Quartus II integrated environment.	2	2	1 Review the VHDL language, understand the principle corresponding to the VHDL description, and write the core function corresponding to the experiment; (1 class hour) 2 Submit experiment reports: including waveform simulation files, device programming results, and logic function test results on the development board. And record in detail at least 1-2 problems encountered, explaining how they were analyzed and solved. (1 class hour)	1. Pre-class document check: VHDL core program files are required to be submitted before class; 2. Review of laboratory reports.
4. Experiment Four	Design of an 8-bit adder: Designing an 8-bit adder using the VHDL text design method in the Quartus II integrated environment.	2	2	1. Review the VHDL language, understand the principle corresponding to the VHDL description, and write the core function corresponding to the experiment; (1 class hour) 2. Submit experiment reports:	1. Pre-class document check: VHDL core program files are required to be submitted before class; 2. Review of laboratory reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				including waveform simulation files, device programming results, and logic function test results on the development board. And record in detail at least 1-2 problems encountered, explaining how they were analyzed and solved. (1 class hour)	
5. Experiment Five	3-line - 8-line decoder: Designing a 3-line - 8-line decoder using VHDL text design methods in the Quartus II integrated environment.	2	2	1. Review the VHDL language, understand the principle corresponding to the VHDL description, and write the core function corresponding to the experiment; (1 class hour) 2. Submit experiment reports: including core code, waveform simulation files, device programming results, and logic function test results on the development board. And record in detail at least 1-2 problems encountered, explaining how they were analyzed and solved. (1 class hour)	1. Pre-class file check: It is required to submit the VHDL core program file before class. 2. Review of laboratory reports.
6. Experiment Six	Decimal Addition Counter: Design a decimal addition counter with synchronous	2	2	1. Review the VHDL language, understand the principle corresponding	1. Pre-class document check: VHDL core program files are required to be

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	count enable and asynchronous reset function.			to the VHDL description, and write the core function corresponding to the experiment; (1 class hour) 2. Submit the experiment report: including the core code of the experiment, waveform simulation file, device programming results, and logical function test results on the development board. And record in detail at least 1-2 problems encountered, explaining how they were analyzed and solved. (1 class hour)	submitted before class; 2. Review of laboratory reports.
7 Experiment Seven	4-digit decimal counter display: Design the 4-digit decimal counter first, then the display decoder, and finally create a top-level file to connect the former two.	2	2	1. Review the VHDL language, understand the principle corresponding to the VHDL description, and write the core function corresponding to the experiment; (1 class hour) 2. Submit experiment reports: including core code, waveform simulation files, device programming results, and logic function test results on the development board. And record in detail at least 1-2 problems	1. Pre-class file check: The VHDL program underlying file of the 4-digit decimal counter is required to be submitted before class; 2 Review of the experiment report.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				encountered, explaining how they were analyzed and solved. (1 class hour)	
8. Experiment Eight	State Machine Implementing Sequence Detector: Designing a sequence detector for "01111110"	2	2	1. Review the VHDL language, understand the principles described in VHDL, and write the core functions for the corresponding experiments; (1 class hour) 2. Submit experiment report: Include core code, waveform simulation file, pin lock and hardware download test results, and answer experiment thinking questions. And record in detail at least 1-2 problems encountered, explaining how they were analyzed and solved. (1 class hour)	1. Pre-class document check: VHDL core program files are required to be submitted before class; 2. Review of laboratory reports.
(Practical Teaching) Tips		16	16		
Total		48	66	Total hours = 114 hours	
Credits (ECTS)		3.8			

Principles and Applications of Embedded Systems

Competence field	Engineering application
Curriculum designation	Principles and Applications of Embedded Systems
Curriculum code	9061324050
Semester(s) in which the curriculum is taught	6th Semester
Person responsible for the curriculum	Lincheng Zhang
Lecturer	Lincheng Zhang, Depeng Chen.
Language	Chinese
The relationship between the curriculum and the major	"Principles and Applications of Embedded Systems" is an elective course on the professional platform for electronic information Engineering. This course focuses on ARM-based microprocessors and real-time operating system Linux, emphasizing the basic structure and principles of embedded system hardware and the basic techniques of related software development. The task is to enable students to learn the basic knowledge of embedded systems from the perspective of software and hardware applications, understand the working principles and cutting-edge development trends of embedded systems, Master the application theory and application technology, establish the overall concept of embedded system application and development, be familiar with the hardware circuit principles and software development methods and processes of embedded systems, and initially master the design methods of embedded system application from the combination of theory and practice, and initially possess the ability to analyze application and design development of embedded systems.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Theory + experiment Teaching hours: 64 hours Among them: Theoretical instruction: 48 hours Laboratory/practical teaching: 16 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 150 class hours; Contact hours = 64 hours; Self-study hours = 86 hours;
Credit points (ECTS)	5.0
Requirements according to the examination regulations	Only students with a class attendance rate of more than two-thirds and a homework completion rate of more than two-thirds are eligible to take the exam.

Prerequisite curriculum	Computer Basics, Principles and Applications of Single-Chip Microcomputers, Principles and Applications of Microcomputers, Embedded Linux Operating System, C Language Programming.
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to provide students with an in-depth understanding of the principles and applications of ARM embedded systems and to master the design and development methods of ARM embedded systems. The specific objectives include: **Knowledge:** Understand the basic structure, fundamental principles, and fundamental methods of ARM-based embedded systems. Including the basics of embedded systems, ARM architecture and programming model, ARM instruction system, ARM application system hardware design, introduction to Linux system, Linux programming basics, Bootloader, Linux kernel porting, etc. **Skills:** 1、Be capable of designing, developing, debugging and testing embedded application products using software and hardware tools such as ARM embedded hardware platform and Ubuntu operating system. 2、It enables students to master embedded technology on the basis of application, from the product perspective, master the cross-application of electronic technology, computer technology, software engineering and other technologies, establish the overall thinking and process of product development, apply theory to practice, and lay a technical foundation for students' future employment. **Ability:** 1. Be able to understand and master the basic methods of developing and designing the most popular or newly launched new processors and other related chips, software debugging tools, operating systems and application software, etc. 2 Be able to design reasonable experimental steps according to the experimental plan, be able to correctly use the relevant development board of the ARM hardware platform, complete the relevant design and development of applications under Linux through the linux operating system platform, be able to debug, analyze experimental results and draw reasonable and effective conclusions. 3 Have the ability to summarize, organize and express the purpose, principle, content, steps, results and analysis of

	experiments in writing, and be able to write experimental reports and design documents for embedded systems and applications.
Contents	**Theoretical instruction (48 contact hours, 66 self-study hours)** Chapter 1: Introduction to Embedded Systems. (4 contact hours, 2 self-study hours) 1、The concept, composition, characteristics and classification of embedded systems 2、Applications of embedded systems 3、Trends in embedded systems 4、Design and development methods for embedded systems; Chapter 2: ARM Architecture and Programming Model (6 contact hours, 4 self-study hours) 1、The architecture of ARM microprocessors and the performance of each series of processors; 2、The operating mode, working mode and status of ARM processors 3、ARM register/memory organization; 4、ARM exception. Chapter 3: ARM Instruction System (4 contact hours, 4 self-study hours) 1、Version of the ARM Instruction System 2、ARM microprocessor instruction format 3、The addressing mode of ARM microprocessor instructions 4、ARM instruction classification. Chapter 4: ARM Assembly Programming (2 exposure hours, 2 self-study hours) 1、ARM assembly pseudo-instructions and macro instructions 2、ARM ATPCS 3、ARM Programming Chapter 5: Hardware Design for ARM Application Systems (8 contact hours, 6 self-study hours) 1、Introduction to S3C2410X 2、Development board peripheral circuit design 3、Development board interface circuit design 4、Other servo circuits

	Chapter 6: Introduction to Linux Systems (6 contact hours, 12 self-study hours) 1、Introduction to Linux 2、Installation of Ubuntu system 3、Common Linux commands 4、Linux Text editing Chapter 7: Basics of Linux Programming (8 contact hours, 8 Self-study hours) 1、Cross-development environment setup 2、Shell scripts 3、Makefile Chapter 8:.Bootloader(2 contact hours, 2 Self-study hours) 1、BootLoader Basics 2、ViVi 3、U-Boot Chapter 9: Linux Kernel Porting (2 contact hours, 2 Self-study hours) 1、The concept of Linux porting 2、Linux kernel and architecture 3、Linux Kernel porting Chapter 10: Embedded Linux Driver Development (2 contact hours, 2 self-study hours) 1、Fundamentals of device drivers 2、Driver development examples Chapter 11: Embedded Linux Application Development (4 contact hours, 6 self-study hours) 1、Network communication Protocols 2、linux Network Programming Basics 3、Embedded WEB server 4、Introduction to Embedded Graphics systems 5、Embedded GUI design Based on Qt/e 6、Qt Development Basics and Examples Final Review: (0 contact hours, 16 self-study hours) **Experimental teaching (16 contact hours, 20 self-study hours)** Experiment Item 1: Installation and Use of Ubuntu. (4 contact hours, 4 self-study hours) Experiment Content: Be able to install ubuntu independently,

	such as through a virtual machine or USB boot installation disk, and perform partitioning and configuration; And basic Ubuntu operations such as familiarity with the desktop environment, file management, terminal command usage, system Settings, software management, and network configuration. Experiment Project 2: Setting up a cross-development environment. (2 contact hours, 2 self-study hours) Experiment Content: Based on Experiment 1, configure the cross-compilation environment Ubuntu, familiarize yourself with the structure and wiring of the experiment box, achieve intercommunication between the host and target machines, and compile programs using the cross-compiler and run them on the experiment box, etc. Experiment Project 3: Embedded Development Design. (2 contact hours, 2 self-study hours) Experimental content: Based on the design requirements of the embedded system, perform hardware selection and design, software architecture design, implement software coding and module testing, software and hardware integration and debugging, and finally system optimization, testing, deployment and maintenance steps. Experiment Project 4: Design of Smart Terminal for 2048 Games Based on linux. (8 contact hours, 12 self-study hours) Experiment content: Conduct a project requirements analysis based on the actual project being carried out and develop a detailed design plan. Design and implement the game logic, including core functions such as board initialization, block movement and merging, and new number generation; Use the graphical interface library to design a clear and concise user interface that can display the game status in real time and respond to user input; Finally, conduct thorough testing and debugging to ensure the game runs stably and is fully functional. Through this experiment, students will gain an in-depth understanding of the embedded Linux application development process and enhance their programming practice skills. Finally, write the project summary report, including the project background, design plan, implementation process, test results, etc.
Study and examination requirements and forms of	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence).

examination	2. In-class interaction (5%) : answering questions in class, etc 3. Assignments and experiments (25%) : Experiment reports. 4. Final assessment (60%) : Final examination.
Media employed	Multimedia computers, projectors, laser Pointers, blackboards, chalk, Linux operating systems and Arm development boards, ARM embedded integrated experiment boxes, etc
Reading list	1. Textbook [1] Z. Chen, et al. Principles and Applications of ARM Embedded Technology[M], 12th ed. Beijing: Beihang University Press, 2023. 2. Reference Books [1] Y. F. Li, et al. ARM Embedded Linux System Development: From Beginner to Master[M]. Beijing: Tsinghua University Press, 2018. [2] J. K. Zhang and X. Q. Zhang, Detailed Explanation of Embedded Linux System Development Based on ARM[M]. Beijing: Posts & Telecom Press, 2010.

"Principles and Applications of Embedded Systems"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical Teaching					
Chapter 1: Introduction to Embedded Systems	1. The concept, composition, characteristics, and classification of embedded systems 2. Applications of embedded systems 3. Trends in embedded systems 4. Design and development methods for embedded systems;	4	2	1. Pre-class information search: What do you think are the most cutting-edge technologies and application areas in the field of embedded systems in the past five years? (1 class hour) 2. Pre-class preview: Preview the lecture PPT	1. Random interactive questions and answers in class.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Chapter 2: ARM Architecture and Programming Models	1. The architecture of ARM microprocessors and the performance of various series of processors; 2. The operating mode, working mode and status of ARM processors 3. ARM register/memory organization; 4. ARM anomaly.	6	4	1. Pre-class preview: Look up the mainstream ARM series processor categories, core structures and key parameters in the market, and preview the lecture PPT. (2 class hours) 2. Create your own "ARM register structure diagram" "Anomaly vector table". (2 class hours)	1. Random interactive questions and answers in class. 2. Project exercise test.
Chapter 3: ARM Instruction Systems	1. Versions of the ARM Instruction System 2. ARM microprocessor instruction format 3. The addressing mode of ARM microprocessor instructions 4. ARM instruction classification.	4	4	1. Check the developments related to ARM instructions at home and abroad (1 class hour) 2. Preview before class: Preview the lecture PPT. (1 class hour) 3. After-class exercise: Complete writing the corresponding ARM instructions based on Chinese instructions. (2 class hours)	1. Random interactive Q&A in class. 2. Random quizzes in class.
Chapter 4: ARM Assembly Programming	1. ARM assembly pseudo-instructions and macro instructions 2. ARM ATPCS 3. ARM Programming	2	2	1. Pre-class preview: Preview the lecture PPT. Focus on memorizing common pseudo-instruction syntax and get a preliminary understanding of macro instruction definition invocation (1 class	1. Random interactive questions and answers in class. 2. Random quizzes in class.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				hour) 2. Compile a brief table of core rules for ARM assembly pseudo-instructions and ATPCS (1 class hour)	
Chapter 5: Hardware Design for ARM Application Systems	1. Introduction to S3C2410X 2. Development board peripheral circuit design 3. Development board interface circuit design 4. Other servo circuits	8	6	1.Pre-class preview: Preview the lecture PPT. (2 class hours) 2.Based on the interface and circuit of the S3C2410X chip, search for and learn about another model of chip, and compare its advantages and disadvantages 3.After-class task: Prepare a table of core pin and peripheral circuit correspondence for other models of chips. (2 class hours)	1. Classroom interactive questions and answers. 2. Random quizzes in the classroom. 3. Homework correction
Chapter 6: Introduction to Linux Systems	1. Introduction to Linux 2. Installation of Ubuntu system 3. Common Linux commands 4. Linux Text editing	6	12	1. Pre-class preview: Preview the lecture PPT. (2 class hours) 2. Practice: Virtual Machine and ubuntu installation. (2 class hours) 3. Practice Exercises: ubuntu Common Command Operations (3 hours) 4. After-class Practice: Using and Practicing the Vi Editor (3 hours) 5. Comprehensive Practice on ubuntu operating System (2 hours)	1. Classroom interactive Q&A. 2. Random discussion in class. 3. Random tests in the classroom.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Chapter 7: Basics of Linux Programming	1. Cross-development environment setup 2. Shell scripts 3. Makefile	8	8	1. Pre-class preview: Preview the teaching PPT. (2 class hours) 2. Practical Operations in Shell usage and programming (4 credits) 3. Makefile writing and running of code examples (2 hours)	1. Classroom interactive questions and answers. 2. Random discussions in class. 3. Random tests in the classroom.
Chapter 8:.Bootloader	1. BootLoader Basics 2. ViVi 3. U-Boot	2	2	1. Pre-class preview: Preview the teaching PPT. (1 class hour) 2. Find the source code of any Bootloader and learn to rewrite the porting. (1 class hour).	1. Classroom interactive questions and answers. 2. Random discussions in class. 3. Random tests in the classroom.
Chapter 9: Linux Kernel Porting	The concept of Linux porting 1. Linux kernel and architecture 2. Linux Kernel porting	2	2	1. Pre-class preview: Preview the lecture PPT. (1 class hour) 2. Find source code for any version of the Linux kernel and learn to port. (1 class hour).	1. Classroom interactive questions and answers. 2. Random discussions in class. 3. Random tests in the classroom.
Chapter 10: Embedded Linux Driver Development	1. Device driver fundamentals 2. Driver development example	2	2	1. Pre-class preview: Preview the teaching PPT. (1 class hour) 2. Find the source code of any driver development instance and try to practice the development. (1 credit hour).	1. Classroom interactive questions and answers. 2. Random discussions in class. 3. Random tests in the classroom.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Chapter 11: Embedded Linux Application Development	Network communication protocols 1. linux Network Programming Basics 2. Embedded WEB server 3. Introduction to Embedded Graphics systems 4. Embedded GUI design based on Qt/e 5. Qt Development Basics and Examples	4	6	1. Pre-class preview: Preview the lecture PPT. (2 class hours) 2. Practical Assignment: Design any simple interface based on Qt/e. (4 hours).	1. Classroom interactive questions and answers. 2. Random discussion in class. 3. Random tests in the classroom.
Final exams	Students prepare and review	0	16	1. Review key points and consolidate difficult points; 2. Review class experiments, etc.	1. Form study groups for peer supervision: Group members agree on daily study time and tasks, establish wechat groups, and check in daily for record. 2. Teacher supervision: Set up fixed offline or online Q&A sessions. Judge the overall review situation of the class based on the frequency and depth of students' questions. 3. Supervision by counselors: Visiting student dormitories during the review week to supervise and inspect.
Subtotal (Theoretical Teaching)		48	66		

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical Teaching					
1. Experiment One (Confirmatory)	Installation and use of Ubuntu	4	4	1. Be able to install ubuntu independently, such as through a virtual machine or USB boot installation disk, and perform partitioning and configuration; And basic operations related to Ubuntu. (3 class hours) 2. Submit the experiment report: including the purpose, principle, steps, results and core code of the experiment. And record in detail at least 1-2 problems encountered, explaining how they were analyzed and solved. (1 class hour)	1. Pre-class document check: The software and corresponding tools are required to be installed before class; 2. On-site acceptance of experimental simulation results; 3. Review of the experiment report.
2. Experiment Two (Confirmatory)	The establishment of a cross-development environment	2	2	1. Based on Experiment 1, configure the cross-compilation environment Ubuntu, familiarize yourself with the structure and wiring of the experiment box, achieve interconnection between the host and target machines, and compile programs using the cross-compiler and run them on the experiment box, etc. (2 class hours)	1. On-site acceptance of experimental results;
3. Experiment Three (Design)	Embedded development design	2	2	1. Based on the design requirements of the embedded system, carry out hardware selection and design, software architecture	1. On-site acceptance of experimental results;

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				design, implement software coding and module testing, software and hardware integration and debugging, and finally system optimization, testing, deployment and maintenance steps. (2 class hours)	
4. Experiment Four (Verification)	Integrated design of embedded system instances	8	12	1. Based on the actual project being carried out, conduct a project requirements analysis and develop a detailed design plan. (2 class hours) 2. Project-related code development and debugging, etc. (8 credits) 3. Submit the experiment report: including the purpose, principle, steps, results and core code of the experiment. And record in detail at least 1-2 problems encountered, explaining how they were analyzed and solved. (2 class hours)	1. On-site acceptance of experimental results; 2. Review of experimental reports.
Subtotal (Practical Teaching)		16	20		
Total		64	86	Total hours = 150 hours	
Credit points (ECTS)		5.0			

Module Descriptions - Centralized practice

Labor education for college students

Competence field	Centralized practice
Curriculum designation	Labor education for college students
Curriculum code	9133315010
Semester(s) in which the curriculum is taught	1st Semester ~ 6th Semester
Person responsible for the curriculum	Li Wan
Lecturer	Li Wan, Yu Zhong, Huan Duan, Ting Zhang, Zhaoyu Zhou
Language	Chinese
The relationship between the curriculum and the major	"Labor education for college students" is an educational activity for students to love labor and love the working people by exerting the educational function of labor. Accurately grasp the requirements for cultivating the labor spirit, labor value orientation and labor skill level of socialist builders and successors, comprehensively improve students' labor literacy, and enable students to: establish correct labor concepts, possess necessary labor abilities, cultivate positive labor spirit, and develop good labor habits and qualities.
Teaching methods, number of teaching hours	Target students: all current undergraduate students Teaching method: Theoretical teaching + practical teaching Teaching hours (Contact hours): 5 hours Among them: Theoretical instruction: 4 class hours Laboratory/practical teaching: 1 class hour Class size: Organized by administrative class
Workload	Total workload = 47 class hours; Contact hours = 5 hours; Self-study hours = 42 hours;
Credit points (ECTS)	1.6
Requirements according to the examination regulations	Only students with a class attendance rate of two-thirds are eligible to participate in the examination.
Prerequisite curriculum	no
Curriculum objectives /expected learning outcomes	**Learning outcomes:** The main task of this course is to guide students to establish correct concepts of labor, understand the meaning and value of labor, master basic labor laws and regulations, and enhance labor literacy and practical ability. The specific objectives include: **Knowledge:** 1. Understand the basic concepts, goals and functions of labor education; 2. Master the basic viewpoints of Marx's labor theory of value and its significance for all-round development; 3. Understand the ideas of labor education at home and abroad and

	their development; 4. Be familiar with labor laws and regulations and knowledge of labor safety. **Skills:** 1. Have basic labor practice skills and be able to complete daily labor tasks such as campus cleaning and organizing; 2. Be able to apply labor knowledge to solve simple problems in real life. **Ability**: 1. Develop an attitude of respecting and loving labor; 2. Establish a correct view of labor and career; 3. Enhance teamwork skills and a sense of social responsibility.
Contents	**Theoretical instruction (4 contact hours, 0 self-study hours)** **Part 1: The Connotation and Extension of Labor Education in Higher Education Institutions (1 contact hour, 0 self-study hours)** 1. Analysis of the connotation 1.1 Specialized parts of the higher education system 1.2 Reflect the trend of labor development in the new era 1.3 Three major task areas: ideological education, skill development, and practical training 1.4 Main focus: Overall improvement of college students' labor literacy 1.5 Purpose orientation: The harmonious unity of intrinsic and extrinsic values 2. Extension analysis 2.1 Labor values: Internalized in the heart, externalized in action 2.2 Emotional attitude towards labor: Love for labor and creation 2.3 Labor virtues: Hard work, honest work and creative work 2.4 Work habits: Work hard and diligently 2.5 Labor knowledge and Skills: Systematic science education lays a solid foundation **Part 2: Principles for Strengthening Labor Education in Colleges and Universities in the New Era (1 contact hours, 0 Self-study hours)** 1. Ideological principles 2. The principle of The Times 3. Systematization principle 4. Innovation Principle 5. The principle of synergy **Part 3: Design of the Implementation System for Labor Education in Colleges and Universities in the New Era (1 contact hours, 0 self-study hours)** 1. Curriculum construction 2. Integrate with ideological and political education

	3 Combine with professional education 4 Combine with practical training 5 Combine with social practice and volunteer service 6. Integrate with innovation and entrepreneurship education 7. Integrate with industry-education integration 8. Integrate with career education and employment guidance 9. Integrate with campus culture **Part 4: Daily Labor and Life Practice (0.5 contact hours, 0 Self-study hours)** 1. Self-service labor 2. Guidance on home labor practice 3. School labor practice guidance **Part 5: Labor Legal Rights and Labor Safety (0.5 contact hours, 0 self-study hours)** 1. System of labor laws and regulations 2. Labor Contracts and Labor Standards Law 3. Labor disputes and resolution 4. Labor protection and labor safety **Practical teaching (1 contact hour, 42 self-study hours)** Practice Project 1: Campus cleaning. (0.3 contact hours, 4 self-study hours) Practice: Participate in two cleaning sessions of the campus cleaning area by class, and be inspected by the instructor after completion. Practice Project 2: Clearing weeds. (0.2 contact hours, 4 self-study hours) Practice: Each class participates in two rounds of weeding in the campus cleaning area, and the instructor inspects after completion. Practice Project 3: Laboratory/Training Room tidying and maintenance. (0.5 contact hours, 4 self-study hours) Practice: Participate in two rounds of professional laboratory equipment arrangement and environmental cleaning by class, and be inspected by the instructor after completion. Practical Project 4: Maintenance of Dormitory Hygiene. (0 contact hours, 30 self-study hours) Practice: Maintenance of dormitory hygiene in units of dormitories, inspected and verified by members of the college dormitory management department on a weekly basis, and then fed back to the instructor.
Study and examination requirements and forms of examination	This course assessment is formative assessment, which includes classroom performance, inspection and evaluation, practical participation and results. Weighting of assessment and calculation of total grade:

	Course total score = Classroom performance ×10%+ inspection and evaluation ×35%+ practical participation ×55%
Media employed	Labor tools (brooms, garbage bags, gloves, etc.)
Reading list	1. Textbooks [1] H. Yu, et al. Labor Education Tutorial for College Students in the New Era[M]. Changsha: Hunan Normal University Press, 2020. 2. Reference book [1] X. B. Liu, K. Li, and W. F. Peng. Deeply Understanding the Significance and Practical Relevance of Strengthening Labor Education in the New Era[J]. China Higher Education, 2018, 21. [2] X. H. Wen. On Deepening Labor Education Guided by the Marxist View of Labor in the New Era[J]. China Higher Education, 2018, 21.

“ Labor education for college students ” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Theoretical teaching					
Part 1: The Connotation and Extension of Labor Education in Colleges and Universities	1. Analysis of the connotation 2. Extension analysis	1	0	--	--
Part 2: Principles for Strengthening Labor Education in Colleges and Universities in the New Era	1. Ideological principles 2. The principle of The Times 3. Systematization principle 4. Innovation Principle 5. The principle of collaboration	1	0	--	--

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Part 3: The design of the Implementation System for Labor Education in Colleges and Universities in the New Era	1. Curriculum construction 2. Integrate with ideological and political education 3 Combine with professional education 4 Combine with practical training 5 Combine with social practice and volunteer service 6. Integrate with innovation and entrepreneurship education 7. Integrate with industry-education integration 8. Integrate with career education and employment guidance 9. Integrate with campus culture	1	0	--	--
Part 4 of 4: Daily Labor Life Practice	1. Self-service labor 2. Guidance on home labor practice 3. School labor practice guidance	0.5	0	--	--
Part 5 of 5: Labor Legal Rights and Labor Safety	1. Labor laws and regulations system 2. Labor Contracts and Labor Standards Law 3. Labor disputes and resolution 4. Labor protection and labor safety	0.5	0	--	--
(Theoretical Instruction) Little Plan		4	0		

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical teaching					
Practice Project 1	Campus cleaning.	0.3	4	Each class participates in two campus cleaning sessions, each lasting two class hours.	After completion, the instructor will check it out.
Practice Project 2	Clear the weeds.	0.2	4	Each class participates in two campus cleaning sessions, each lasting two class hours.	After completion, the instructor will check it out.
Practice Project 3	Laboratory/training room tidying and maintenance.	0.5	4	Each class will participate in two professional laboratory equipment organization and environmental cleaning sessions, each lasting for two class hours.	After completion, the instructor will conduct the inspection.
Practice Project 4	Dormitory hygiene maintenance.	0	30	Dormitory sanitation maintenance is carried out on a per-dormitory basis, with 5 class hours per student per semester for a total of six semesters.	Each week, members of the college dormitory management department will inspect and verify, and then provide feedback to the instructor.
(Practical Teaching) Small budget		1	42		
Total		5	42	total hours = 47 hours	
Credits (CP)		1.6			

Admission Education and Military Training

Competence field	Centralized practice
Curriculum designation	Admission Education and Military Training
Curriculum code	9132315030
Semester(s) in which the curriculum is taught	1st Semester
Person responsible for the curriculum	Li Wan
Lecturer	Li Wan
Language	Chinese
The relationship between the curriculum and the major	This course is a compulsory intensive practical course for freshmen majoring in electronic information engineering, with the fundamental goal of "cultivating virtue and nurturing talent". Through orientation, help freshmen quickly adapt to the university environment and clarify their professional development path, and through military training, cultivate discipline awareness and collaboration ability, laying a quality foundation for subsequent professional courses.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching hours (contact hours) : 24 hours Among them: Practical teaching: 24 hours Class size: By class
Workload	Total workload = 108 class hours; Contact hours = 24 hours; Self-study hours = 84 hours;
Credit points (ECTS)	3.6
Requirements according to the examination regulations	Students are required to attend on time, with an attendance rate of no less than two-thirds, and complete basic tasks such as housekeeping and training tasks as required. Only then can one be qualified
Prerequisite curriculum	no
Curriculum objectives /expected learning outcomes	**Knowledge:** 1. Master the core content of the school's history, regulations and discipline, and understand the training program and development prospects of the electronic information engineering major; 2. Be familiar with the basic knowledge of national defense and understand the rights and obligations of citizens in national defense; 3. Have a basic understanding of college career planning, mental health adjustment, financial aid policies, etc. **Skills:** 1. Proficient in military training skills such as formation movements and room arrangement; 2. Learn to use school rules and regulations to regulate daily behavior, and have preliminary college study planning and interpersonal

	communication skills; 3. Be able to collaborate on collective tasks and have practical skills in basic emergency response. **Ability:** 1. Enhance environmental adaptability and quickly complete the role transition from high school to college; 2 Cultivate collectivism and organizational discipline, enhance stress resistance and teamwork skills; 3 Establish a sense of patriotism and a scientific view of talent to lay a solid ideological foundation for professional study and career development.
Contents	**Practical hours (24 contact hours, 84 self-study hours)** 1. Orientation module (2 contact hours, 4 self-study hours) Understand the school's development history, school spirit and motto, as well as the core of campus culture; Master school rules and regulations; Clarify the training program, curriculum system and employment prospects of the electronic Information Engineering major; Learn college adaptation skills, interpersonal communication methods and basic knowledge of emotion regulation. 2. Training Mobilization and Instruction learning (1 contact hour, 4 self-study hours) Clarify the purpose of military training, safety instructions and assessment criteria; Master the core contents of the Discipline regulations and Internal Affairs Regulations regarding attendance and disciplinary handling; Be familiar with the norms of military appearance and conduct (dress code, grooming, behavior) and key points of self-examination. 3. Formation movement training (16 contact hours, 48 self-study hours) Master the essentials of standing at attention (three stands and three draws), resting at ease, straddling, and counting; Proficiently perform the rotation force and foot alignment of the stop-and-turn method (turning left/right/backward); Learn to step in step, swing arm height, stride length and speed, and the transition between moving forward and stopping; Master the etiquette movements of sitting down, squatting, standing up, saluting and finishing. 4. Housekeeping and Style Formation (1 contact hour, 6 self-study hours) Master the four-step process of "pressing, folding, pinching, trimming" and the "tofu block" standard for folding military quilts; Learn the "three-line alignment" (towels, toothbrushes, clothes) arrangement

	norms for dormitory items; Form good habits of daily routine and cleaning. 5. Combined Exercises and theoretical consolidation (4 contact hours, 22 self-study hours) Proficiently complete the formation movements, the continuous and combined practice of military-style boxing, and the coordination of the formation process; Review the basic knowledge of national defense and the core points of school rules and regulations; Summarize the gains from military training and orientation, and sort out the ideas for the four-year college academic plan.
Study and examination requirements and forms of examination	Examination format: Assessment Final grade: Attendance (20%) + daily performance (30%) + drill results (50%)
Media employed	Military uniforms
Reading list	1. Textbook [1] Freshman Orientation Guide[M]. Publisher: University Internal Distribution, 2025.

“ Admission Education and Military Training ” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical teaching					
1. Orientation module	1. School History Education: School development history, campus culture, resources of the school history museum; 2. School Rules and regulations: Educational management regulations, student evaluation system, academic integrity; 3. Career planning education: Academic career planning, professional development path; 4. Mental health education: Learning adaptation, interpersonal communication, and emotion regulation skills;	2	4	1. Review school history materials and professional training programs; 2 Write a draft of your four-year academic plan;	1 Collect the draft of your academic plan.
2. Training mobilization and study of regulations	1. Training Mobilization: Military training Objectives, Requirements, Safety instructions; 2. Dress code: Requirements for dress, appearance and conduct.	1	4	1 Keep in mind the key points of self-inspection of military appearance and conduct;	1. Regularly check the implementation of military appearance and conduct.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
3. Formation movement training	1. Basic movements: Attention, rest, straddle, counting; 2. Stop-and-turn method: Turn left, right, backward, combined training; 3. Marching and Stopping: Arm swings, stride exercises and continuous movements for marching in step and running; 4. Etiquette movements: Sit down, squat down, stand up, salute and finish.	16	48	1. Repeat the basic movements, turning between stops, marching and stopping, etc.	1. During training, the instructor corrects each person one by one and groups check each other; 2. Phased spot checks: Individual movement assessment and team continuous movement demonstration.
4. Housekeeping and style development	1. Housekeeping: Folding of military quilts, placement of dormitory items, and proper cleaning;	1	6	1. Refer to the standard diagram for housekeeping;	1. Check daily for compliance with dormitory standards.
5. Comprehensive drill and presentation of results	1. Group practice for each subject: Formation movements, military-style boxing (optional), formation process; 2. Presentation of results: Parade performance, evaluation.	4	22	1 Review the key points of all training subjects' movements;	1. Score on the spot during the drill.
Total		24	84	Total hours = 108 hours	
Credits (ECTS)		3.6			

Social Practice and Volunteer Service

Competence field	Centralized practice
Curriculum designation	Social Practice and Volunteer Service
Curriculum code	9141315010
Semester(s) in which the curriculum is taught	1st Semester ~ 4th Semester
Person responsible for the curriculum	Huan Duan
Lecturer	Huan Duan, Yu Zhong, Xue Du, Wei Wang
Language	Chinese
The relationship between the curriculum and the major	This course is a compulsory public course in colleges and universities. It aims to enhance students' sense of social responsibility and service awareness by organizing them to participate in social practice and volunteer service activities, cultivate their teamwork ability, organizational coordination ability and practical ability, improve their overall quality and promote their all-round development.
Teaching methods, number of teaching hours	Target students: All undergraduate students Teaching method: Practical teaching Teaching hours (Contact hours): 8 hours Among them: Practical teaching: 8 hours Class size: Organized by class
Workload	Total workload = 93 class hours; Contact hours = 8 hours; Self-study hours = 85 hours;
Credit points (ECTS)	3.1
Requirements according to the examination regulations	Students must complete three practices, have an attendance rate of no less than 90%, meet the required duration of social practice, and submit a reflection report in order to be qualified.
Prerequisite curriculum	no
Curriculum objectives /expected learning outcomes	**Knowledge:** 1. Understand the basic concepts, meanings and types of volunteer service; 2. Master the basic methods and considerations of social practice; 3. Understand the relationship between social service and social responsibility. **Skills:** 1. Be able to participate in and complete volunteer activities; 2. Have the ability to organize, coordinate, work as a team and communicate; 3. Be able to write standard reports on social practice experiences. **Ability:**

	1. Enhance social responsibility and service awareness; 2. Enhance social adaptability and practical skills; 3. Develop teamwork and leadership skills.
Contents	**Practical teaching (8 contact hours, 85 self-study hours)** **1. Participate as a volunteer in school-organized activities (2 contact hours and 7 self-study hours)** Requirement: Complete at least 3 volunteer service activities, each lasting no less than 2 hours. Content: Participate in various volunteer activities organized by the school, such as orientation, campus Open Day, environmental protection activities, etc. Results: Submit a record of volunteer service activities (including service time, location, content, and references) **2 Summer "Three Down to the Countryside" Social practice (4 contact hours, 68 self-study hours)** Requirements: Each student participates at least once over four years, with a cumulative duration of no less than 15 days. Content: Participate in the "Three Down to the Countryside" social practice activities organized by the school and provide services in rural areas, communities, enterprises, etc. Results: Submit a report on the "Three Down to the Countryside" social practice (including activity plan, implementation process, summary of results, and insights). **3. Writing of Reflections (2 contact hours, 10 self-study hours)** Requirement: Write a 2000-word reflection on social practice and volunteer service. Content: Based on the previous two activities, include a review of the activities, personal insights, ability improvement, future prospects, etc. Results: Submit one electronic copy and one paper copy.
Study and examination requirements and forms of examination	Examination format: Assessment Final grades include: ① Regular process assessment (20%) : attendance, activity engagement, service attitude. ② Volunteer Service and Practice Report (50%) : Records of volunteer service activities, "Three Down to the Countryside" social practice report. ③ Reflections Report (30%) : Completeness of content, depth of thought, and textual expression.
Media employed	Social practice guidebooks, report submission systems, etc

Reading list	1. Reference book [1] G. Q. Chen and H. Liu, College Students' Social Practice Tutorial[M], Beijing: Higher Education Press, 2020. [2] M. Wang, Y. Li, et al., Introduction to Volunteer Service[M], Beijing: Social Sciences Academic Press, 2021.

"Social Practice and Volunteer Service" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical teaching					
Item 1: On-campus volunteer service	1. Basic concepts and significance of volunteer service; 2. Volunteer service process and norms; 3. Activity organization and communication skills; 4 Volunteer Safety and Etiquette;	2	7	Participate in various volunteer activities organized by the school, such as orientation, campus Open Day, environmental protection activities, etc. Complete at least 3 volunteer activities, each lasting no less than 2 hours; Submit a volunteer service record form.	Volunteer service record form review; Proof from the organizing unit of the activity.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Item 2: Summer "Three to the Countryside" social practice	1. The significance and types of social practice; 2. Social practice research methods; 3. Social Problem analysis and countermeasure thinking; 4. Teamwork and project execution ability; 5 Practice Report writing norms;	4	68	Participate in the "Three Down to the Countryside" social practice activities organized by the school, and provide services in rural areas, communities, enterprises, etc. Complete at least 15 days of social practice; Submit a social practice report (including plans, processes, outcomes, and insights).	Review of the social practice report; On-site or online inspection by the instructor
Item 3: Writing a reflection report	1. Reflective writing method; 2. Refinement and expression of practical insights; 3 Report structure and logical organization;	2	10	Write a 2000-word reflection that combines the previous two practical experiences and reflects personal growth and reflection.	Review of report content; Plagiarism detection; Format compliance check
Combined		8	85	Total hours = 93 hours	
Credits (ECTS)		3.1			

Metalworking Practice A

Competence field	Centralized practice
Curriculum designation	Metalworking Practice A
Curriculum code	9162715010
Semester(s) in which the curriculum is taught	4th Semester
Person responsible for the curriculum	Li Zhou
Lecturer	Weishi Tan, Li Zhou, Lingfang Zhang
Language	Chinese
The relationship between the curriculum and the major	"Metalworking Practice A" is a concentrated practice course for the electronic information Engineering major and is an important part of the professional practice teaching system. Through practical operation of metalworking techniques such as fitter, lathe, welder, 3D printing/industrial robot, students' basic metalworking skills are developed, providing the ability support at the mechanical manufacturing process level for the hardware production of electronic equipment, structural modification, instrument maintenance and other links, filling the knowledge gap in the field of mechanical operation for electronic majors, At the same time, it promotes the integration of electronic and mechanical disciplines, cultivates students' multi-disciplinary collaborative thinking in engineering practice, enhances their comprehensive ability to solve complex engineering problems, and lays a practical foundation for students to engage in positions related to electronic equipment research and development, embedded system hardware design, industrial automation, etc., meeting the industry's demand for compound technical talents.
Teaching methods, number of teaching hours	Target major: Electronic Information Engineering Teaching method: Practical teaching Teaching hours (Contact hours): 24 hours Class size: Four classes with approximately 160 students
Workload	Total workload: 44 class hours Contact hours: 24 hours Self-study hours: 20 hours
Credit points (ECTS)	1.5
Requirements according to the examination regulations	no
Prerequisite curriculum	Advanced Mathematics, Circuit Analysis, Analog Electronic Technology, Digital Signal Processing, C Language Programming, Data Structure, Principle and Application of Microcontroller
Curriculum objectives /expected learning outcomes	**Learning outcomes** The main task of this course is to enable students to gain an in-depth understanding of electrical and electronic technology and its

	applications, master the common basic skills in electrical and electronic technology, understand the design process of electronic products, and lay a solid practical foundation for further study of professional courses and subsequent course design and graduation design. The specific objectives include: **Knowledge:** 1. Master the basic principles, operation norms and safety guidelines of metalworking techniques such as fitter, lathe, welder, 3D printing, industrial robot, etc. 2 Understand the knowledge of the connection between mechanical manufacturing processes and the hardware production, structural modification, instrument maintenance and other links of electronic equipment, and be clear about the logic of the cross-application of electronic and mechanical disciplines. **Skills:** 1. Be capable of independently performing fitter operations (such as marking, sawing, filing, etc.), turning operations (such as turning outer circle, end face, etc.), and welding operations (such as arc welding, gas welding, etc.) on typical metal parts; 2 Be capable of modeling and printing simple parts using 3D printing technology, and master the basic operation process of industrial robots; 3. Have the comprehensive practical ability to apply metalworking skills to scenarios such as the production of electronic equipment hardware, structural modification, and instrument maintenance. **Ability:** 1. Develop rigorous engineering safety awareness and standardized process operation habits, and establish a spirit of craftsmanship that strives for excellence; 2. Enhance multidisciplinary collaborative thinking (the intersection of electronic and mechanical knowledge), and improve the comprehensive ability to solve complex engineering problems; 3. Lay a practical foundation for positions such as electronic equipment development, embedded system hardware design, industrial automation, etc., and meet the industry's demand for compound technical talents.
Contents	**Total hours: 24 contact hours, 20 self-study hours** **1. Introduction to Metalworking Practice (2 contact hours, 2 self-study hours)** 1.The position of mechanical manufacturing in the national economy; 2. Engineering training content and regulations; 3. Contents and arrangements of metalworking practice; 4. Objectives and teaching Requirements of Metalworking Practice; 5. Learning methods and assessment methods for metalworking

	practice. **2. Welder Training (6 contact hours, 4 self-study hours)** 1. Understand the types, structures, performance and usage of manual arc welders; 2. Understand the process parameters of manual arc welding and their impact on welding quality; 3. Understand the common defects of manual arc welding and their causes; 4. Know the names and functions of common welding equipment, the names, grades and functions of welding materials, the arc welding process, the impact of electrode angles and electrode movement methods on welding quality, and understand welding defects and deformations; 5. Know the common types of welding joints and bevel types, and understand the characteristics of welding processes in different spatial positions; 6. Know other welding methods such as CO2 shielded welding, argon arc welding, etc. 7. Master welding safety operating procedures. **3. Lathe Operator training (6 contact hours, 4 self-study hours)** 1. Understand the composition, movement, application and main transmission structure of the horizontal lathe, and understand the model of the lathe; 2 Be familiar with the composition and structure of common turning tools and understand the function of the main angles of the turning tools. Understand the properties of commonly used tool materials; 3. Understand the methods of turning outer circles, inner holes, end faces, steps, cones and threading. 4 Understand the basic concepts of cutting motion, cutting parameters, machining accuracy and surface roughness; Understand the range of turning operations and understand the calculation and adjustment of cutting parameters; 5. Understand the characteristics of common clamping methods and install workpieces and tools correctly; 6. Master the safety operating procedures for turning. **4. Fitter training (4 contact hours, 4 self-study hours)** 1 Understand the role of fitter work in mechanical manufacturing and equipment maintenance; 2 Be familiar with the basic operations of the main work of a fitter (marking, sawing, filing, chiseling, drilling, tapping and threading); Tools, jigs and measuring tools used.

	3. Know the methods of drilling, reaming, boring, 锪 holes, scraping and grinding; 4. Master the safety operating procedures for fitters. **5. 3D Printing/Industrial Robot Training (6 contact hours, 6 self-study hours)** 1 Understand the basic principles, methods, current status, application scope and prospects of rapid prototyping technology; 2. Understand the processing principles and techniques of rapid prototyping equipment for practical training; 3. Understand the installation and operation methods of the software and hardware of desktop rapid prototyping equipment; 4. Understand the composition of the production line; 5. Understand the system composition of industrial robots, the operation interface of teaching devices and their basic functions; 6. Understand the structure and coordinate system of industrial robots.
Study and examination requirements and forms of examination	1. Examination form: **In-class test (graded according to metalworking practice assessment criteria)** The total score of the metalworking practice consists of 80% of the practical operation score and 20% of the practice report. 2. Examination Requirements The results of each practical training project will be evaluated based on two aspects: "work attitude" and "internship effect", with emphasis on internship effect. (1) Work attitude Work attitude refers to the situation in which students comply with the "Notes on Metalworking Practice", mainly including safety awareness, organizational discipline, attitude towards public welfare labor, and whether they obey management, etc. The overall assessment is divided into five grades: a) Very good: Can model compliance with the rules of the Metalworking Practice, have a high sense of safety and organizational discipline, actively participate in public welfare labor, and assist the instructor in management. b) Good: Can strictly abide by the regulations in the Metalworking practice, has a relatively high level of safety d) Poor: Does not seriously abide by the regulations in the metalworking Practice, has a poor sense of safety and organizational discipline, cannot actively participate in public welfare labor, cannot strictly obey the management of the instructor, and has many absences (more than three times of being late, leaving early, leaving post, etc.) Absence from work without cause for more than one day; Including sick leave and personal leave The number of days absent does not exceed one-third of the total

	internship time. Or there have been minor safety incidents caused by human error. e) Very poor: There is a serious violation of the "Notes for Metalworking Practice", with weak safety awareness and organizational discipline, no participation in public welfare labor, no obedience to the management of the instructor, serious absence (more than five times of being late, leaving early, leaving the post, etc.; more than two days of absence without reason; the number of days of absence including sick leave and personal leave exceeds one-third of the total practice time). Or there have been more than five serious human accidents. (2) Internship effect The internship results are based on the assessment of turning workpieces, fitter workpieces, welding workpieces, and 3D printing/industrial robot operations. On-site assessment of the workpieces for each trade shall be conducted according to the following standards.
Media employed	Machine tools: Horizontal lathes (such as CA6140 horizontal lathes), bench drills, bench vise Turning tools: external cylindrical turning tools, end face turning tools, internal hole turning tools, slotting tools, thread turning tools Clamping tools: three-jaw self-centering chucks, four-jaw single-action chucks, front center, rear center, chuck wrench, center socket Measuring tools: Vernier calipers, external micrometers, internal micrometers, dial indicators, thread gauges, Angle gauges Auxiliary tools: Wrench (for tool clamping and machine tool adjustment), screwdriver, copper rod (for workpiece clamping and adjustment)
Reading list	1. Textbooks [1] Z. Gao. Metalworking Internship[M]. Xi'an: Northwestern Polytechnical University Press, 2020. [2] L. Zhou. Metalworking Internship[M]. Chengdu: Chengdu University of Electronic Science and Technology Press, 2024.

“Metalworking Practice A” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
1. Introduction to Metalworking practice	1. The position of mechanical manufacturing in the national economy; 2. Engineering training content and regulations; 3. Contents and arrangements of metalworking practice; 4. Objectives and teaching Requirements of Metalworking Practice; 5. Learning methods and assessment methods for metalworking practice; 6. Safety education	2	2	1. Understand the position of mechanical manufacturing in the national economy. (0.2 class hours) 2. Understand the school Engineering Training Center, relevant regulations and the significance of engineering training. (0.2 class hours) 3. Understanding the mechanical manufacturing process. (1 class hour) 4. Understand the content arrangement, learning methods and assessment methods of metalworking practice. (0.2 class hours) 5. Establish and keep in mind safety	1. In-class tests 2. Practical Training Report

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				training awareness. (0.4 class hours)	
2 Welder training	1. Understand the types, structures, performance and usage of manual arc welding machines; 2. Understand the process parameters of manual arc welding and their impact on welding quality; 3. Understand the common defects of manual arc welding and their causes; 4 Know the names and functions of common welding equipment, the names, grades and functions of welding materials, and the arc welding process The influence of electrode angles and electrode movement methods on welding quality, understanding welding defects and deformations; 5 Know the common types of welding joints and bevel types, and understand the characteristics of welding processes in different spatial positions; 6. Know other welding methods such as CO2 shielded welding, argon arc welding, etc. 7. Master welding safety operating procedures	6	4	1. Complete the manual arc flat welding operation. (4 class hours)	1. In-class tests 2. Training report
3. Lathe Operator training	1. Understand the composition, movement, application and main transmission structure of the horizontal lathe, and the	6	4	1. Complete the turning operation; (3.5 class hours)	1. In-class tests 2. Training report

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	model of the lathe; 2. Be familiar with the composition and structure of common turning tools and understand the functions of the main angles of turning tools. Understand the properties of commonly used tool materials; 3. Understand the methods of turning outer circles, inner holes, end faces, steps, cones and threading; 4 Understand the basic concepts of cutting motion, cutting parameters, machining accuracy and surface roughness Understand the range of turning operations and understand the calculation and adjustment of cutting parameters; 5. Understand the characteristics of common clamping methods and install workpieces and tools correctly; 6. Master the safety operating procedures for turning.			2 Use tools, jigs and gauges correctly. (0.5 class hours)	
4. Fitter training	1. Understand the role of fitter work in mechanical manufacturing and equipment maintenance; 2 Be familiar with the basic operations of the main work of a fitter (marking, sawing, filing, chiseling, drilling, tapping and threading) Tools, jigs and measuring tools used. Understand methods such as drilling, reaming, boring, holes, scraping and	4	4	1. Complete operations such as marking, sawing, filing, chiseling, drilling, tapping and threading; (3.5 class hours) 2. Use the common tools and measuring instruments used by fitters correctly. (0.5 class hours)	1. In-class tests 2. Training report

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	grinding; 3. Master the safety operating procedures for fitters.				
5.3D Printing/Industrial Robot Training	1. Understand the basic principles, methods, current status, application scope and prospects of rapid prototyping technology; 2. Understand the processing principles and techniques of rapid prototyping equipment for practical training; 3. Understand the installation and operation methods of the software and hardware of desktop rapid prototyping equipment. 4. Understand the composition of the production line; 5. Understand the system composition of industrial robots, the operation interface of teaching devices and basic functions; 6. Understand the structure and coordinate system of industrial robots	6	6	1. Understand the basic operations of 3D design software and 3D printers; (0.5 class hours) 2 Print simple keychains. (4 class hours) 3. Understand the system composition and basic functions of industrial robots. (0.5 class hours) 4. Understand the basic operation and programming rules of industrial robots. (1 class hour)	1. In-class tests 2. Training report
Total		24	20	44 class hours in total	
Credits (ECTS)		1.5			

Electronic and Electrical Practice A

Competence field	Centralized practice
Curriculum designation	Electronic and Electrical Practice A
Curriculum code	9161715010
Semester(s) in which the curriculum is taught	1st Semester
Person responsible for the curriculum	Weishi Tan
Lecturer	Weishi Tan, Li Zhou, Jianquan He, Biao Qiu, Lingfang Zhang, Tie Li
Language	Chinese
The relationship between the curriculum and the major	"Electronic and Electrical Practice A" is designed as a concentrated practical course that is required for students of science and engineering non-mechanical and electrical majors. It consists of two parts: electrical practice and electronic practice. Through the "Electrical and Electrical Practice A" course, students' self-study is strengthened, their practical ability and creative thinking in the comprehensive application of electrical and electrical technology are enhanced, a solid foundation is laid for the subsequent study of related professional courses, students' comprehensive application ability of professional knowledge is cultivated, and it is in line with employment demands.
Teaching methods, number of teaching hours	Target major: Science and engineering non-mechanical and electrical major Teaching method: Practical teaching Teaching hours (Contact hours): 24 hours Class size: about 40 students per class.
Workload	Total workload: 48 class hours Contact hours: 24 hours Self-study hours: 24 hours
Credit points (ECTS)	1.6
Requirements according to the examination regulations	no
Prerequisite curriculum	College Physics
Curriculum objectives /expected learning outcomes	**Learning outcomes** The main task of this course is to enable students to gain an in-depth understanding of electrical and electronic technology and its applications, master the common basic skills in electrical and electronic technology, understand the design process of electronic products, and lay a solid practical foundation for further study of professional courses and subsequent course design and graduation design. The specific objectives include: **Knowledge:** Master the common sense of safe electricity usage, the usage

	methods of common electrician tools, instruments and meters, and give students an initial understanding of basic electrician training, lighting circuit training and electric drive training. Master the correct identification and detection methods of common electronic components and understand and master the basic knowledge of the use of common electronic instruments and meters. Learn about the design process of electronic products by assembling and debugging them. **Skills:** Learn to use common electrical tools, electrical and electronic instruments and meters; Be proficient in manual soldering and the assembly and debugging of electronic products; Master the installation of household lighting circuits and the simple control of three-phase asynchronous motors. **Ability:** Develop students' ability to apply professional knowledge comprehensively to solve practical problems, improve students' overall quality, enhance students' engineering practice ability and employment competitiveness; Be able to develop training programs for phenomena and problems based on scientific principles and using scientific methods, including designing training programs, analyzing and interpreting data, and drawing reasonable and effective conclusions through information synthesis; Through the learning and application of this knowledge, students are cultivated to develop a scientific working attitude and good working habits, and to understand the life values of learning to think deeply when successful and remaining calm when frustrated in the process of engineering design.
Contents	**Total hours: 24 contact hours, 24 self-study hours** **1. Electrician Training (12 contact hours, 12 self-study hours)** (1) Common knowledge of electricity usage; (2) How to use common electrical tools; (3) Training on common wire connection methods; (4) Training on the installation of lighting appliances and lighting control circuits; (5) Control electrical appliances, principles and control circuits of three-phase asynchronous motors. **2. Electronic Practice (12 contact hours, 12 self-study hours)** (1) Use of common electronic devices and measuring instruments; (2) Identification and testing of electronic components; (3) Soldering skills training; (4) Electronic product manufacturing.

Study and examination requirements and forms of examination	Examination format: Assessment Examination requirements: Attendance rate above 90%, qualification for acceptance of practical training works. Final grades include: Physical Work presentation and acceptance (50%) : Assessment of the integrity, stability, and innovation of the practical work. And assess teamwork. Practical training Report (30%) : Evaluate the standardization of the report, the completeness of the document, and the division of labor within the team. Regular process assessment (20%) : including classroom engagement and self-study progress checks.
Media employed	Electronic technology integrated lab, electrical and electronic Skills work island, multimedia, laser pen, blackboard, etc
Reading list	1. Textbooks [1] X. Li, D. Zhu, et al. Electrical and Electronic Training[M]. Harbin: Harbin Institute of Technology Press, 2023. 2. Reference books [1] M. Liu. Electrical and Electronic Training[M]. Beijing: Higher Education Press, 2014. [2] Y. Yang. Electrical and Electronic Training Course[M]. Beijing: Machinery Industry Press, 2021. [3] X. Xiong. Electrical and Electronic Skills Training[M]. Beijing: Electronic Industry Press, 2004. [4] Y. Guo. Electronic Training Course[M]. Beijing: Machinery Industry Press, 2005. 3. Other information Teaching PPT for Electronic Training Teaching PPT for Electrical Engineering Training

“Electronic and Electrical Practice A” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
1. Electrician practice	1. Common knowledge of electricity usage; 2. How to use common electrical tools; 3. Training on common wire connection methods; 4. Training on the installation of lighting appliances and lighting control circuits; 5. Control electrical appliances, principles and control circuits of three-phase asynchronous motors.	12	12	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (6 class hours) 2. After-class practical training report: Complete the electrician practical training report. (6 class hours)	1. The Rain Classroom platform automatically records video views. 2. Training report grading. 3. Random spot checks in class: Randomly select several groups to check the preview effect on the spot.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
2. Electronic practice	1. Use of common electronic devices and measuring instruments; 2. Identification and testing of electronic components; 3. Soldering skills training; 4. Electronic product manufacturing.	12	12	1. Preview before class: Watch the Rain Classroom micro-lesson video and preview the teaching PPT. (6 class hours) 2. After-class training report: Complete the electronic training report. (6 class hours)	1. The Rain Classroom platform automatically records video views. 2. Training report grading. 3. Random spot checks in class: Randomly select several groups to check the preview effect on the spot.
Combined		24	24	A total of 48 hours	
Credit (ECTS		1.6			

Electronics Technology Internship and Electronic Product Assembly and Debugging Internship

Competence field	Centralized practice
Curriculum designation	Electronics Technology Internship and Electronic Product Assembly and Debugging Internship
Curriculum code	9061615010
Semester(s) in which the curriculum is taught	1th Semester
Person responsible for the curriculum	Saichun Hu
Lecturer	Laixiu Zhou, Saichun Hu, Weichu Xiao, Qiuxiang Zhu, Jie Xiong, Yong Ye
Language	Chinese
The relationship between the curriculum and the major	"Electronics Technology Internship and Electronic Product Assembly and Debugging Internship" is an important part of the teaching plan for the Electronic Information Engineering major, playing a crucial role in achieving the professional talent training objectives. Through the production process internship, students will understand the characteristics of production, management, and operation in modern electronic enterprises, familiarize with the operation methods of China's electronic market, and further comprehend the significant role of safety awareness and safe production in the manufacturing of electronic products. By integrating theory with practice, students will apply the learned theoretical knowledge to analyze the actual production technologies observed during the internship, thereby enriching, verifying, consolidating, and deepening theoretical knowledge, as well as improving the ability to solve practical engineering problems. The skill training of electronic product assembly and debugging is an indispensable step for Electronic Information Engineering students to develop practical and hands-on capabilities. It serves as a key link to understand various electronic components and integrate circuit theory with practice, and also a strengthening process that combines theoretical knowledge with practical work.
Teaching methods, number of teaching hours	Target Students: Artificial Intelligence & Electronic Information Engineering Major Teaching Method: Centralized practice Teaching hours (Contact hours): 24 hours Class Size: 4 classes with approximately 160 students
Workload	Total Workload = 56 hours Contact Hours = 24 hours Self-Study Hours = 32 hours

Credit points (ECTS)	1.9
Requirements according to the examination regulations	After the completion of the internship, each student shall independently complete an internship report. The report is required to integrate theory with practice, featuring clear viewpoints, sufficient supporting evidence, logical organization, detailed materials, rigorous argumentation, and correct conclusions.
Prerequisite curriculum	Circuit Analysis
Curriculum objectives /Expected learning outcomes	**Learning Outcomes:** The main task of this course is to provide skill training in electronic product assembly and debugging. It is an indispensable step for Electronic Information Engineering students to develop practical and hands-on capabilities, a key link to understand various electronic components and integrate circuit theory with practice, as well as a strengthening process that combines theoretical knowledge with practical work. The specific objectives include: **Knowledge:** 1. Master the basic principles of electronic product assembly and debugging, as well as the performance and application scenarios of common electronic components; 2. Understand the operating procedures of engineering projects, the methods of team division of labor, and the top-down module decomposition approach; 3. Grasp the basic theories of engineering management and economic decision-making applicable to complex electronic information engineering problems; 4. Learn the communication norms and expression methods suitable for team meetings, project reports, and other academic exchange scenarios. **Skills:** 1. Be able to proficiently complete the assembly and debugging of electronic products, and accurately identify and handle common technical problems in the process; 2. Be able to effectively communicate and collaborate with team members, organize and coordinate team work as a leader, and promote the efficient completion of project tasks; 3. Be able to conduct detailed discussions and demonstrations on professional issues in project implementation, and propose optimal solutions to problems; 4. Be able to accurately express viewpoints and respond to inquiries through oral presentations, documents, charts, etc., and adapt to communication differences with peers and the public; 5. Be able to apply engineering management and economic decision-making methods in formulating solutions to complex electronic information engineering problems in a multidisciplinary

	environment. **Ability:** 1. Enhance practical and hands-on capabilities, laying a solid foundation for solving practical engineering problems in future work; 2. Cultivate team collaboration and leadership skills, improving the ability to participate in and organize engineering projects; 3. Develop professional communication and academic argumentation competence, enabling effective expression and response in various exchange scenarios; 4. Foster systematic thinking and comprehensive decision-making ability, considering multidisciplinary factors in complex engineering problems; 5. Improve professional literacy and adaptability, meeting the requirements of sustainable development in the electronic information industry.
Contents	**Centralized practice (24 Contact Hours, 32 Self-Study Hours)** 1. Through the internship on the production process of electronic components, master the characteristics and production requirements of electronic component manufacturing, and understand the development status of electronic component companies. 2. Learn and grasp the production, testing, research and development of electronic components. 3. Initially understand the general methods of production management in modern electronic enterprises through internships in electronic component manufacturing companies, and integrate the learned knowledge with production practice. 4. After the completion of the internship, each student shall independently complete an internship report. The report is required to integrate theory with practice, featuring clear viewpoints, sufficient supporting evidence, logical organization, detailed materials, rigorous argumentation, and correct conclusions. 5. Earnestly abide by the internship schedule; no being late, no leaving the internship post early, and no leaving the internship unit without permission in advance. 6. Strictly comply with the labor and production discipline of the internship unit: smoking is strictly prohibited in the factory area; touching automatic control instruments is strictly prohibited in the production area; behaviors unrelated to the internship that are hazardous to safety or have a negative impact, such as frolicking, listening to walkmans, or reading magazines, are strictly prohibited. 7. Those who violate the internship discipline may be subject to penalties such as criticism, ordered inspection, supplementary internship, or even termination of the internship.

	8. Under the guidance of instructors, each student shall independently assemble and debug a digital power supply and complete a practical training report.
Study and examination requirements and forms of examination	1. Work Performance(40%) 2. Document Performance(25%) 3. Defense Performance(35%)
Media employed	Multimedia computers, projectors, Multisim software, circuit experiment kits, soldering irons, signal generators, DC power supplies, multimeters, oscilloscopes, etc.
Reading list	1. Textbooks [1] J. Wu, Engineering Training for Electronic Information Majors. Xi'an: Xidian University Press, 2016.

"Electronics Technology Internship and Electronic Product Assembly and Debugging Internship" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical Teaching					
Phase 1: Internship Launch and Project Mobilization	1. Explain the assessment method (Work Performance: 40% + Document Performance: 25% + Defense Performance: 35%); 2. Soldering technology is one of the basic operational skills for electrical engineering practitioners. Through training, students are required to initially master this technology while fostering a patient, meticulous, and	2	6	1. Watch soldering videos to master soldering techniques. (2 Hours) 2. On the basis of understanding the basic working principles of digital power supplies, learn to install, debug, and operate them, as well as troubleshoot common faults. (4 Hours)	1. Submit screenshots of watched soldering videos; 2. Assess the soldering technology and output parameters of the assembled digital power supply through inspection.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	rigorous work style in practice; 3. On the basis of understanding the basic working principles of digital power supplies, learn to install, debug, and operate them, as well as troubleshoot common faults.				
Phase 2: Electronic Process Internship	1. Master the characteristics and production requirements of electronic component manufacturing; 2. Learn and understand the production, testing, research and development of electronic components; 3. Initially understand the general methods of production management in modern electronic enterprises through electronic component manufacturing companies, and integrate theoretical knowledge with production practice.	4	6	1. Through the internship on the production process of electronic components, master the characteristics and production requirements of electronic component manufacturing, and understand the development status of electronic component companies. (2 Hours) 2. Learn and understand the production, testing, research and development of electronic components. (2 Hours) 3. Initially understand the general methods of production management in modern electronic enterprises through electronic component manufacturing companies, and integrate theoretical knowledge with production practice. (2 Hours)	1. Assess through the content of the internship report; 2. Random spot check: Randomly select students to assess their understanding of the production process of electronic components and the general methods of production management in modern electronic enterprises.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 3: Assembly and Debugging of a Digital Power Supply	Independently complete the installation, debugging, and operation of a digital power supply, and master the troubleshooting of common faults.	14	16	1. Watch soldering videos to master soldering techniques. 2. On the basis of understanding the basic working principles of digital power supplies, learn to install, debug, and operate them, as well as troubleshoot common faults. 3. Independently complete the installation, debugging, and operation of a digital power supply, and master the troubleshooting of common faults. (16 Hours)	Inspect and test the digital power supply assembled by each student, including evaluating the soldering technology and measuring the power supply parameters.
Phase 4: Internship Report & Achievement Submission	Master the specifications and content requirements for document writing; share debugging skills and common troubleshooting methods; conduct acceptance inspection of physical works and test power supply parameters.	4	4	1. Master the specifications and content requirements for document writing. 2. Share debugging skills and common troubleshooting methods. 3. Conduct acceptance inspection of physical works and test power supply parameters. (4 Hours)	3. All materials shall be submitted before the final deadline of the internship, including: Internship report; Assembled digital power supply; Screenshots of power supply parameter test results.
Total		24	32	Total Class Hours = 56 hours	
Credit points (ECTS)		1.9			

Analog Unit Circuit Simulation and Development Comprehensive Practical Training Internship

Competence field	Centralized practice
Curriculum designation	Analog Unit Circuit Simulation and Development Comprehensive Practical Training Internship
Curriculum code	9061615020
Semester(s) in which the curriculum is taught	2th Semester
Person responsible for the curriculum	Dongchu Jiang
Lecturer	Dongchu Jiang, Qiuxiang Zhu, Laixiu Zhou, Fei He
Language	Chinese
The relationship between the curriculum and the major	"Analog Unit Circuit Simulation and Development Comprehensive Practical Training Internship" is one of the concentrated practices in the electronic information engineering major, It is a practical teaching component of the analog electronic technology course and a comprehensive training for students to learn the analog electronic technology course. It is accomplished through a series of processes such as designing, simulating, making, debugging and writing design summaries or design specifications of a certain subject under the guidance of the teacher. It enables students to apply the theory they have learned in the digital electronic technology course closely to practice, to independently solve problems in real production and life, and to create small analog electronic systems.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Intensive practice Teaching hours (Contact hours): 24 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 60 class hours; Contact hours =24 hours; Self-study hours = 36 hours;
Credit points (ECTS)	2.0
Requirements according to the examination regulations	Only students who have an attendance rate of more than two-thirds and have completed their works are allowed to take the test.
Prerequisite curriculum	Advanced Mathematics, College Physics, Circuit Analysis
Curriculum objectives /expected learning outcomes	**Learning outcomes** The main task of this course is to enable students to apply the theory they have learned in the Analog electronics technology course closely to practice, to independently solve problems in real production and life, and

	to create small analog electronic systems. The aim is to develop students' ability to apply theory to practice and to design and make by hand, laying a good foundation for students to design more complex and programmable electronic circuits in the future. The specific goals include: **Knowledge:** 1. Be able to build a preliminary model for the chosen topic, and determine the framework structure and functional division of the model as well as reasonable extensibility. 2. Implement each functional module separately and then integrate the design. During the design process, it is necessary to consider implementing more functions, reducing the types of devices used, and the cost-effectiveness of the devices used; Be able to select appropriate computer simulation software to simulate each functional module, improve and optimize based on the simulation results, and finally make circuit boards for testing. 3 Be able to communicate effectively with team members, work together, and act as the leader to organize, coordinate and direct the team to carry out work. An engineering project is a system with mature operational procedures. Before undertaking an engineering project, an implementation team should be formed according to the project requirements, and detailed division of labor should be carried out. The project should be decomposed step by step into different modules using a top-down approach, with specific responsible persons assigned to each module, and then division of labor and collaboration should be carried out to complete the project design efficiently. 4 Be able to fully consider the application of engineering management and economic decision-making methods in the process of formulating solutions to complex electronic information engineering problems in a multi-disciplinary environment. **Skills:** 1. Students independently design, simulate, make, debug and write design summaries or design specifications for a certain subject. 2. Through the combination of theory and practice, independently produce small analog electronic systems. **Ability:** 1. Develop students' ability to apply the theories learned in the analog electronics technology course to solve problems, and develop students' ability to independently solve problems in real production and life. 2. To develop students' ability to apply theory to practice and to design and produce by hand, laying a good foundation for students to design more complex, programmable electronic circuits in the future. 3. Improve students' overall quality, enhance their engineering practice ability and employment competitiveness.

	4. Through the learning and application of this knowledge, students are cultivated to develop a scientific working attitude and good working habits, and to understand the life values of learning to think deeply when successful and remaining calm when frustrated in the process of engineering design.
Contents	**Teaching (24 contact hours, 36 self-study hours)** **1. Phase 1: Course Initiation and Basic Training (2 contact hours, 4 self-study hours)** (1) Explanation of assessment methods (50% physical + 30% report + 20% regular), release of reference topics (such as sine wave signal generator**,** DC regulated power supply) and training requirements; (2) Tools and Software Basics: Demonstrate the installation and basic operation of Multisim12, explain the safety norms for the use of soldering irons and oscilloscopes; (3) Component Identification: Explain the specification reading and selection basis of resistors, capacitors (103, 101 ceramic capacitors, 47μF electrolytic capacitors), and light-emitting diodes. **2. Phase 2: Circuit Simulation and Parameter Optimization (6 contact hours, 8 self-study hours)** (1) Explanation of Circuit Principles: Analyze the working logic of the RC sinusoidal oscillation circuit (basic amplifier, feedback network, frequency selection network, amplitude stabilization network), derive the oscillation frequency formula, and clarify the parameter requirements; (2) Guidance on Simulated operations: Instruct students to draw unit circuit schematic diagrams, configure oscilloscope parameters, adjust sliding rheostats to 20% and record simulated waveforms; (3) Analysis of simulation results: Explanation of parameter adjustment methods for issues such as waveform distortion and no oscillation. **3. Phase 3: Physical Fabrication and Soldering Practice (12 contact hours, 16 self-study hours)** (1) Soldering Specification teaching: Demonstrate the soldering steps of through-hole components (trimming pins, soldering, fixing), focus on the key points of soldering IC sockets, electrolytic capacitors (polarity distinction), light-emitting diodes, and demonstrate the handling methods of solder balls and false soldering; (2) Physical assembly guidance: Based on the component list, instruct students to complete the soldering and assembly of components on the PCB board; (3) Soldering quality inspection: Check the quality of each group of solder joints one by one, ensuring no missed solder or false solder and correct polarity of components. **4. Phase 4: Debugging Acceptance and Report Writing (4 contact hours, 8 self-study hours)** (1) Circuit Debugging guidance: Explain the power connection method, instruct students to test the circuit function (such as touching the metal contact to observe the diode light up, keep it off for 8 seconds after releasing), and use a multimeter to measure the

	output voltage; (2) Troubleshooting guidance: Share troubleshooting ideas for issues such as the diode not emitting light and abnormal waveforms (such as reinforcing solder joints for false soldering problems); (3) Acceptance and Reporting: Organize physical acceptance (with student ID and name engraved on the circuit board), guide students to write practical reports, and explain the format norms of the reports.
Study and examination requirements and forms of examination	1. Works (50%). 2. Regular process assessment (25%). 3. Internship report (25%).
Media employed	Multimedia computer, projector, Multisim software, analog circuit experiment box, soldering iron, signal generator, DC power supply, multimeter, oscilloscope, etc.
Reading list	1. Textbooks [1] CH. Cheng. Simulated Electronic Technology Experiment and Course Design[M]. Beijing: Electronic Industry Press, 2016. [2] Y. Guo. Simulation Electronic Technology Experiment and Course Design Guidance[M]. Nanjing: Southeast University Press, 2007.

“Analog Unit Circuit Simulation and Development Comprehensive Practical Training Internship” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 1: Course Initiation and Basic Practical Training	1. Assessment methods and topic selection guidance; 2. Multisim12 Installation and Basic operations; 3. Component (resistors, capacitors, NE555, leds) specification identification and selection.	2	4	1. Topic selection and research: Review application cases of RC sinusoidal oscillation circuits and DC regulated power supplies, determine training topics, and draw system block diagrams (1 class hour); 2. Software preparation: Install Multisim12 and complete basic operation exercises (new project, add common components, draw simple series circuits) (1 class hour); 3. Component information lookup: Search for NE555 datasheet, forward voltage drop parameters of light-emitting diodes, and organize component list (2 hours).	1. Topic review: Students submit topic forms and system block diagrams, and teachers review and file; 2. Software check: Submit screenshots of Multisim basic operations (such as series circuit schematic diagram) through the online platform; 3. Document Check: Submit a component parameter collation table.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 2: Circuit simulation and parameter optimization	1. Designed circuit principles and frequency formulas; 2. Multisim12 schematic drawing; 3. Simulation waveform analysis and parameter adjustment.	6	8	1. Principle Preview: Derive the frequency characteristics of the RC series-parallel frequency selection network and organize the functional notes of each module of the oscillation circuit (2 class hours); 2. Simulation exercises: Independently draw the schematic diagram of the RC sinusoidal oscillation circuit, attempt to adjust R1 and C1 parameters (e.g. R1=10kΩ, C1=0.1μF), and record waveforms at different parameters (4 hours); 3. Problem Recording: Organize problems such as "no oscillation" and "waveform distortion" encountered in the simulation, and preliminarily analyze the causes (2 hours).	1. Submission of simulation screenshots: Submit screenshots of simulation waveforms at different parameters (including oscilloscope parameters) through the online platform; 2. Classroom spot check: Randomly select students to demonstrate simulation operations on the spot and explain the calculation process of oscillation frequency.
Phase 3: Physical production and welding Practice	1. Through-hole component soldering specifications (trimming pins, soldering, fixing); 2. Key points for soldering IC sockets, electrolytic capacitors, leds; 3. Solder balls and false soldering methods.	12	16	1. Soldering practice: Practice soldering using a waste PCB board with resistors and capacitors, and master the solder joint formation standard (no spikes, no false soldering) (3 class hours); 2. Component pre-treatment: Trim the pins of components according to the size of the PCB board (such as 5mm for resistor pins), and distinguish the positive and negative terminals of electrolytic capacitors (2 hours); 3. Pre-assembly simulation: Simulate the component layout on the breadboard to confirm the connection logic and avoid line conflicts after soldering (2 class hours). 4. Carefully complete the work (9 hours).	1. Welding sample inspection: Students submit welding practice samples (including 3 resistors and 2 capacitors), and the teacher assesses the quality of the solder joints; 2. Pre-assembly inspection: On-site inspection of the breadboard simulation layout to confirm that the connection logic is correct.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 4: Commissioning acceptance and report writing	1. Circuit function testing (diode light emission, waveform measurement); 2. Troubleshooting (solder joints, pins, parameter issues); 3. Practical report writing and physical inspection.	4	8	1. Commissioning preparation: Write the commissioning plan (including test steps, instrument usage list), prepare the test record sheet (such as diode luminous duration, output voltage value) (2 class hours); 2. Problem-solving: For the problem of "diodes not emitting light" after soldering, try re-soldering the solder joints, check the NE555 pins, and record the problem-solving process (3 class hours); 3. Report writing: Complete the first draft of the practice report (including working principle, simulation results, component list, physical drawing), organize test data (5 hours); 4. Acceptance preparation: Write your student ID and name on the circuit board and record the circuit function demonstration (1 class hour).	1. Procedural centralized inspection: First session: Check the progress of system integration, with a focus on hardware connections and underlying driver issues. Second session: Check system functionality integrity and guide software logic optimization. Third session: Physical work acceptance and functional demonstration. Each team will present their final work on the spot, and the teacher will score them based on the score sheet. Team defense and PPT presentation will be conducted at the same time 2. Outcome-based submission: Submit the circuit function demonstration video or circuit board photo, and submit the final version of the practice report in electronic form before the final course deadline.
Total		24	36	A total of 60 class hours	
Credits (ECTS)		2.0			

Digital Unit Circuit Simulation and Development Comprehensive Practical Training Internship

Competence field	Centralized practice
Curriculum designation	Digital Unit Circuit Simulation and Development Comprehensive Practical Training Internship
Curriculum code	9061615030
Semester(s) in which the curriculum is taught	3th Semester
Person responsible for the curriculum	Laixiu Zhou
Lecturer	Laixiu Zhou, Yue Tan, Dongchu Jiang, Fei He
Language	Chinese
The relationship between the curriculum and the major	"Digital Unit Circuit Simulation and Development Comprehensive Practical Training Internship" is one of the concentrated practical courses for the Electronic Information Engineering major, a practical teaching component of the "Digital Electronic Technology" course, and a comprehensive training for students to apply the knowledge learned in this course. Guided by teachers, it is completed through a series of processes where students independently conduct the design, simulation, production, debugging of a specific project, as well as the writing of a design summary or design specification. This training cultivates students' ability to integrate the theoretical knowledge and practical skills acquired from the "Digital Electronic Technology" course, independently solve practical problems in production and daily life, and develop small-scale electronic systems.
Teaching methods, number of teaching hours	Target Students: Electronic Information Engineering Major Teaching Method: Practical Teaching Teaching hours (Contact hours): 24 hours Class Size: 4 classes with approximately 160 students
Workload	Total Workload = 78 hours Contact Hours = 24 hours Self-Study Hours = 54 hours
Credit points (ECTS)	2.6
Requirements according to the examination regulations	Only students with an attendance rate of over two-thirds and completed works are eligible to participate in the test.
Prerequisite curriculum	Advanced Mathematics, Circuit Analysis, Analog Electronic Technology, Digital Electronic Technology
Curriculum objectives /Expected learning outcomes	**Learning Outcomes:** The main task of this course is to enable students to integrate the theoretical knowledge and practical skills acquired from the "Digital Electronic Technology" course, independently solve practical

	problems in production and daily life, and develop small-scale electronic systems. Its purpose is to cultivate students' ability to combine theory with practice and engage in hands-on design and production, laying a solid foundation for students to design more complex and programmable electronic circuits in the future. The specific objectives include: **Knowledge:** 1. Master the core theoretical knowledge of Digital Electronic Technology and the working principles of common digital electronic components; 2. Understand the basic methods of modeling small-scale electronic systems, including framework design, functional division, and extended function planning; 3. Grasp the characteristics, application scenarios, and operation logic of computer simulation software for digital circuits; 4. Learn the operating procedures of engineering projects, the top-down module decomposition method, and the basic theories of engineering management and economic decision-making applicable to electronic circuit design. **Skills:** 1. Be able to establish preliminary models for selected topics, determine reasonable framework structures, functional divisions, and extended functions; 2. Be able to implement and integrate designs according to different functional modules, considering factors such as multi-function realization, minimized device types, and cost-performance ratio of components; 3. Be able to select appropriate computer simulation software to simulate each functional module, and optimize the design based on simulation results before fabricating and testing circuit boards; 4. Be able to effectively communicate and collaborate with team members, and organize, coordinate, and direct team work as a leader to complete project design efficiently; 5. Be able to apply engineering management and economic decision-making methods in formulating solutions to complex electronic information engineering problems in a multidisciplinary environment. **Ability:** 1. Enhance the ability to integrate theoretical knowledge with practice, laying a solid foundation for solving practical engineering problems in digital electronic technology fields; 2. Cultivate systematic thinking and innovative design capabilities, improving the ability to independently develop small-scale electronic systems;

	3. Develop team collaboration and leadership skills, adapting to the collaborative work mode in engineering projects; 4. Foster comprehensive decision-making ability, considering technical, economic, and practical factors in the design process; 5. Improve professional literacy and technical adaptability, meeting the development requirements of the electronic information industry for complex circuit design talents.
Contents	**Centralized practice (24 Contact Hours, 54 Self-Study Hours)** Phase 1: Course Launch and Mobilization (4 Contact Hours, 6 Self-Study Hours) 1. Explain the assessment method (Works: 50% + Report: 25% + Daily Assessment: 25%) and release topic selection guidelines. 2. Development Environment Training: Uniformly explain and demonstrate Multisim12 software. 3. Quick review of basic knowledge such as digital circuit design methods. Phase 2: Component Identification and Soldering (4 Contact Hours, 4 Self-Study Hours) 1. Familiarize with various electronic components and correctly read their parameter values. 2. Complete soldering tasks and be able to handle various issues such as solder balls, insufficient solder, cold solder joints, etc. 3. Master through-hole component soldering: Grasp the soldering procedures and methods for through-hole resistors, diodes, crystals, IC sockets, connectors, ceramic capacitors, triodes, tactile switches, nixie tubes, light-emitting diodes (LEDs), dual-row pin headers, electrolytic capacitors, switches, and binding posts. Phase 3: Design and Fabrication (6 Contact Hours, 26 Self-Study Hours) 1. Design and fabricate unit circuits. 2. Debug and measure the parameters and performance of unit circuits. Phase 4: Work Acceptance and Guidance (10 Contact Hours, 18 Self-Study Hours) 1. Q&A and Inspection: Conduct centralized answers and individual guidance for problems encountered by each group during the design and fabrication process. 2. Debugging Skills: Share common troubleshooting methods for hardware and software issues. 3. Physical Work Acceptance, Functional Demonstration, Defense, and PPT Report.

	4. Complete the internship report titled "Comprehensive Training on Simulation and Development of Digital Unit Circuits".
Study and examination requirements and forms of examination	1. Work Performance(50%) 2. Document Performance(25%) 3. Defense Performance(25%)
Media employed	Multimedia computers, projectors, Multisim software, circuit experiment kits, soldering irons, signal generators, DC power supplies, multimeters, oscilloscopes, etc.
Reading list	1. Textbooks [1] J. You, Experiments and Course Design of Digital Electronic Technology (2nd Edition). Beijing: China Machine Press, 2017. [2] X. Xu, Guidance for Experiments and Course Design of Digital Electronic Technology (2nd Edition). Nanjing: Southeast University Press, 2014.

"Digital Unit Circuit Simulation and Development Comprehensive Practical Training Internship" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Practical Teaching					
Phase 1: Internship Launch and Project Mobilization	1. Explain the assessment method (Work Performance: 50% + Document Performance: 25% + Defense Performance: 25%); 2. Development Environment Training: Uniformly explain and demonstrate Multisim12 software. 3. Quick review of basic knowledge such as digital circuit design methods.	4	6	1. Project Research and Approval: Conduct literature review, determine the final project topic, design the system block diagram, select electronic components, etc. (2 Hours) 2. Environment Setup and Basic Verification: Install Multisim12 software, and implement a pulse signal generation circuit with a 555 timer as the core on the Multisim12 platform. (4 Hours)	1. Topic Selection Review: Students register their selected topics, which will be reviewed and filed by teachers. 2. Environment Inspection: Submit screenshots of the pulse signal generation circuit through the online platform as proof.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 2: Component Identification and Soldering	1. Familiarize yourself with various electronic components and correctly read their parameter values. 2. Complete soldering tasks and be capable of handling various issues such as solder balls, insufficient solder at joints, inadequate solder volume, cold solder joints, etc. 3. Complete through-hole component soldering; master the soldering procedures and methods for through-hole resistors, diodes, crystals, IC sockets, connectors, ceramic capacitors, triodes, tactile switches, nixie tubes, light-emitting diodes (LEDs), dual-row pin headers, electrolytic capacitors, switches, and binding posts through manual soldering.	4	4	1. Familiarize yourself with various electronic components. (2 Hours) 2. Practice soldering on a breadboard. (2 Hours)	1. Component Parameter Inspection: Submit documents specifying the parameter values of each electronic component through the online platform as proof. 2. Soldering Inspection: Students hand in the soldered breadboard.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 3: Design and Fabrication	1. Design and fabricate unit circuits; 2. Debug and measure the parameters and performance of unit circuits.	6	26	1. Design circuits according to project requirements. (6 Hours) 2. Draw and simulate the complete project circuit on the Multisim12 platform until the simulation results meet the project requirements. (4 Hours) 3. Complete the soldering of the project circuit on the breadboard. (10 Hours) 4. Debug and measure the parameters and performance of unit circuits. (6 Hours)	1. Circuit Review: Submit screenshots of the designed circuit and simulation results through the online platform as proof. 2. In-Class Random Spot Check: Randomly select several projects for on-site demonstration, and require students to explain the working process.
Phase 4: Work Acceptance and Guidance	1. Q&A and Inspection: Provide centralized answers and individual guidance for problems encountered by each group during the design and fabrication process. 2. Debugging Skills: Share common troubleshooting methods for hardware and software issues. 3. Physical Work Acceptance, Functional Demonstration, Defense, and PPT Report. 4. Complete the internship report titled	10	18	1. Functional Testing: Conduct operational tests on the system, handle abnormal situations (such as insufficient solder, cold solder joints, reversed chip insertion, etc.), and record the final functional demonstration video. (10 Hours) 2. Document Writing: Compose the final version of the internship report Comprehensive Training on Simulation and Development of Digital Unit Circuits. (4 Hours)	1. Process-Oriented Centralized Inspections: - First Guidance: Inspect system connection issues. - Second Guidance: Verify the completeness of system functions. - Third Guidance: Physical Work Acceptance and Functional Demonstration. Demonstrate the final work on-site; teachers will score based on the grading rubric. The defense and PPT report will be conducted

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	Comprehensive Training on Simulation and Development of Digital Unit Circuits.			3. Defense Preparation: Create PPT for the final defense and conduct pre-rehearsals. (4 Hours)	simultaneously. 2. Result-Oriented Submission: Submit all electronic materials before the final course deadline, including: the internship report Comprehensive Training on Simulation and Development of Digital Unit Circuits, defense PPT, and functional demonstration video.
Total		24	54	Total Class Hours = 78 hours	
Credit points (ECTS)		2.6			

Microcontroller System Comprehensive Practical Training Internship

Competence field	Centralized practice
Curriculum designation	Microcontroller System Comprehensive Practical Training Internship
Curriculum code	9061615040
Semester(s) in which the curriculum is taught	4th Semester
Person responsible for the curriculum	Wenguo Li
Lecturer	Wenguo Li, Yue Tan, Lin Lin, Shiying Mo, Xiongjie Liu
Language	Chinese
The relationship between the curriculum and the major	This course is designed as a comprehensive, design-oriented experiment of the "Principle and Application of Microcontroller" course, and can serve as a complement and enhancement to classroom teaching and regular in-class experiments. Through the study of the "Principles and Applications of Microcontrollers" course, students have initially mastered the basic principles of the 51 microcontroller, as well as the basic principles and applications of parallel ports, serial ports, interrupts, and timing, etc. The in-class experiments are mainly based on the experimental instruction book, and it is difficult to fully develop students' independent design and hands-on ability. Through the "Comprehensive Training and Practice of Single-Chip Microcomputer Systems" course, students' autonomous learning is strengthened, learning outcomes are consolidated, students' practical ability and creative thinking in the comprehensive application of single-chip microcomputer technology are improved, a solid foundation is laid for the subsequent study of related professional courses, students' comprehensive application ability of professional knowledge is cultivated, and it is in line with employment demands.
Teaching methods, number of teaching hours	Target major: Electronic Information Engineering Teaching method: Practical teaching Teaching hours (Contact hours): 12 hours Class size: Four classes with approximately 160 students.
Workload	Total workload: 83 class hours Contact hours: 12 hours Self-study hours: 71 hours
Credit points (ECTS)	2.8
Requirements according to the examination regulations	no
Prerequisite curriculum	Advanced Mathematics, Circuit Analysis, Analog Electronic Technology, Digital Electronic Technology Principle and Application of Microcontroller
Curriculum objectives	**Learning outcomes**

/expected learning outcomes	The main task of this course is to enable students to gain an in-depth understanding of the principles and applications of microcontrollers, master the interface technology for interaction between microcontroller systems and external components, and design a small example. The specific objectives include: **Knowledge:** ① Be capable of designing and fabricating peripheral circuits for AT89S52 microcontrollers using various components and writing peripheral driver programs, and master the testing methods for various technical parameters of electronic products. ② Master interface technologies for external interaction such as ADC, DAC, PWM, DMA, etc. by explaining the comprehensive questions of the given intelligent car, and be able to apply these technologies for data acquisition and processing. ③ Design and implement a small project based on a single-chip microcomputer in the form of a 1-3 person team. **Skills:** ① Learn to write, compile, burn and debug programs using microcontroller development environments and tools such as Keil; ② Be able to design and implement smart cars based on microcontrollers, such as motor rotation, the use of different sensor modules and key input processing, etc. ③ Master the application of microcontrollers in embedded systems and be capable of completing hardware interface design and software programming for self-selected topics. **Ability:** ① Develop students' ability to apply professional knowledge comprehensively to solve practical problems, improve students' overall quality, enhance students' engineering practice ability and employment competitiveness; ② This course design provides comprehensive questions on intelligent cars to cultivate students' ability to think independently, solve problems, and design products; ③ Through the learning and application of this knowledge, students will develop a scientific working attitude and good working habits, and understand the life values of learning to think deeply when successful and remaining calm when frustrated in the process of engineering design.
Contents	**Total hours: 12 contact hours, 71 self-study hours** **1. Phase One: Course Initiation and Project Mobilization (2 contact hours, 6 self-study hours)** (1) Explain the assessment method (50% of the work + 30% of the presentation + 20% of the regular assessment), release the project library and topic guidance;

	(2) Development Environment Practice: A unified explanation and demonstration of the Keil C51 development process; (3) Quick Review of 89C51 resource features: Review basic knowledge such as I/O, interrupts, timers, etc. **2. Phase 2: Core Skills Modular Intensive Instruction (2 contact hours, 8 self-study hours)** (1) Key principles; (2) Digital tube display principle and drive; (3) LCD1602 LCD display; **3. Phase 3: Sensor and Actuator Drive (3 contact hours, 12 self-study hours)** (1) Sensor data acquisition: ADC and temperature sensors; (2) Power Interface and Control: Explain the driving capability limitations of the I/O port of the microcontroller, and introduce the usage scenarios and circuit designs of transistors, MOSFETs, relays, and motor driver chips. (3) Application: Combine timer, digital tube display, LCD display, sensor data acquisition, etc. to build a prototype of a multitask system. **4. Phase 4: System Integration and Project Tutoring (5 contact hours, 45 self-study hours)** (1) Take the "Intelligent temperature-controlled fan system" as an example to explain how to integrate scattered modules such as display, buttons, sensors, motor drives, etc. into one main program, with a focus on modular programming ideas. (2) Debugging tips: Share common methods for troubleshooting hardware and software issues. (3) Q&A and Inspection: Provide concentrated answers and individual guidance for the problems encountered by each group during the project integration phase. (4) Physical work acceptance and function demonstration, team defense and PPT presentation.
Study and examination requirements and forms of examination	Examination format: Assessment Examination Requirements: Attendance rate above 90%, project technical report completion rate above 90%, qualification for defense acceptance. Final grades include: ① Physical demonstration and defense acceptance (50%) : Assess the integrity, stability and innovation of the project. As well as team collaboration, presentation skills and question responses. ② Project technical report (30%) : Evaluate the normativity of the design, the completeness of the documentation, and the division of labor within the team. ③ Regular process assessment (20%) : including classroom

	engagement and self-study progress checks.
Media employed	Keil and Proteus software, single-chip microcomputer experiment box, multimedia, laser pointer, blackboard, etc
Reading list	**1.** Textbooks [1] H. Yang, H. Huang, et al., Principle and Application of Microcontroller, Xiangtan: Xiangtan University Press, 2013.. 3. Reference book [1] W. Xie, J. Yang, et al., Single Chip Microcomputer Principle and Application and C51 Program Design, Beijing: Tsinghua University Press, 2019. [2] Z, Ma, et al., C Language Application Program Design for Single Chip Microcomputers, Beijing: Beijing University of Aeronautics and Astronautics Press, 2021. [3] R, Liu, et al., Single Chip Microcomputer Principle and Application Tutorial, Beijing: China Machine Press, 2021. 3. Other Materials [1] Comprehensive Course Design of "Microcontroller Principles and Applications" - Theoretical Teaching PPT

“ Microcontroller System Comprehensive Practical Training Internship” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 1: Course Initiation and Project Mobilization	(1) Explain the assessment method (works 50% + reports 30% + regular assessment 20%), release the project library and topic guidance; (2) Development Environment Practice: A unified explanation and demonstration of the Keil C51 development process; (3) Quick Review of 89C51 resource features: Review basic knowledge such as I/O, interrupts, timers, etc.	2	6	1. Project research and initiation: The team discusses together, reviews materials, and determines the final project topic, system block diagram, software and hardware division plan, etc. (2 class hours) 2. Environment setup and basic Verification: Install the Keil C51 development environment based on the microcontroller minimum system board, create the project and write the program to achieve the flashing of an LED using multiple methods such as external interrupts and timer interrupts. (4 class hours)	1. Topic review: Students register their topics in groups, and the teacher reviews and records them 2. Environmental inspection: Submit a screenshot of the source code file of "LED flashing" as proof through an online platform.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 2: Core Skill Modularization	(1) Key principles; (2) Digital tube display principle and drive; (3) LCD1602 LCD display;	2	8	1. Enable dynamic scanning drive 2-digit digital tube to stably display the last two digits of your student number. (2 class hours) 2. Implement the display of "Hello World" and the pinyin of your name in two lines on LCD1602. (2 class hours) 3. Integrated application: Use keys to control changes in item display content. (4 class hours)	1. Code review: Submit screenshots of the corresponding source code file and display effect through an online platform as proof. 2. Random spot checks in class: Randomly select a few groups and demonstrate their key and display functions on the spot. And ask students to analyze the code they have written.
Phase 3: Sensors and Actuator Drives	(1) Sensor data acquisition: ADC and temperature sensors; (2) Power Interface and Control: Explain the driving capability limitations of the I/O port of the microcontroller, and introduce the usage scenarios and circuit designs of transistors, MOSFETs, relays, and motor driver chips. (3) Application: By integrating timer, digital tube display, LCD display, sensor data acquisition and other elements, a prototype of a multi-task system is constructed.	3	12	1. Complete the driving and data reading code for the core sensors of the project. (3 class hours) 2. Complete the construction of drive circuits and code writing for project core actuators such as motors, relays, servos, etc. (3 class hours) 3. Project Association: Implement the drivers of at least one display module and one input module on a breadboard or minimum system board based on your project requirements, and complete the tests. For example: LCD1602 shows the current temperature and the set threshold. (6 class hours)	1. Code review: Submit screenshots of the corresponding source code files and display effect screenshots through the online platform as proof. 2. Classroom random spot checks: Randomly select several groups and demonstrate their display functions on the spot. And ask students to analyze the code they have written.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 4: System Integration and Project Coaching	(1) Take the "Intelligent temperature-controlled fan system" as an example to explain how to integrate scattered modules such as display, buttons, sensors, motor drives, etc. into one main program, with a focus on modular programming ideas. (2) Debugging tips: Share common methods for troubleshooting hardware and software issues. (3) Q&A and Inspection: Provide concentrated answers and individual guidance for the problems encountered by each group during the project integration phase. (4) Physical work acceptance and function demonstration, team defense and PPT presentation.	5	45	1. System software and hardware integration: Integrate the modules (input, display, sensing, execution) completed in the previous stages, write the main program logic, and implement the basic functions of the project. Address issues such as incompatibility between modules and timing conflicts. (20 credits) 2. Functional optimization and stability testing: Conduct long-term running tests on the system, optimize the code structure, handle abnormal situations such as sensor data anomalies, key mistriggering, etc., to enhance the stability and reliability of the work. Record the final feature demonstration video. (15 class hours) 3. Document writing: Work together to write the final version of the Project Technical Report. (6 class hours) 4. Preparation for the defense: Prepare a PPT for the final defense and conduct an internal rehearsal within the team. (4 class hours)	1. Procedural concentrated inspection: First session: Check the progress of system integration, with a focus on hardware connections and underlying driver issues. Second session: Check system functionality integrity and guide software logic optimization. Third session: Physical work acceptance and functional demonstration. Each team will present their final work on the spot, and the teacher will score them based on the score sheet. Team defense and PPT presentation will be conducted at the same time 2. Outcome-based submission: Before the final deadline of the course, submit all electronic materials, including: "Project Technical Report", defense PPT, function demonstration video, and source code engineering files.
Total		12	71	83 class hours in total	
Credits (ECTS)		2.8			

Electronic System Engineering Practical Training Internship

Competence field	Centralized practice
Curriculum designation	Electronic System Engineering Practical Training Internship
Curriculum code	9061615050
Semester(s) in which the curriculum is taught	5th Semester
Person responsible for the curriculum	Wenguo Li
Lecturer	Wenguo Li, Saichun Hu, Jie Xiong, Lincheng Zhang
Language	Chinese
The relationship between the curriculum and the major	This practical training is a comprehensive and design-oriented experiment of the "Electronic System Design" course, serving as a supplement and enhancement to classroom teaching and regular in-class experiments. After learning the "Electronic System Design" course, students have initially mastered the basic principles of the STM32 system, as well as basic principles and applications such as GPIO, key principles, serial communication, external interrupts and timing. In-class experiments mainly refer to experimental guidelines, which are difficult to give full play to students' independent design and hands-on abilities. Through comprehensive practical training in electronic system design, students' independent learning is strengthened, learning outcomes are consolidated, students' practical ability and creative thinking in the comprehensive application of STM32 technology are improved, a solid foundation is laid for subsequent related professional courses, students' comprehensive application ability of professional knowledge is cultivated, and it is aligned with employment needs.
Teaching methods, number of teaching hours	Target Major: Electronic Information Engineering Teaching Methods: Practical Teaching Practical Teaching Hours (Contact Hours): 9 class hours Class Size: Approximately 160 students in four classes
Workload	Total Workload: 70 class hours Contact Hours: 9 class hours Self-study Hours: 61 class hours
Credit points (ECTS)	2.3
Requirements according to the examination regulations	Only students with an attendance rate of 90% and a homework completion rate of 90% are eligible to take the exam.
Prerequisite curriculum	Advanced Mathematics, Circuit Analysis, Analog Electronic Technology, Digital Electronic Technology, C Language Programming, Data Structures, Principle and Application of Microcontroller, Electronic System Design, etc.
Curriculum objectives	**Learning Outcomes:**

/expected learning outcomes	The main task of this module is to enable students to deeply understand the principles and applications of STM32, master the interface technology for STM32 systems to interact with external components, and design a small example. Specific objectives include: **Knowledge:** ① Be able to design and fabricate STM32 peripheral circuits using various components, write peripheral driver programs, and master the testing methods of various technical parameters of electronic products. ② By explaining the comprehensive project of STM32-based multi-functional mobile wireless data acquisition instrument, master interface technologies for interacting with the outside world, such as ADC, DAC, PWM, etc., and be able to apply these technologies for data acquisition and processing. ③ Design and implement a comprehensive small project based on STM32 in the form of small teams of 1-3 people. **Skills:** ① Learn to use development environments and tools, such as Keil, for program writing, compilation, burning and debugging; ② Be able to design and implement STM32-based multi-functional mobile wireless data acquisition instruments, such as data acquisition, use of different sensor modules and key input processing, etc.; ③ Master the application of STM32 in embedded systems, and be able to complete hardware interface design and software programming for self-selected topics. **Ability:** ① Cultivate students' ability to comprehensively apply professional knowledge to solve practical problems, improve students' comprehensive quality, and enhance their engineering practice ability and employment competitiveness; ② Through the comprehensive practical training project of STM32-based multi-functional mobile wireless data acquisition instrument, cultivate students' ability to think independently, solve problems and design products; ③ Through the learning and application of these knowledge, cultivate students' scientific work attitude and good work habits, and help them understand the life values of thinking deeply when succeeding and staying calm when encountering setbacks in the engineering design process.
Contents	**Theoretical Teaching (9 contact hours, 61 self-study hours)** Phase 1: Course Launch and Project Mobilization (1 contact hour, 6 self-study hours)

	（1）Explain the assessment method (Works 50% + Report 30% + Daily Assessment 20%), release the project library and topic selection guidance; （2）Development environment training: Uniformly explain and demonstrate the Keil 5 development process; （3）Quick review of STM32 resource characteristics: Review basic knowledge such as I/O, interrupts, timers, etc.; （4）Literature retrieval Phase 2: Modular Intensive Lectures on Core Skills (2 contact hours, 8 self-study hours) （1）Use of development schematics; （2）GPIO interface principle; （3）Principle and use of human-computer interface; （4）Usage principles of sensors required for the project; Phase 3: System Design and Project Guidance (3 contact hours, 20 self-study hours) （1）System design process （2）System design ideas （3）Software and hardware design （4）System testing Phase 4: System Integration and Project Guidance (3 contact hours, 12 self-study hours) （1）Physical work acceptance and function demonstration. （2）Team defense and PPT report. （3）Course design report. Other Practices (0 contact hours, 15 self-study hours): 1. College Students' Innovation and Entrepreneurship Training Program (Embedded System Design) 2. Disciplinary Competitions (National and Hunan Provincial Electronic Design Competitions, National Embedded System Design and Application Competitions, etc.)
Study and examination requirements and forms of examination	Final Score Composition: ① Basic class requirements (20%): No lateness, early departure, unexcused absence, etc.; ② Physical demonstration and defense acceptance (30%): Conduct function demonstration of the physical work completed in the practical training and accept it through defense; ③ Practical report writing (50%): Internship content and practical training experience, summary.
Media employed	Keil and Proteus software, STM32 development boards, multimedia, laser pointers, blackboards, etc.

Reading list	1. Textbooks [1] Y. Zhang, et al., Atomic Teaches You to Play STM32 (Library Function Version), Beijing: Beihang University Press, 2019. 2. Reference Books [9] P. Xiang, Principle and Application of STM32 Microcontroller, Beijing: Tsinghua University Press, 2022.

"Electronic System Engineering Practical Training Internship"Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 1: Course Launch and Project Mobilization	(1) Explain the assessment method (Works 50% + Report 30% + Daily Assessment 20%), release the project library and topic selection guidance; (2) Development environment training: Uniformly explain and demonstrate the Keil 5 development process; (3) Quick review of STM32 resource characteristics: Review basic knowledge such as I/O, interrupts, timers, etc.; (4) Literature retrieval	1	6	1. Project research and approval: Discuss as a team, review materials, determine the final project topic, system block diagram, software and hardware division of labor plan, etc. (2 class hours) 2. Literature retrieval (1 class hour); 3. Environment setup and basic verification: Install the Keil 5 development environment, create a project and write a program based on the STM32 minimum system board, and realize the blinking of an LED through various methods such as external interrupts and timer interrupts. (2 class hours) 4. Component preparation and purchase (1 class hour)	1. Topic Selection Review: Students register their topics in groups, which are reviewed and filed by teachers 2. Environment Check: Submit a "component list" as proof through the online platform.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 2: Modular Intensive Lectures on Core Skills	(1) Use of development schematics; (2) GPIO interface principle; (3) Principle and use of human-computer interface; (4) Usage principles of sensors required for the project;	2	8	1. Realize dynamic scanning to drive 2-digit nixie tubes and stably display the last two digits of your student ID. (2 class hours) 2. Realize displaying "Hello World" and your name in Pinyin in two lines on LCD1602. (2 class hours) 3. Comprehensive application: Use keys to control changes in the displayed content of the project. (4 class hours)	1. Code Review: Submit screenshots of corresponding source code files and display effect screenshots as proof through the online platform. 2. In-class Random Spot Check: Randomly select several groups to demonstrate their key and display functions on site. And require students to analyze the written code.
Phase 3: System Design and Project Guidance	(1) System design process (2) System design ideas (3) Software and hardware design (4) System testing	3	20	1. Complete the project design plan. (3 class hours) 2. System design ideas. (3 class hours) 3. Complete the core hardware design and PCB diagram of the project (4 class hours) 4. Complete the project software design (4 class hours) 5. Complete the joint testing of the system's software and hardware. (6 class hours)	1. Review and provide on-site guidance on the project design plan. 2. Provide on-site guidance on the project's software and hardware design plan through Q&A interaction. 3. Conduct on-site inspections of the joint system debugging situation.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 4: System Integration and Project Guidance	(1) Physical work acceptance and function demonstration. (2) Team defense and PPT report. (3) Course design report.	3	12	1. Physical work acceptance and function demonstration. (1 class hour) 2. Course design report writing. (6 class hours) 3. Defense PPT preparation and team defense (5 class hours)	1. On-site acceptance of physical works 2. On-site defense and suggestions for improvement 3. Review and grade the course design report
Other Practices	1. College Students' Innovation and Entrepreneurship Training Program (Embedded System Design) 2. Disciplinary Competitions (National and Hunan Provincial Electronic Design Competitions, National Embedded System Design and Application Competitions, etc.)	0	15	1. Project application, design and completion (average 6 class hours per student). 2. Independent practice in disciplinary competition laboratories (average 9 class hours per student).	1. Completion certificates of College Students' Innovation and Entrepreneurship Training Programs 2. Award certificates of national, provincial and university-level competitions
Total		9	61	**Total Hours = 70 class hours**	
Credit points (ECTS)		2.3			

Embedded System Comprehensive Practical Training Internship

Competence field	Centralized practice
Curriculum designation	Embedded System Comprehensive Practical Training Internship
Curriculum code	9061515060
Semester(s) in which the curriculum is taught	6th Semester
Person responsible for the curriculums	LinCheng Zhang
Lecturer	LinCheng Zhang, Depeng Chen
Language	Chinese
The relationship between the curriculum and the major	"Embedded System Comprehensive Practical Training Internship" is an intensive practical course for students majoring in electronic information engineering. It is an important link for students majoring in electronic information engineering to deepen their learning and enhance their skills. The practical training internship covers various aspects such as ARM architecture principles, embedded C language programming, hardware interface design, system debugging, etc. The task is to enable students to learn the basic knowledge of embedded systems from the perspective of software and hardware applications, understand the working principles and cutting-edge development trends of embedded systems, and master their application theories and application technologies. Enable students to independently complete system design based on ARM microcontrollers, including hardware circuit construction and software programming implementation. Ultimately, through practical training, students will be able to acquire basic qualities and practical abilities in embedded system development, laying a solid foundation for future career development. This includes not only the improvement of technical skills, but also the development of comprehensive qualities such as teamwork and project management, enabling students to adapt to the rapidly changing demands of the industry.
Teaching methods, number of teaching hours	Target students: Electronic Information Engineering Teaching method: Practical teaching Teaching hours (Contact hours): 12 hours Class size: Four classes with approximately 160 students
Workload	Total workload = 72 class hours; Contact hours = 12 hours; Self-study hours = 60 hours;
Credit points (ECTS)	2.4
Requirements according to the	Only students who have an attendance rate of more than

examination regulations	two-thirds and meet all the requirements of the program can participate in the defense.
Prerequisite curriculum	Principle and Application of Microcontroller, C Language Programming A, Principles and Applications of Embedded Systems.
Curriculum objectives /expected learning outcomes	**Learning outcomes** The main task of this course is to give students a comprehensive grasp of the basic principles, hardware architecture and software development process of ARM embedded systems; Through practical operation, master the use of ARM microcontrollers for project development and enhance programming, debugging and system optimization skills; At the same time, cultivate students' practical operation skills, problem-solving skills and teamwork skills, ensure that students can flexibly apply the knowledge they have learned in real projects, accumulate valuable experience for future embedded system development work, and comprehensively enhance personal professional quality and competitiveness. The specific goals include: **Knowledge:** Understand the fundamentals of ARM-based embedded systems, ARM microprocessor architecture, C/C++ programming language, embedded Linux operating system principles, hardware interface technology, circuit design and debugging, etc. **Skills:** 1. Be capable of designing, developing, debugging and testing embedded application products using software and hardware tools such as ARM embedded hardware platform and Ubuntu operating system. Enhance the ability to design and develop embedded systems, including requirements analysis, system design, code writing and testing. 2. Develop students' skills in system debugging and optimization, as well as teamwork and project management. Through practice, students will be able to independently complete the development, testing and maintenance of embedded system projects. It will enable students to master embedded technology on the basis of application, from the product perspective, master the cross-application of electronic technology, computer technology, software engineering and other technologies, establish the overall thinking and process of product development, apply theory to practice, and lay a technical foundation for students' future employment. **Ability:**

	1. Be able to understand and master the basic methods of developing and designing the most popular or newly launched new processors and other related chips, software debugging tools, operating systems and application software, etc. 2. Be able to design reasonable experimental steps according to the experimental plan, be able to correctly use the relevant development board of the ARM hardware platform, complete the relevant design and development of applications under Linux through the linux operating system platform, be able to debug, analyze experimental results and draw reasonable and effective conclusions. 3. Have the ability to summarize, organize and express the purpose, principle, content, steps, results and analysis of experiments in writing, and be able to write experimental reports and design documents for embedded systems and applications. 4. Have the ability to analyze and solve problems, as well as teamwork spirit and communication skills. Through practical training, students will be able to independently design and implement embedded system projects, comprehensively enhancing their professional skills and overall qualities.
Contents	**Practical training (12 contact hours, 60 self-study hours)** **Phase 1: Internship Initiation and Project Mobilization (2 contact hours, 6 self-study hours)** (1) Explain the assessment methods (20% regular assessment + 20% report + 60% practical training defense), and release the project library and topic selection guidance. (2) Cross-development environment setup and practice exercises; (3) Explanation and practice of ARM development board hardware and interfaces; **Phase 2: Core Skills Modularized Instruction (3 contact hours, 16 self-study hours)** (1) Develop the use of this schematic diagram; (2) GPIO principles; (3) LED principles; (4) External interrupt principle; (5) Timer principle; (6) Serial communication experiment; **Phase 3: Project Development and Practice (6 contact hours, 36 self-study hours)** (1) Integrated project implementation phase of embedded systems; (2) Extended functionality and the realization of innovative

	ideas; (3) Debugging Tips: Share common methods for troubleshooting hardware and software issues. (4) Q&a and Inspection: Provide concentrated answers and individual guidance for the problems encountered by each group during the project integration phase. (5) Physical demonstrations and defense acceptance. **Phase Four: Project Report Writing and Reflection (1 contact class hour, 2 self-study class hours** Write an internship report and summarize what you have gained.
Study and examination requirements and forms of examination	1. Attendance (10%) : Basic course requirements (no lateness, no early departure, no unexcused absence). 2. In-class interaction (10%) : answering questions in class, etc 3. Physical demonstration and defense acceptance (40%) : Functional demonstration of the physical object made during the training and internship, followed by defense acceptance; 4. Writing of the practice report (40%) : Practice content and practice training experience and summary.
Media employed	Multimedia computers, projectors, laser Pointers, blackboards, chalk, Linux operating systems and Arm development boards, ARM embedded integrated experiment boxes, etc
Reading list	1. Reference book [1] Y. F. Li, et al. ARM Embedded Linux System Development: From Beginner to Master[M]. Beijing: Tsinghua University Press, 2018. [2] J. K. Zhang and X. Q. Zhang. Detailed Explanation of Embedded Linux System Development Based on ARM[M]. Beijing: Posts & Telecom Press, 2010.

“Ideological and Moral Cultivation and Legal Basis” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 1: Course Initiation and Project Mobilization	(1) Explain the assessment methods (works 50% + reports 30% + regular assessments 20%), release the project library and topic guidance; (2) Cross-development environment setup and practice exercises; (3) Explanation and practice of ARM development board hardware and interfaces;	2	6	1. Project research and initiation: Team discussion, review of materials, determination of the final project title, system block diagram, software and hardware division plan, etc. (2 class hours) 2. Environment setup and basic validation: Install the ubuntu development environment and get familiar with the use of ARM development board-related hardware and interfaces. (4 class hours)	1. Topic review: Students register their topics in groups, and the teacher reviews and records them 2. Environmental inspection: Random spot checks.

Phase 2: Core Skills Modular Intensive Instruction	(1) The formulation of the core controller solution (2) Design and application implementation of peripheral modules	3	16	1. Implement the application and control of different peripheral functional modules respectively. (10 class hours) 2. Integrated application: Using different modules to control certain functions of the project. (6 class hours)	1.Random spot checks in class: Randomly select several groups and demonstrate their functions on the spot. And ask students to analyze the code they have written.
Phase 3: Project Development and Practice	(1) Embedded Systems Integrated Project implementation phase; (2) Extended functionality and the realization of innovative ideas; (3) Debugging Tips: Share common methods for troubleshooting hardware and software issues. (4) Q&a and Inspection: Provide concentrated answers and individual guidance for the problems encountered by each group during the project integration phase. (5) Physical demonstrations and	6	36	1. Complete the core hardware design of the project, and write and test the driver code for each module. (6 class hours) 2. Complete project software design and code writing and testing. (6 class hours) 3. Complete the software and hardware integration of the project system to achieve the basic functions of the project. (6 class hours) 4. Functional optimization and stability testing: Run the system for a long time, optimize the code structure, handle anomalies, and enhance the stability and reliability of the work. Record the final feature	1. Random spot checks in the classroom: Several groups are randomly selected to demonstrate their functions on the spot. And ask students to analyze the code they have written. Procedural concentrated review: 2. Defense. Pass the physical work acceptance and functional demonstration. Each team presents their final work on the spot, and teachers score them based on the score sheet.

	defense acceptance.			demonstration video. (14 class hours) 5. 4. Defense preparation: Prepare a PPT for the final defense and conduct an internal team rehearsal practice. (4 class hours)	
Phase 4: Project Report writing and Reflection	Write internship reports and summarize personal gains	1	2	Document writing: Work together to write the final version of the Project Training and Internship Report. (2 class hours)	1. Result-oriented submission: Submit all electronic materials, including: Training and Internship Report, defense PPT, functional demonstration video, source code project file, by the final course deadline.
Total		12	60	Total hours = 72 hours	
Credits (ECTS)		2.4			

Graduation Internship

Competence field	Centralized practice
Curriculum designation	Graduation Internship
Curriculum code	9061615070
Semester(s) in which the curriculum is taught	7th Semester
Person responsible for the curriculum	Qiuxiang Zhu
Lecturer	Qiuxiang Zhu, Dongchu Jiang, Wenguo Li, Yue Tan, Fei He, Yaqi Dengy, Jie Xiong, Xiongjie Liu, Maolin Li, Peng Zhong, et al.
Language	Chinese
The relationship between the curriculum and the major	Graduation Internship is a comprehensive internship for students majoring in electronic information engineering after completing their major courses. It is an important part of the teaching plan and plays a significant role in achieving the professional training goals. Through graduation internship, analyze the actual production technology seen in the internship site with the theoretical knowledge learned, enrich, verify, consolidate and deepen the theoretical knowledge, understand the necessity of book knowledge, and improve the ability to solve practical engineering problems.
Teaching methods, number of teaching hours	Target major: Electronic Information Engineering Teaching method: Practical teaching Teaching hours (Contact hours): 32 hours Class size: Four classes with approximately 160 students
Workload	Total workload: 432 class hours Contact hours: 32 hours Self-study hours: 400 hours
Credit points (ECTS)	14.4
Requirements according to the examination regulations	Complete all practical tasks, complete and submit the graduation internship report manual.
Prerequisite curriculum	Circuit Analysis, Analog Electronic Technology, Digital Electronic Technology, Signals and Systems, Digital Signal Processing, Communication Fundamentals, Principle and Application of Microcontroller, et al.
Curriculum objectives /expected learning outcomes	**Learning outcomes:** **Knowledge:** ① Understand the characteristics of production, management and operation of modern electronic information enterprises, be familiar with relevant market operation methods, and further understand the important role of safety awareness and safe production in product production; ② Through internships in workshops and teams, get in touch with factory managers, technicians and operators, and learn their

	excellent qualities and relevant professional knowledge and skills. ③ Receive a comprehensive training and development. Within the limited internship time, independently complete the development and production of a single-chip microcomputer-based photoelectric system under the guidance of an engineer, and complete the PCB layout, software and hardware design and system debugging. **Skills:** ① Master the characteristics and requirements of electronic product production by learning about the development and production process of an electronic system based on a single-chip microcomputer. Through the study of C++ and JAVA, each intern independently completed the design of a software system. Learn about the international and domestic development status of electronic products and their production processes through the internship. ② Learn about the debugging, testing and development of electronic products, and independently complete the development and production of electronic systems based on single-chip microcomputers. ③ Have a preliminary understanding of the general methods of modern electronic information enterprise management and production management, combine the knowledge learned with production practice, and master the design of information system software and hardware and system debugging. **Ability:** ① During the internship, through understanding the actual production process and conversations with technicians, develop a sense of dedication, mission and pragmatism to the national IT industry, laying a foundation for better adaptation from student to worker; ② By observing and analyzing the production process of electronic products, understand the application of professional knowledge in production practice and deepen the sensory understanding of electronic product production; ③ Connect theory with practice, use the theoretical knowledge learned to analyze the actual production technology seen in the internship site, enrich, verify, consolidate and deepen the theoretical knowledge, understand the necessity of book knowledge, and improve the ability to solve practical engineering problems; ④ Understand the operation and management model of the enterprise and gain on-the-job experience and teamwork ability. ⑤ Graduation internship lays a good foundation for students' employment after graduation.
Contents	**Practical teaching (32 contact hours, 400 self-study hours)** **1. Graduation internship Mobilization (2 contact hours, 4**

	self-study hours) (1) Hold an internship mobilization meeting; (2) Internship discipline and safety education; (3) Description of internship tasks and objectives. **2. Graduation Internship Preparation (2 contact hours, 16 self-study hours)** (1) Learn about product development and production at the internship company through the Internet; (2) Fully study enterprise safety knowledge, factory discipline, factory rules, and clarify internship discipline; (3) Hold an internship mobilization meeting to clarify internship tasks and put forward internship requirements; (4) Make other preparations that should be done before the internship. **3. Graduation Internship content (24 contact hours, 360 self-study hours)** (1) Invite company leaders and engineering technicians to give special technical lectures (entry education, safety education, production process instruction, electronic product research and development, modern factory production organization and management, etc.); (2) Read carefully the technical operation procedures and relevant technical materials of the production workshop, and directly observe and learn the production process on the front line of production under the guidance of the technicians arranged by the internship unit; (3) Learn and master practical production operation skills under the guidance of technicians assigned by the internship unit; (4) Learn the research and development process of electronic products under the guidance of the research and development engineer of the internship unit. (5) Master the characteristics and requirements of electronic product production by learning about the development and production process of an intelligent system based on a single-chip microcomputer. Understand the international and domestic development status of the products and production processes of enterprises such as Yueqian, Software Evaluation Center, Oscon, Kerite, etc. (6) Learn about the debugging, testing and research and development of electronic products, and independently complete system design, development and production based on single-chip microcomputers. (7) Have a preliminary understanding of the general methods of modern enterprise management and production management, and combine the knowledge learned with production practice to effectively master system PCB board making, software and hardware design and system debugging techniques. (8) Understand the operation and management models of enterprises

	through internship companies. **4. Graduation Internship Defense (4 contact hours, 20 self-study hours)** (1) Internship summary report writing; (2) Physical demonstration and defense preparation; (3) Defense and filing of materials.
Study and examination requirements and forms of examination	Final grades include: ① Basic requirements (20%) : No lateness, early departure, absence without reason, etc. ② Mid-term inspection (20%) : Random spot checks during the internship, on-site communication with enterprise mentors about the internship situation; ③ Physical demonstration and defense acceptance (30%) : Functional demonstration of the physical object made during the internship and defense acceptance; ④ Writing of the practice report (30%) : Internship content and practical training experience and summary.
Media employed	Multimedia-assisted instruction, enterprise workshop practice instruction
Reading list	1. Reference book [1] J. Wang and M. Xu, et al. College Students' Electronic Engineering Internship and Design Guide[M]. Beijing: Publishing House of Electronics Industry, 2020.

“ Graduation Internship ” Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 1: Graduation internship mobilization	（1）Hold an internship mobilization meeting; (2) Internship discipline and safety education; (3) Description of internship tasks and objectives.	2	4	1. Attend the internship mobilization meeting, record key points, and understand the significance and objectives of the internship. (2 hours) 2. Learn internship discipline, safety regulations and corporate culture requirements. (2 credits)	1. Check-in and note check at the mobilization meeting: Students are required to submit mobilization meeting notes or summaries of reflections. 2. Discipline and Safety Knowledge Test: Organize an online test to ensure students master the basic norms.
Phase 2: Graduation internship preparation	(1) Internship enterprise research; (2) Job matching and planning; (3) Technical pre-learning and data collection.	2	16	1.Conduct research on the products, technologies and industry status of the internship enterprises, and write research reports. (5 hours) 2. Develop an internship plan based on personal interests and professional directions. (6 hours) 3. Pre-study related technologies (such as single-chip microcomputer system design, PCB	1. Internship Plan Review: The supervisor reviews the feasibility and clarity of the internship plan. 2 Review of Technical Pre-learning outcomes: Submit technical notes or pre-research reports.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
				layout, etc.) and collect reference materials. (5 credits)	
Phase 3: Graduation internship implementation	(1) Induction education and technical training; (2) Job practice and project development; (3) Mid-term review and feedback.	24	360	1. Participate in enterprise technical lectures and training, and write learning summaries. (50 hours) 2. Under the guidance of enterprise mentors, complete actual projects (such as system development based on single-chip microcomputers), and document the process and problems. (285 hours) 3. Organize interim results and prepare interim presentation materials. (25 credit hours)	1. Internship Log and Weekly Report: Submit the internship log weekly, and the supervisor will check and provide feedback regularly. 2. Mid-term Review and Review: Organize mid-term review meetings where students report progress and mentors and enterprise mentors evaluate together.
Phase 4: Graduation internship defense	(1) Internship summary report writing; (2) Physical demonstration and defense preparation; (3) Defense and filing of materials.	4	20	1. Write the internship summary report, systematically review the internship content, achievements and insights. (15 class hours) 2. Prepare physical demonstration materials, defense PPT and lecture notes. (5 class hours) 3. Organize all internship materials and prepare for filing. (5 credits)	1. Report Review and revision: The supervisor reviews the internship report and provides revision suggestions. 2. Defense Organization and Evaluation: Organize defense sessions, and the review panel will score based on the presentation, presentation, and defense performance. 3. Archiving of materials: Check the completeness and standardization of all materials.
Combined		32	400	Total hours = 432 hours	
Credits (ECTS)		14.4			

Module Descriptions - Graduation thesis/design

Graduation Comprehensive Training

Competence field	Graduation thesis/design
Curriculum designation	Graduation Comprehensive Training
Curriculum code	9061515010
Semester(s) in which the curriculum is taught	8th Semester
Person responsible for the curriculum	Qiuxiang Zhu
Lecturer	Dongchu Jiang, Wenguo Li, Yue Tan, Qiuxiang Zhu, Fei He, YaqiDeng, Jie Xiong, Xiongjie Liu, Maolin Li, Peng Zhong
Language	Chinese
The relationship between the curriculum and the major	Graduation integrated training programs can train students on how to apply the knowledge they have acquired over the past four years to engineering design or research. Students can independently complete the entire graduation project under the guidance of their mentors. Students have a comprehensive ability to research, gather information, present proposals, analyze calculations, draw designs (in accordance with national standards) or conduct experimental tests, program computations, translate foreign data, write reports (design manuals or theses), and defend graduation. The content combines the actual needs of research and engineering, and students should complete engineering projects, research projects or experimental projects in electronic information engineering and similar specialties.
Teaching methods, number of teaching hours	Target major: Senior students of Electronic Information Engineering Teaching methods: Theoretical instruction, computer and microcontroller practice Training hours (Contact hours): 136 hours Theoretical teaching, laboratory/practical teaching, and computer practice are arranged by teachers according to each student's specific project. Class size: Each teacher instructs 8 to 10 students
Workload	Total workload: 731 class hours Contact hours: 136 hours Self-study hours: 595 hours
Credit points (ECTS)	24.4
Requirements according to the examination regulations	Students complete literature translation and project tasks (experiments, designs, or calculations) required by their mentors; Pass the mid-term review of the graduation integrated training; Complete the graduation project (thesis).
Prerequisite curriculum	Complete all required courses (semesters 1-7)
Curriculum objectives	Through this module, students will be able to acquire:

/expected learning outcomes	The objective and task of the graduation comprehensive Training is to enable students to combine theoretical knowledge with skills to analyze and solve practical problems related to electronic information engineering. **Knowledge:** Show an understanding of the knowledge learned from the project, as well as the methods of literature review and research. **Skills:** (1) The ability to conduct independent literature retrieval and research; (2) Demonstrate the ability to analyze theory and practice; (3) Design the main framework of the thesis, develop hardware and software; (4) Practice the ability to process and analyze data comprehensively; (5) The ability to write papers and design specifications. **Ability:** Students should acquire the ability to track trends in their major and related fields, study deeply, acquire comprehensive interdisciplinary knowledge and skills related to the course, apply knowledge and modern engineering tools, consider economic, environmental, legal, safety, health, ethical and other factors in design, have a certain degree of innovation and engineering literacy, and have teamwork and communication skills.
Contents	**Graduation Project (136 contact hours, 595 self-study hours)** **Phase 1: Topic selection and Assignment (16 contact hours, 69 self-study hours)** (1) Graduation Project Mobilization and Academic Norms; (2) Literature retrieval and topic analysis; (3) Issue the assignment. **Phase 2: Project Design and Initiation Phase (24 contact hours, 100 self-study hours)** （1）Project research and literature review; （2）Scheme justification and technical route design; （3）Proposal defense; **Phase 3: Design and Implementation (56 contact hours, 278 self-study hours)** （1）Complete the detailed design and implementation of each module of the system, including hardware, software and algorithms; （2）Experimental data and results analysis; （3）Mid-term review and audit. **Phase 4: Essay Writing and Revision (24 contact hours, 102 self-study hours)**

	(1) Systematically organize the design and implementation process and write the graduation thesis document. (2) Revision and improvement of the thesis. **Phase 5: Finalization and Defense (16 contact hours, 46 self-study hours)** (1) Organize the graduation defense. (2) Guide the revision and finalization of the thesis. (3) Collect paper materials.
Study and examination requirements and forms of examination	Final grades include: attendance (10%), proposal defense (15%), mid-term assessment (15%), graduation project (thesis) writing (30%), graduation defense (30%). ① Attendance (10 percent) : The initiative and ability of the student throughout the integrated design process will be evaluated and the supervisor will give a score; ② Proposal defense (15%) : The proposal defense group will review the graduation comprehensive training questions submitted by the students, evaluate the proposal reports submitted by the students, and give corresponding scores; ③ Mid-term Assessment (15%) : The instructor reviews the mid-term assessment form submitted by the student, checks the progress of the graduation comprehensive training project, and gives corresponding scores; ④ Graduation design (thesis) writing (30%) : The instructor reviews the graduation design report submitted by the student and gives corresponding scores; ⑤ Graduation defense (30%) : The student's defense score during the comprehensive design process.
Media employed	Computers, multimedia, blackboards, Tencent Meeting online software, etc
Reading list	Hunan City University Graduation Thesis (Design) Report template

"Graduation Comprehensive Training" Class Hour allocation details

Total hours = contact hours + self-study hours

(Contact hours are the total hours of the course in the 2025 version of the talent training program, self-study hours are the hours that the instructor requires students to study independently, which may include court-related activities: previewing, homework, review, exam preparation, etc. It also includes self-exploration: online search for information, experimental design, case analysis and other activities related to course knowledge);

ECTS credits (European credits)= Total hours /30

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 1: Topic selection and assignment of tasks	(1) Graduation project mobilization and academic norms; (2) Literature retrieval and topic analysis; (3) Issue the assignment.	16	69	1. Determine the initial topic direction based on the instructor's research project, enterprise demand, competition project or social practice, etc. (3 class hours) 2. Based on the initial topic direction, systematically search and carefully read no fewer than 15 high-quality Chinese and English documents, summarize the technical routes, strengths and weaknesses of existing research, and extract core technical ideas that are instructive for the topic. (45 class hours) 3. On the basis of full discussion with the supervisor, clarify the specific function of the topic, the key problems to be solved, the initial technical indicators and implementation ideas. (20 class hours) 4. Read and confirm the requirements of the Graduation Project Assignment. (1 credit hour)	1. Process communication and review: Students are required to have at least one face-to-face communication with their supervisors on topic selection, verify literature reading notes and project initiation concepts. • The supervisor reviews and assesses the depth of the research and the feasibility of the topic. 2. Assignment and Confirmation: • After receiving the official Graduation Project Assignment, students are required to indicate that they have understood and accepted the task requirements.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 2: Project Design and Proposal phase	(1)Project research and literature review; (2)Scheme justification and technical route design; (3) Proposal defense;	24	100	1. Systematically search and read Chinese and foreign literature. Based on the literature reading, write a complete and logically clear literature review that includes: current research status at home and abroad, analysis of key technologies, research ideas for this project, etc. (20 class hours) 2. For the core functions, propose 2-3 technically feasible implementations and compare them in terms of performance, cost, complexity, development cycle, etc. (32 class hours) 3. Complete the project scheme design, including the overall system block diagram, the hardware core circuit schematic diagram, the software functional module diagram, and the key algorithms or technical routes to be adopted. (38 class hours) 4. Write the thesis proposal and the thesis defense PPT, highlighting the key points, difficulties, innovations, implementation plan and expected results of the project. (10 class hours)	1. Document review: • Submit the initial draft of the Literature Review and the Proposal, which will be reviewed and revised by the supervisor. 2. Review of the proposal defense: • Students participate in the proposal defense organized by the teaching and research section. The review panel scores based on the quality of the presentation, the feasibility of the proposal, and the performance of the defense. • Assessment linkage: The score of the thesis proposal defense will be included in the overall course evaluation score.
Phase 3: Design and Implementation phase	(1)Complete the detailed design and implementation of each module of the system, including hardware,	56	278	1. Hardware/Software development and implementation: (150 class hours) Hardware direction: Complete circuit schematic and PCB design, component procurement and soldering, hardware unit circuit debugging, system integration. Software: Complete the coding, unit testing, module integration and system integration of each software functional module. Software and hardware integration: Coordinate the joint debugging of the hardware base and software algorithms to ensure that the	1. Routine process inspection: • Implement a "weekly report/weekly meeting" system, where students submit progress reports each week and mentors hold regular group meetings in the offline lab or online via Tencent Meeting to keep track of progress and solve problems. 2 Mid-term results review: • The instructor checks the mid-term

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
	software and algorithms; (2)Experimental data and results analysis; (3)Mid-term review and audit.			overall system functionality meets the standards. 2. Experimental verification and data analysis: (80 class hours) Conduct experiments and collect system performance data; Or conduct simulations to validate the theoretical model. Process, analyze, and visualize the experimental data, compare it with the design metrics, and draw conclusions. 3. Prepare for the mid-term review: Organize the work results of this stage, write the mid-term Review report of the graduation project, and prepare presentation materials (such as physical demonstrations, simulation results, data charts, etc.). (48 class hours)	results, and the student demonstrates the system functions on-site and reports the project progress. • Assessment linkage: The mid-term inspection results will be included in the final course grade, and a warning will be issued to those who are seriously lagging behind in progress.
Phase 4: Essay Writing and Revision	(1)Systematically organize the design and implementation process and write the graduation thesis document. (2) Revision and improvement of the thesis.	24	102	1. Writing the first draft of the thesis (60 class hours) • Complete the full text of the first draft of your graduation thesis according to the school template. Make sure the structure is complete, the data is accurate, the charts are clear, and the arguments are adequate. 2. Multiple rounds of iterative revisions (42 hours) • First draft revision: Focus on addressing major structural and content issues raised by the supervisor. • Second draft revision: Focus on deepening data analysis, perfecting the argumentation chain, and optimizing language expression. • Third draft/Pre-final revision: Focus on formatting, proofreading of references, and correction of grammatical errors.	1. Multi-manuscript review system: • Students submit their first draft, second draft, and third draft in sequence at specified time points. The supervisor will annotate and review each draft, provide specific revision suggestions, and check the implementation of the revisions for the next submission. 2. Detection of academic misconduct: • Before finalizing the paper, use a detection system to check for plagiarism and ensure that the text copy ratio complies with school regulations.

Knowledge Unit (Chapter)	Knowledge Points	Contact hours	Self-study hours	Self-study content	Self-study hours supervision methods
Phase 5: Finalization and Defense of the thesis	(1)Organize the graduation defense. (2)Guide the revision and finalization of the thesis. (3) Collect paper materials.	16	46	1. Defense Preparation and Practice (34 class hours) • Prepare a defense PPT that highlights key points, is illustrated with pictures and text, and has clear logic. • Write your defense script and conduct repeated timed practice to ensure smooth presentation and precise timing. • Prepare for the question-and-answer session, predict the technical or conceptual questions that the judges might raise, and organize the answers. 2 Finalization and submission of the paper (12 class hours) • Complete all revisions of the thesis based on the final opinion of the supervisor and feedback from the pre-defense to form the final version. • Submit all electronic and paper versions as required by the school.	1. Formal defense and filing of materials: • Students attend the formal graduation defense organized by the college. • Assessment link: The defense committee scores based on the quality of the thesis, presentation, and questions and answers, which are included in the overall grade. • Final review: Check the completeness and standardization of the submitted final version of the thesis and related materials.
Combined		136	595	Total hours = 731 hours	
Credits (ECTS)		24.4			

Module Descriptions - Autonomous development(optional)

The specification of the syllabus for Autonomous Development (Optional)

In the 2025 version of the talent cultivation plan, students are required to take 10 credits of elective courses including Humanities and Social Sciences, Arts and Physical Education, Innovation and Entrepreneurship, Other 1, and Other 2. As these courses are selected freely by students online, there are no fixed teaching syllabuses. This is to inform you!