

沈阳化工大学本科培养方案

信息工程学院

专业名称：电子科学与技术

专业代码：080702

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电子科学与技术专业培养方案

一、培养目标

本专业坚持“立德树人，回归教育初心”的育人理念，培养综合素质良好，德、智、体、美、劳全面发展，具备电子科学与技术专业知识，具有较强工程实践能力和创新意识，能够在电子信息及相关领域从事微电子器件的工程设计、制造、应用开发和项目管理等工作的高素质应用型工程技术人才和社会主义接班人。

毕业 5 年后的学生：

(1) 具有扎实的理论基础，具备适应电子信息领域发展的专业能力和专业视野，能够综合运用数学、自然科学、专业知识以及交叉学科知识，对电子信息及相关领域的微电子器件复杂工程问题的解决方案进行分析和设计。

(2) 具有在企业与社会环境下，运用现代工具对电子信息及相关领域的微电子器件进行分析、设计、制造和应用的能力。

(3) 具有高度的社会责任感和道德修养、健全的人格、良好的心理素质和人文科学素养、和谐包容的团队精神、有效的沟通与表达能力和工程项目管理能力，在工程实践中能综合考虑法律、环境与可持续性发展等因素，具有坚持公共利益优先的素质。

(4) 具有广阔的国际视野，主动适应不断变化的国内外形势和环境，能够通过多种学习渠道更新知识，形成终生学习的习惯，实现能力和技术水平的提升。

二、专业方向

微电子技术。

三、毕业要求

本方案根据本科专业类教学质量国家标准、专业认证标准中的要求，基于成果导向教育理念，依据人才培养目标和专业多年形成的人才培养特色，针对电子科学与技术专业的特点，制定本专业毕业能力要求和指标点分解。

本专业毕业能力要求和指标点分解：

毕业能力要求	指标点
毕业要求 1： 工程知识：掌握数学、自然科学、工程基础和电子科学与技术专业知识用于解决微电子器件设计、制造和应用中的复杂工程问题。	1-1.能够将数学、自然科学、工程基础和专业知运用到复杂工程问题的恰当表述中。
	1-2.能够将工程基础和专业知用于微电子系统单元的设计和分析。
	1-3.能够将工程基础和专业知用于电子信息及相关领域的微电子系统分析和优化。
	1-4.能够将工程基础和专业知用于对电子信息及相关领域的微电子系统进行设计和改进。
毕业要求 2： 问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究来分析微电子器件设计、制造和应用中的复杂工程问	2-1.能够运用数学、自然科学和工程科学的基本原理，识别电子信息及相关领域的微电子器件设计、制造及应用的复杂工程问题中的关键环节和参数。
	2-2.能够通过模拟分析、基于工艺和系统运行指标分析等方法正确表达电子信息及相关领域的微电子器件设计、制造及应用的复杂工程问题。

题, 以获得有效结论。	2-3.能够通过文献研究来分析电子信息及相关领域的微电子器件设计、制造及应用的复杂工程问题, 以获得有效结论。
毕业要求 3: 设计/开发解决方案: 在综合考虑社会、健康、安全、法律、文化以及环境等因素的前提下, 能够针对微电子器件设计、制造和应用中的复杂工程问题设计解决方案, 设计满足特定需求的系统和单元, 并能够在设计环节中体现创新意识。	3-1.能够在综合考虑社会、健康、安全、环境、法律等现实约束条件下, 对电子信息及相关领域的微电子器件设计、制造及应用系统的复杂工程问题设计解决方案。
	3-2.能够根据用户的特定需求, 设计合理的微电子系统和单元。
	3-3.能够综合考虑社会、健康、安全、环境、法律等现实约束条件下, 通过对微电子器件设计、制造及应用的设计方案进行优化, 体现创新意识。
毕业要求 4: 研究: 能够基于科学原理并采用科学方法对微电子器件设计、制造和应用中的复杂工程问题进行研究, 包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。	4-1.能够基于专业理论, 根据对象特性, 设计可行的研究方案。
	4-2.能够基于科学原理并采用科学方法对微电子器件设计、制造及应用的复杂工程问题设计实验方案, 开展实验, 分析与解释数据。
	4-3.能够针对微电子器件相关的复杂工程问题进行应用研究, 并通过信息综合得到合理有效的结论。
毕业要求 5: 使用现代工具: 掌握文献检索、资料查询以及运用现代信息技术获取相关信息的基本方法, 能够针对微电子器件设计、制造和应用中的复杂工程问题, 开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具, 包括对复杂工程问题的预测与模拟, 并能够理解其局限性。	5-1.掌握文献检索、资料查询以及运用现代信息技术获取相关信息的基本方法。
	5-2.能够正确选择与使用仿真工具、人机界面集成工具等技术、资源, 对微电子器件设计、制造及应用的复杂工程问题进行预测与模拟。
	5-3.在解决微电子器件相关的复杂工程问题实践中提高现代工具的应用能力, 并能够理解其局限性。
毕业要求 6: 工程与社会: 能够基于微电子器件设计、制造和应用中的背景知识进行合理分析, 评价专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响, 并理解应承担的责任。	6-1.掌握社会、健康、安全、法律以及文化等方面的相关知识, 能够基于电子信息及相关领域背景知识进行合理分析。
	6-2.能够评价工程实践和工程方案对社会、健康、安全、法律以及文化的影响, 理解在电子信息及相关领域的微电子器件及应用系统相关工程实践中应承担的责任。
毕业要求 7: 环境和可持续发展: 能够理解和评价针对微电子器件设计、制造和应用的复杂工程问题的工程实践对环境、社会可持续发展的影响。	7-1.能够理解和体验针对微电子器件设计、制造和应用相关的复杂工程问题的工程实践对环境、社会可持续发展的影响。
	7-2.能够运用环境与可持续发展等相关法律法规分析、评价针对微电子器件设计、制造和应用相关的复杂工程问题的工程实践对环境、社会可持续发展的影响。
毕业要求 8: 职业规范: 具有人文社会科学素养、社会责任感, 能够在微电子器件设计、制造和应用中的工程实践中理解并遵守工程职业道德和规范, 履行责任。	8-1.培养良好的世界观、人生观, 了解国家与社会发展。
	8-2.能够树立和践行社会主义核心价值观, 理解个人与社会的关系, 了解中国国情, 明确个人作为社会主义事业建设者和接班人所肩负的责任和使命。具有良好的人文社会科学素养。
	8-3.理解工程师的职业性质和责任; 遵守工程职业道德和规范, 并履行责任。
毕业要求 9: 个人和团队: 能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。	9-1.能够在多学科背景下的团队中承担个体角色并发挥个体优势。
	9-2.能够在多学科背景下的团队中承担团队成员角色并发挥团队协作精神。
	9-3.能够在多学科背景下的团队中承担团队负责人角色并发挥管理能力。
毕业要求 10: 沟通: 能够就微电子器件设计、制造和应用中的复杂工程问题与业界同行及社会公众进行有效沟通和交流, 包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令, 并具备一定的国际视野, 能够在跨文化背景下进行沟通和交流。	10-1.具备外语交流能力, 具有一定的国际视野, 能够在跨文化背景下进行沟通和交流。
	10-2.了解电子信息领域发展趋势和热点问题, 利用图表、公式、计算、图纸等内容的整合表达思想, 就微电子器件设计、制造和应用相关的复杂工程问题与业界同行及社会公众有效地进行口头和书面的信息交流。
毕业要求 11: 项目管理: 理解并掌握工程管理原	11-1.理解并掌握一定的工程管理原理与经济决策方法。

理与经济决策方法，并能在多学科环境中应用。	11-2. 能够应用工程管理原理与经济决策方法对微电子器件设计、制造和应用相关的复杂工程问题进行有效分析和综合评价。
毕业要求 12: 终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。	12-1. 充分认识到电子信息领域微电子器件设计、制造和应用系统的快速发展，能在社会发展的大背景下，认识到不断探索和学习的必要性，具有自主学习和终身学习的意识。
	12-2. 具有自主学习能力，掌握终身学习的语言工具和计算机工具，具有健康良好的体魄和心理，以适应工作中的各种任务。

专业毕业要求应该能够支撑培养目标的达成。建立本专业毕业要求支撑培养目标实现的关系阵。

毕业要求支撑培养目标实现的关系矩阵

毕业要求	培养目标			
	培养目标 1	培养目标 2	培养目标 3	培养目标 4
1: 工程知识	√			
2: 问题分析	√			
3: 设计/开发解决方案	√			
4: 研究		√		
5: 使用现代工具		√		
6: 工程与社会		√		
7: 环境和可持续发展			√	√
8: 职业规范			√	
9: 个人和团队			√	
10: 沟通			√	√
11: 项目管理			√	
12: 终身学习				√

四、主干学科

电子科学与技术

五、专业核心课程

电路分析基础、模拟电子技术、数字电子技术、信号与系统I、半导体物理学、微电子器件基础、光电子技术、单片机原理与应用、数字系统与逻辑设计、微电子工艺原理、集成电路原理与设计、光伏材料学。

六、修业年限

本科基本学制 4 年，弹性学习年限 3-6 年，按照学分制度管理。

七、授予学位

学生应至少修满 167 学分方可毕业。符合《沈阳化工大学本科毕业生学士学位授予工作有关规定(2017 年 3 月修订)》学位授予条件者，可授予工学学士学位。

八、学分要求

课程类别	课程模块		课程性质	学分要求	小计	比例 (%)
通识教育课	通识教育必修课	思政类	必修	17	41.5	24.9
		外语类		12		
		计算机类		2.5		
		军事安全类		2		
		劳动体育类		5		
		创新创业类		2		
		心理健康类		1		
	通识教育选修课	美育类(400)	选修	2	8	4.8
		中国与世界(500)		2		
		四史(600)		1		
		经济管理类(700)		1		
		传统文化(900)		2		
	通识教育实践课	军训	实践	2	2	1.2
学科平台课	学科基础课程	公共基础类	必修	63	73	69.2
		专业基础类				
	学科实践课程	-	实践	10		
专业教育课	专业核心课程	-	必修	12	38	69.2
	专业选修课程	-	选修	4		
	专业实践课程	-	实践	22		
能力拓展课	专业特色课程	-	必修(或实践)	4.5	4.5	
课外环节	课外通识实践	人文社会实践	课外实践	4	4	
		身心健康实践				
		外语技能实践				
	创新创业实践	创新训练		4		
		创新大赛				
		创客活动				
	生涯教育	成长规划类		1		
总学分/比例					167	100

Electronic Science and Technology Major 2021 Undergraduate Education Program

I. Educational Objectives

Adhering to the educational concept of "fostering virtue through education and returning to the original intention of education", this major is committed to the cultivation of high-quality application-oriented engineering and technical talents and socialist successors with good comprehensive quality, who will improve all round in terms of morality, intelligence, physical ability, aesthetic sensibility and work skills, possess professional knowledge of electronic science and technology, strong engineering practice ability and innovation consciousness and engage in engineering design, manufacture, application development and project management of microelectronics devices in electronic information and related fields.

Students 5 years after graduation:

(1) Having a solid theoretical foundation, and the professional ability and vision to adapt to the development in the electronic information field; being able to analyze and design solutions to complex engineering problems of microelectronics devices in electronic information and related fields by combining mathematics, natural science, professional and interdisciplinary knowledge.

(2) Having the ability to analyze, design, manufacture and apply microelectronic devices with modern tools in electronic information and related fields in a corporate and social environment.

(3) Having a high degree of social responsibility and moral cultivation, sound personality, good mentality and humanistic quality, harmonious team spirit, effective communication and expression ability and project management ability; being able to comprehensively consider the factors such as law, environment and sustainable development and stick to the principle of public interest first in engineering practice.

(4) Having broad international vision; taking the initiative to adapt to the constantly changing situations and environments at home and abroad; being able to update knowledge through a variety of learning channels and form a habit of lifelong learning to improve ability and technical level.

II. Major direction

Microelectronic technology

III. Graduation Requirements

According to the requirements of the national standards of undergraduate professional teaching quality and professional certification standards, based on the concept of achievement oriented education, according to the talent training objectives and professional training characteristics formed over the years, and in view of the characteristics of the field of electronic science and technology, the graduation ability requirements and index points of this specialty are formulated.

Graduates should obtain knowledge and competences as follows:

Graduation Requirements	Indices
<p>Requirement 1: Engineering knowledge: Mastering mathematics, natural sciences, fundamentals of engineering and electronic science and technology expertise to solve complex engineering problems in the design, manufacture and application of micro-electronic devices.</p>	1-1. Being able to apply the fundamentals and expertise of mathematics, science, and engineering to the appropriate presentation of complex engineering problems.
	1-2. Being able to apply the fundamentals and expertise of engineering to the design and analysis of microelectronic system units.
	1-3. Being able to apply the fundamentals and expertise of engineering to the analysis and optimizing of microelectronic systems in electronic information and related fields.
	1-4. Being able to apply the fundamentals and expertise of engineering to the design and improvement of microelectronic systems in electronic information and related fields.
<p>Requirement 2: Problem Analysis: Being able to apply the basic principles of mathematics, natural science and engineering science to identify, express, and analyze, through literature research, complex. engineering problems in the design, manufacture, and application of microelectronic devices to reach effective conclusions.</p>	2-1. Being able to apply the basic principles of mathematics, natural science and engineering science to identify critical aspects and parameters of complex engineering problems in the design, manufacture and application of micro-electronic devices in electronic information and related fields.
	2-2. Being able to express complex engineering problems in the design, manufacture and application of microelectronics devices in electronic information and related fields by means of simulation analysis and analysis based on process and system operation indicators.
	2-3. Being able to analyze complex engineering problems in the design, manufacture and application of microelectronic devices in electronic information and related fields through literature research to obtain effective conclusions.
<p>Requirement 3: Design/development of solutions: under the premise of comprehensive consideration of social, health, safety, legal, cultural and environmental factors, being able to design solutions to complex engineering problems in the design, manufacture and application of microelectronic devices so as to meet specific needs for systems and units and demonstrate the sense of innovation in the design session.</p>	3-1. Being able to design solutions to complex engineering problems in the design, manufacture and application of microelectronic devices in electronic information and related fields, taking into account social, health, safety, environmental and legal constraints.
	3-2. Being able to design reasonable microelectronic systems and units according to the specific needs of users.
	3-3. Being able to optimize the design, manufacture and application of micro-electronic devices under the realistic constraints of society, health, safety, environment and law, and demonstrate the sense of innovation.
<p>Requirement 4: Research conduction: being able to use scientific principles and methods to conduct research on complex engineering problems in the design, manufacture and application of microelectronic devices, including designing experiments, analyzing and interpreting data, and obtaining reasonable and effective conclusions through information synthesis.</p>	4-1. Being able to design feasible research schemes based on professional theories and object characteristics.
	4-2. Being able to design plans, conduct experiments, analyze and interpret data based on scientific principles and methods for complex engineering problems in the design, manufacture and application of micro-electronic devices.
	4-3. Being able to do application research on complex engineering problems related to microelectronic devices and obtain reasonable and effective conclusions through information synthesis.

<p>Requirement 5: Use of modern tools: mastering the basic methods of literature retrieval, data inquiry and relevant information acquisition by using modern information technology; being able to develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for complex engineering problems in the design, manufacture and application of microelectronic devices, including prediction and simulation of complex engineering problems and understanding of their limitations.</p>	5-1. Mastering the basic methods of literature retrieval, data inquiry and obtaining relevant information acquisition by using modern information technology.
	5-2. Being able to correctly select and use simulation tools, human-computer interface integration tools and other technologies and resources to predict and simulate complex engineering problems in the design, manufacturing and application of microelectronics devices.
	5-3. Developing the ability to apply modern tools and understanding their limitations in the practice of solving complex engineering problems related to microelectronic devices.
<p>Requirement 6: Engineering and Society: Being able to analyze and evaluate the impact of professional engineering practices and solutions to complex engineering problems on society, health, safety, laws, as well as culture and understand the responsibilities, based on background knowledge in the design, manufacture, and application of microelectronic devices.</p>	6-1. Mastering knowledge of society, health, safety, laws and culture, and being able to make rational analyses based on background knowledge of electronic information and relevant fields .
	6-2. Being able to evaluate the impact of engineering practices and solutions on society, health, safety, laws as well as culture and understand the responsibilities of engineering practices related to microelectronics devices and application systems in electronic information and related fields.
<p>Requirement 7: Environment and Sustainability: Being able to understand and evaluate the impact of complex engineering practices in the design, manufacture and application of microelectronic devices on environmental and social sustainability.</p>	7-1. Being able to understand and experience the impact of complex engineering practices related to the design, manufacture and application of microelectronic devices on environmental and social sustainability.
	7-2. Being able to apply the laws and regulations of environment and sustainable development to analyze and evaluate the impact of complex engineering practices related to the design, manufacture and application of micro-electronic devices on environmental and social sustainable development.
<p>Requirement 8: Professional norms: With good literacy of humanities and social science as well as social responsibility, being able to understand and abide by engineering professional ethics and norms and fulfill responsibilities in the design, manufacture and application of microelectronic devices.</p>	8-1. Being trained to have a good outlook on the world and life, and understand the development of the country and society
	8-2. Being able to establish and practice socialist core values, understand the relationship between individuals and society; being clear about China's national conditions and the responsibilities and missions of individuals as builders and successors of the socialist cause. Having a good humanities and social science literacy.
	8-3. Understanding the professional nature and responsibilities of engineers; abiding by engineering professional ethics and codes and fulfilling responsibilities.
<p>Requirement 9: Individuals and Teams: Being able to act as individuals, team members, and leaders in a multidisciplinary team.</p>	9-1. Being able to take on individual roles and leverage their strengths in a multi-disciplinary team.
	9-2. Being able to play the role of team member and team spirit in a multi-disciplinary environment.

	9-3. Being able to take on the role of team leader and develop management skills in a multi-disciplinary team.
Requirement 10: Communication: Being able to effectively communicate with other professionals of the trade and the public on complex engineering issues in the design, manufacture and application of microelectronic devices, including writing reports, designing drafts, giving presentations, and clearly issuing or responding to directives, and having international vision and being capable of cross-cultural communication..	10-1. Having the ability to communicate in a foreign language, possessing a certain international vision, and being able to communicate and communicate in a cross-cultural context.
	10-2. Understanding the development trend and hot issues in the field of electronic information, using the integration of charts, formulas, calculations, drawings and other contents to express ideas, and effectively communicate oral and written information with industry peers and the public on complex engineering issues related to the design, manufacture and application of micro -electronic devices.
Requirement 11: Project Management: Understanding and mastering the principles of engineering management and economic decision-making methods, and being able to apply them in a multidisciplinary environment.	11-1. Understanding and mastering certain engineering management principles and economic decision-making methods.
	11-2. Being able to apply engineering management principles and economic decision-making methods to effectively analyze and comprehensively evaluate complex engineering problems related to the design, manufacture and application of micro-electronic devices.
Requirement 12: Lifelong learning: Having the consciousness of autonomic learning and lifelong learning, and having the ability to adapt to development through continuous learning.	12-1. Fully understanding the rapid development of microelectronics device design, manufacturing and application system in the field of electronic information, realizing the necessity of continuous exploration and learning under the background of social development, and having the consciousness of autonomous learning and lifelong learning.
	12-2. Having the ability of self-learning, mastering the lifelong learning language tools and computer tools, having good physical and mental health to adapt to various tasks in the work.

The relationship between graduation requirements and educational objectives

Graduation Requirements	Educational Objectives			
	Educational Objective 1	Educational Objective 2	Educational Objective 3	Educational Objectives 4
1: Engineering Knowledge	√			
2: Problem Analysis	√			
3: Design/Development of Solutions	√			
4: Research conduction		√		
5: Use Modern Tools		√		
6: Engineering and Society		√		
7: Environment and Sustainable Development			√	√
8: Career Planning			√	
9: Individuals and Teams			√	
10: Communicate			√	√

11: Project Management			√	
12: Lifelong Learning				√

IV. Major Subject

Electronic Science and Technology

V. Core Courses

Fundamentals of Circuit Analysis, Analog Electronic Technology, Digital Electronic Technology, Signals and Systems I, Fundamentals of Microelectronic Devices, Optoelectronic Technology, The Application and Principal of MCU, Principles of Microelectronic Technology, Digital System and Logic Design, Principles of Integrated Circuit Design, photovoltaic materials.

VI. Educational System

The basic length of undergraduate education is 4 years, and the flexible study period is 3-6 years, which is managed according to the credit system.

VII. Confer Degrees

Students should have at least 167 credits to graduate. Those who meet the requirements of the Degree Awarding Regulations for Undergraduates of Shenyang University of Chemical Technology (Revised in March 2017) will be awarded the Bachelor of Engineering degree.

VIII. Credit Requirements

Course Type	Course Modules		Course Nature	Credit requirement	Subtotal	Proportion (%)
General Education	General Education (Compulsory)	Ideological and Political Courses	Compulsory	17	41.5	24.9
		Foreign Language Courses		12		
		Computer Courses		2.5		
		Military and Safety Courses		2		
		Labor and Sport Education		5		
		Innovation and Entrepreneurship		2		
		Mental Health		1		
	General Education (Optional)	Aesthetic Education(400)	Optional	2	8	4.8
		China and the World(500)		2		
		Four Histories(600)		1		
		Economic Management(700)		1		
		Traditional Culture(900)		2		
General Education (Practice)	Military Training	Practice	2	2	1.2	
Discipline Education	Basic Courses	Public Basic Class	Compulsory	63	73	69.2
		Professional Foundation				
	Basic Practice Sessions	-	Practice	10		
Specialized Education	Core Courses	-	Compulsory	12	38	
	Optional Courses	-	Optional	4		
	Specialized Practice Sessions	-	Practice	22		
Competency Development	Individualized Courses	-	Compulsory (or Practice)	4.5	4.5	
Extracurricular Links	Extracurricular General Education Practice	Culture and Society Practice	Extracurricular Practice	4		
		Mentally and Physically Practice				
		Foreign Language Proficiency Training Practice				
	Extracurricular Characteristic Practice	Innovative Training		4		
		Innovation Competition				
		Chuangke Activities				
	Career Education	Growth Planning Courses		1		
Total/Proportion					167.0	100

九、电子科学与技术专业教学进程表

Table of Teaching Schedule for Electronic Science and Technology Major

课程类别 Course Type	课程性质 Course Nature		课程号 Course Code	课程名称 Course Name	学分 Cre.	总学 时数 T. C. H	学时分配 Credit Hour Distribution				各学期周学时分配 Weekly Hours Per Semester								备注 Notes	
							讲课 Lec.	实验 Exp.	上机 Pro.	课外 实践 Pra.	一	二	三	四	五	六	七	八		
											1st	2nd	3rd	4th	5th	6th	7th	8th		
通识教育课 General Education	必修 Compulsory	思政类 Ideological and Political Courses	0710093001	思想道德与法治 Ideological Morality and the Rule of Law	3.0	48	32			16		2								
			0710053001	中国近现代史纲要 Outline of Chinese Contemporary and Modern History	3.0	48	32			16	2									
			0710123001	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	3.0	48	40			8					3					
			0710103001	马克思主义基本原理* Basic Principles of Marxism*	3.0	48	32			16				2						
			0710133001	毛泽东思想和中国特色社会主义理论体系概论* Mao Zedong Thought and Theory of Socialism with Chinese Characteristics *	3.0	48	32			16				2						
			0710012301	形势与政策 Current Situation and Policies	2.0	64	64				2	2	2	2	2	2	2	2		
				0211003101	大学外语I College English I	3.0	48	48				3								
				0211003201	大学外语II* College English II*	3.0	48	48					3							
				0241003301	大学外语III College English III	3.0	48	48						3					五选一	

课程类别 Course Type	课程性质 Course Nature		课程号 Course Code	课程名称 Course Name	学分 Cre.	总学时数 T. C. H	学时分配 Credit Hour Distribution				各学期周学时分配 Weekly Hours Per Semester								备注 Notes		
							讲课 Lec.	实验 Exp.	上机 Pro.	课外实践 Pra.	一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th			
通识教育课 General Education	必修 Compulsory	外语类 Foreign Language Courses	0241003301	大学外语III（进阶英语） College English III（Advanced English CET 6-Orientated）	3.0	48	48						3								
				大学外语III（英语口语表达与交流） College English III（English Oral Expression and Communication）	3.0	48	48								3						
				大学外语III（跨文化交际） College English III（Intercultural Communication）	3.0	48	48								3						
				大学外语III（英语写作表达与交流） College English III(English Writing Expression and Communication）	3.0	48	48								3						
			0241003401	大学外语IV* College English IV*	3.0	48	48								3						
				大学外语IV（进阶英语） College EnglishIV（Advanced English CET 6-Orientated）	3.0	48	48								3						
				大学外语IV（英语口语表达与交流） College EnglishIV（English Oral Expression and Communication）	3.0	48	48								3						
				大学外语IV（跨文化交际） College English IV（Intercultural Communication）	3.0	48	48								3						
		计算机类 Computer Courses	1511372002	C 语言程序设计 C Language Programming	2.5	44	32			12			2								

课程类别 Course Type	课程性质 Course Nature		课程号 Course Code	课程名称 Course Name	学分 Cre.	总学 时数 T. C. H	学时分配 Credit Hour Distribution				各学期周学时分配 Weekly Hours Per Semester								备注 Notes		
							讲课 Lec.	实验 Exp.	上机 Pro.	课外 实践 Pra.	一	二	三	四	五	六	七	八			
											1st	2nd	3rd	4th	5th	6th	7th	8th			
通识教育课 General Education	必修 Compulsory	军事安全类 Military and Safety Courses	0710081001	军事理论 Military Theory	1.0	16	16						2								
			1510261302	安全教育 Safety Education	1.0	16	16					1	1	1	1	1	1	1			
		劳动体育类 Labor and Sport Education	2640021001	劳动教育 Laboure Education	1.0	16	16						2								
			0410011101	大学体育I College Physical Education I	1.0	36		36			2										
			0410021201	大学体育II College Physical Education II	1.0	36		36				2									
			0410031301	大学体育III College Physical Education III	1.0	36		36					2								
			0410041401	大学体育 IV College Physical EducationIV	1.0	36		36						2							
			创新创业类 Innovation and Entrepreneurship courses	1557011002	创造性思维与创新方法 Creative Thinking and Innovative Methods	1.0	16	16							2						
		1740011001		创业基础 Entrepreneurial Foundation	1.0	16	16							2							
		心理健康类 Mental Health Courses	0510041001	大学生心理与健康教育 Mental and Health Education for College Students		1.0	16	16					2								
小计 Subtotal				41.5	780	552	144	12	72	12	16	10	14	6	3	3	2				

课程类别 Course Type	课程性质 Course Nature		课程号 Course Code	课程名称 Course Name	学分 Cre.	总学时数 T. C. H	学时分配 Credit Hour Distribution				各学期周学时分配 Weekly Hours Per Semester								备注 Notes	
							讲课 Lec.	实验 Exp.	上机 Pro.	课外实践 Pra.	一	二	三	四	五	六	七	八		
											1st	2nd	3rd	4th	5th	6th	7th	8th		
通识教育课 General Education	选修 Optional		包括 5 个模块，分别是经济管理类（1.0）、美育类（2.0）、四史（1.0）、传统文化（2.0）、中国与世界（2.0），每学期最多选修 2 门课程。 It includes five modules, namely, economic management (1 credit), aesthetic education (2 credits), four history (1 credit), traditional culture (2 credits), China and the world (2 credits), and a maximum of 2 courses per semester.																	
			小计 Subtotal		8															
	实践 Practice		0415102011	军训 military training	2.0	48				48	+2								集中	
			合计 Total		51.5															
学科平台课 Discipline Education	必修 Compulsory		数学与自然科学类 Natural Science & Mathematics		0310004101	高等数学 I* Advanced Mathematics I*	4.5	80	72				8	6						
					0310005201	高等数学 II* Advanced Mathematics II*	5.5	96	88				8	6						
					0310032001	线性代数 Linear Algebra	2.0	32	32					3						
					0310042001	概率论与数理统计 Probability and Statistics	2.0	32	32							2				
					1519501002	面向信息科学的离散数学 Discrete Mathematics in Information Science	1.0	16	16							2				
					1510251002	复变函数 Function of Complex Variable	1.5	24	24						2					
					0310063101	大学物理 I* University Physics I*	3.0	48	46	2					3					
					0310063201	大学物理 II* University Physics II*	3.0	48	46	2						3				

课程类别 Course Type	课程性质 Course Nature		课程号 Course Code	课程名称 Course Name	学分 Cre.	总学时数 T. C. H	学时分配 Credit Hour Distribution				各学期周学时分配 Weekly Hours Per Semester								备注 Notes		
							讲课 Lec.	实验 Exp.	上机 Pro.	课外实践 Pra.	一	二	三	四	五	六	七	八			
											1st	2nd	3rd	4th	5th	6th	7th	8th			
学科平台课 Discipline Education	必修 Compulsory	工程基础类 Foundation Engineering	0310122002	固体物理学 Solid State Physics	2	32	32						2								
		1510163002	电路分析基础* Fundamentals of Circuit analysis	3.5	56	56					4										
		1510141002	电气工程制图及 CAD Electrical Engineering Drawing and CAD	1.5	26	20		6			2										
		1510913002	模拟电子技术* Analog Electronic Technology*	3.5	60	48	12					3									
		1510923002	数字电子技术* Digital Electronic Technology*	3.5	60	48	12						3								
		1514883002	信号与系统I Signals and Systems I*	3.0	50	44	6						4								
		1514822002	电磁场与电磁波* Electromagnetic Field and Electromagnetic Wave*	2.0	32	32							2								
	专业基础类 Subject Foundation Requisite	1515221002	电子科学与技术专业概论 Introduction to Electronic Science and Technology	1.0	16	16					2										
		1515623002	半导体物理学* Physics of Semiconductors	3.0	50	44	6						3								
		1515633002	微电子器件基础* Fundamentals of Microelectronic Devices*	3.0	52	40	12								3						
		1513822002	单片机原理与应用 The Application and Principal of MCU	2.5	44	32	12									3					
		1513272002	算法与数据结构 Algorithm and Data Structure	2.5	44	32		12					3								
		1515652002	光电子技术* Optoelectronic Technology*	2.0	36	24	12										2				

课程类别 Course Type	课程性质 Course Nature		课程号 Course Code	课程名称 Course Name	学分 Cre.	总学时数 T. C. H	学时分配 Credit Hour Distribution				各学期周学时分配 Weekly Hours Per Semester								备注 Notes					
							讲课 Lec.	实验 Exp.	上机 Pro.	课外实践 Pra.	一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th						
学科平台课 Discipline Education	必修 Compulsory	专业基础类 Subject Foundation Requisite	1517062002	计算机网络* Computer Networks*	2.5	44	32		12								2							
			1516021002	电子线路 CAD CAD in Electronic Circuit	1.0	16	16												2					
			1515642002	集成电路版图设计 Integrated Circuits Layout Design	2.0	36	24			12										2				
			1515751002	电子信息类专业外语 Specialized English on Telecommunication	1.0	16	16												2					
			1515761002	电子信息类科技论文写作与文献检索 Scientific Thesis Writing and Documentation Retrieval for Electronic Information Field	1.0	16	16													2				
			小计 Subtotal				63	1062	928	76	42	16	11	17	17	10	8	10						
	实践 Practice			0310081011	大学物理实验 Physical experiment of college	1.0	24		24					+1							分散			
				1514242022	工程数学实践 Engineering Mathematics Practice	2.0	48		48						+2								集中	
				1510150012	电路分析基础实验 Circuit Analysis Experiment	0.5	12		12					+0.5										分散
				2110071031	金工实习 Metalworking Practice	1.0	24		24					+1										集中
				1514501022	模拟电子课程设计 Analog Electronic Course Design	1.0	24		24									+1						集中
				1514511022	数字电子课程设计 Digit Electronic Course Design	1.0	24		24									+1						集中
				1512212032	电子工艺实习 Electronic Craft Practice	2.0	48		48							+2								集中

课程类别 Course Type	课程性质 Course Nature	课程号 Course Code	课程名称 Course Name	学分 Cre.	总学时数 T. C. H	学时分配 Credit Hour Distribution				各学期周学时分配 Weekly Hours Per Semester								备注 Notes		
						讲课 Lec.	实验 Exp.	上机 Pro.	课外实践 Pra.	一	二	三	四	五	六	七	八			
										1st	2nd	3rd	4th	5th	6th	7th	8th			
学科平台课 Discipline Education	实践 Practice	1516311022	电子线路自动化技术设计实践 Electronic Circuit Automation Technology Practice	1.5	36		36									+1.5			集中	
		小计 Subtotal			10	240		240				1.5	3	2	2	1.5				
	合计 Total				73	1302	928	316	42	16	11	18.5	20	12	10	11.5				
专业教育课 Specialized Education	必修 Compulsory	1525662002	微电子工艺原理* Principles of Microelectronic Technology*	2	36	24		12						2						
		1525673002	集成电路原理与设计* Principles of Integrated Circuit Design*	3.5	60	48		12								4				
		1525682002	集成电路测试技术 Test Technology of Integrated Circuits	2.0	36	24	12									2				
		1526952002	数字系统与逻辑设计 Digital System and Logic Design	2.0	36	24	12								2					
		1526982002	计算机组成原理* Principles of Computer Organization*	2.5	42	36	6								3					
		小计 Subtotal			12	210	156	30	24						7	6				
	选修 Optional	1537242002	Matlab 程序设计 Matlab programming	2.0	36	24		12				2								
		1534842002	Python 数据分析与应用 Python data analysis and application	2.0	36	24		12					2							
		1531552002	自动控制原理II The Principle of Automatic Control II	2.0	34	28	6							2						
		1534872002	语音信号处理 Speech Signal Processing	2.0	36	24		12							2					
		1538563002	ZigBee 技术应用及无线传感器网络 ZigBee Technology and Wireless Sensor Networks	3.0	52	40	12								3					

课程类别 Course Type	课程性质 Course Nature	课程号 Course Code	课程名称 Course Name	学分 Cre.	总学时数 T. C. H	学时分配 Credit Hour Distribution				各学期周学时分配 Weekly Hours Per Semester								备注 Notes			
						讲课 Lec.	实验 Exp.	上机 Pro.	课外实践 Pra.	一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th				
专业教育课 Specialized Education	选修 Optional	1534962002	C#程序设计 C# Programming	2.0	36	24		12						2							
		1534863002	大数据原理与技术 Principle and Technology of Big Data	3.0	56	32		24								4					
		1533012002	传感器原理与应用II Principles and Applications of Sensors	2.5	42	36	6									3					
		小计 Subtotal			4.0																
	(修读要求 Fill in the Study Requirements) 4.0																				
		实践 Practice	1514351032	工程认识实习 Cognition Practice	1.0	24		24					+1						集中		
			1515152032	生产实习 Production Practice	2.0	48		48										+2		集中	
			1516321022	数字系统与逻辑设计课程设计 Digital System and Logic Design Course Design	1.0	24		24							+1					分散	
			1514601022	智能电子系统设计实践 Intelligent Electronic System Design Practice	1.0	24		24											+1		集中
			1515701022	集成电路版图设计实践 Integrated Circuit Layout Design Practice	1.0	24		24											+1		集中 CDIO 课程
			1515711022	集成电路解析实践 Integrated Circuit Analysis Practice	1.0	24		24											+1		集中
			1515721022	微电子电路实训综合实践 Comprehensive Practice of Microelectronic Circuit Training	1.0	24		24											+1		集中

课程类别 Course Type	课程性质 Course Nature	课程号 Course Code	课程名称 Course Name	学分 Cre.	总学时数 T. C. H	学时分配 Credit Hour Distribution				各学期周学时分配 Weekly Hours Per Semester								备注 Notes		
						讲课 Lec.	实验 Exp.	上机 Pro.	课外 实践 Pra.	一	二	三	四	五	六	七	八			
										1st	2nd	3rd	4th	5th	6th	7th	8th			
专业教育课 Specialized Education	实践 Practice	1515731042	毕业设计（论文） Graduation Design (Thesis)	14.0	336		336											+14	集中	
		小计 Subtotal			22	528		528				1		1			6	14		
		合计 Total			38							1		8		6	6	14		
能力拓展课 Competency Development	必修或实践 Compulsory or Practice	1525782002	光伏材料学 Photovoltaic materials	2.0	36	24	12									2				
		1526092002	嵌入式系统 Embedded System	2.5	46	28	18										2			
		小计 Subtotal			4.5	82	52	30									4			
		(修读要求 Fill in the Study Requirements) 5.0																		
总计 Sum				167						23	34.5	31	26	24	24.5	9	16			
课外环节 Extracurricular links	课外实践 Extracurricular practice	人文社会实践 Culture and Society Practice	1513401032	社会调查 Social Survey	0.5	12				12								0.5	分散	
		身心健康社会实践 Mentally and Physically Practice	0410050751	课外体育锻炼 Extracurricular Physical Exercise	0.5	12				12								0.5		分散
			2640030011	劳动教育实践 Laboure Education Practice	0.5	12				12		0.5								分散
			0510070311	心理健康辅导 Mental Health Counseling	0.5	12				12								0.5		分散
		外语技能实践类 Foreign Language Proficiency Training Practice	0210010011	外语技能实践（初级） Foreign Language Proficiency Training Practice (elementary)	2.0	48				48				2						二选一
			0210020011	外语技能实践（高级） Foreign Language Proficiency Training Practice (advanced)	2.0	48				48				2						

课程类别 Course Type	课程性质 Course Nature		课程号 Course Code	课程名称 Course Name	学分 Cre.	总学时数 T. C. H	学时分配 Credit Hour Distribution				各学期周学时分配 Weekly Hours Per Semester								备注 Notes
							讲课 Lec.	实验 Exp.	上机 Pro.	课外实践 Pra.	一	二	三	四	五	六	七	八	
											1st	2nd	3rd	4th	5th	6th	7th	8th	
课外环节 Extracurricular links	课外实践 Extracurricular practice	能力与创新实践 Capability and Innovation Practice	1513414022	大学生素质拓展与创新实践 Quality Development and Innovation Practice	4.0	96				96	1~8 学期依据《沈阳化工大学创新创业实践学分认定办法》由创新创业学院认定								分散
		成长规划类 Growth Planning Courses	1510271312	职业规划与就业指导 Career Planning and Employment Guidance	1.0	40	40				1						1		
小计 Subtotal																			

理论课 1 学分 16 学时，实验课程、上机等 1 学分 24 学时，体育课 1 学分 36 学时，集中实践环节 1 个教学周计 1 学分，学分最小单位为 0.5,课程名称中画*为考试课。

Note: “Cre. (Credits)”, “T.C.H. (Total Credit Hours)”, “Lec. (Lecture)”, “Exp. (Experiment)”, “Pro. (Programming)”, “Pra. (Practice)”.

十、电子科学与技术专业学士学位课程一览表

A list of bachelor's degree programs in Electronic Science and Technology

课程类别 Course Type	模块名称 Modules	序号 No	课程编号 Course Codes	课程名称 Course Name	学分 Credits	开课学期 Semester	
通识教育课 General Education	政治理论 Political Theory	1	0710103001	马克思主义基本原理* Basic Principles of Marxism*	3	4	
		2	0710133001	毛泽东思想和中国特色社会主义理论体系概论* Mao Zedong Thought and Theory of Socialism with Chinese Characteristics*	3	4	
学科平台课 Discipline Education	数学 Mathematics	3	0310004101	高等数学 I* Advanced Mathematics I*	4.5	1	
	物理 Physics	4	0310063101	大学物理 I* University Physics I*	3	2	
	工程基础类 Foundation Engineering	5	1510163002	电路分析基础* Fundamentals of Circuit analysis*	3.5	2	
		6	1510913002	模拟电子技术* Analog Electronic Technology*	3.5	3	
		7	1510923002	数字电子技术* Digital Electronic Technology*	3.5	4	
		8	1514883002	信号与系统I* Signals and Systems I*	3.0	3	
	专业基础类 Subject Foundation Requisite	9	1515623002	半导体物理学* Physics of Semiconductors*	3	4	
		10	1515633002	微电子器件基础* Fundamentals of Microelectronic Devices*	3	5	
		11	1513822002	单片机原理与应用 The Application and Principal of MCU	2.5	5	
		12	1515652002	光电子技术* Optoelectronic Technology*	2	6	
	专业教育课 Specialized Education	微电子技术类 Microelectronic technology	13	1525662002	微电子工艺原理* Principles of Microelectronic Technology*	2	5
			14	1526952002	数字系统与逻辑设计 Digital System and Logic Design	2	5
15			1525673002	集成电路原理与设计* Principles of Integrated Circuit Design*	3.5	6	

说明：关于学士学位课的具体要求见《沈阳化工大学关于学士学位课程水平审核制度的若干规定》

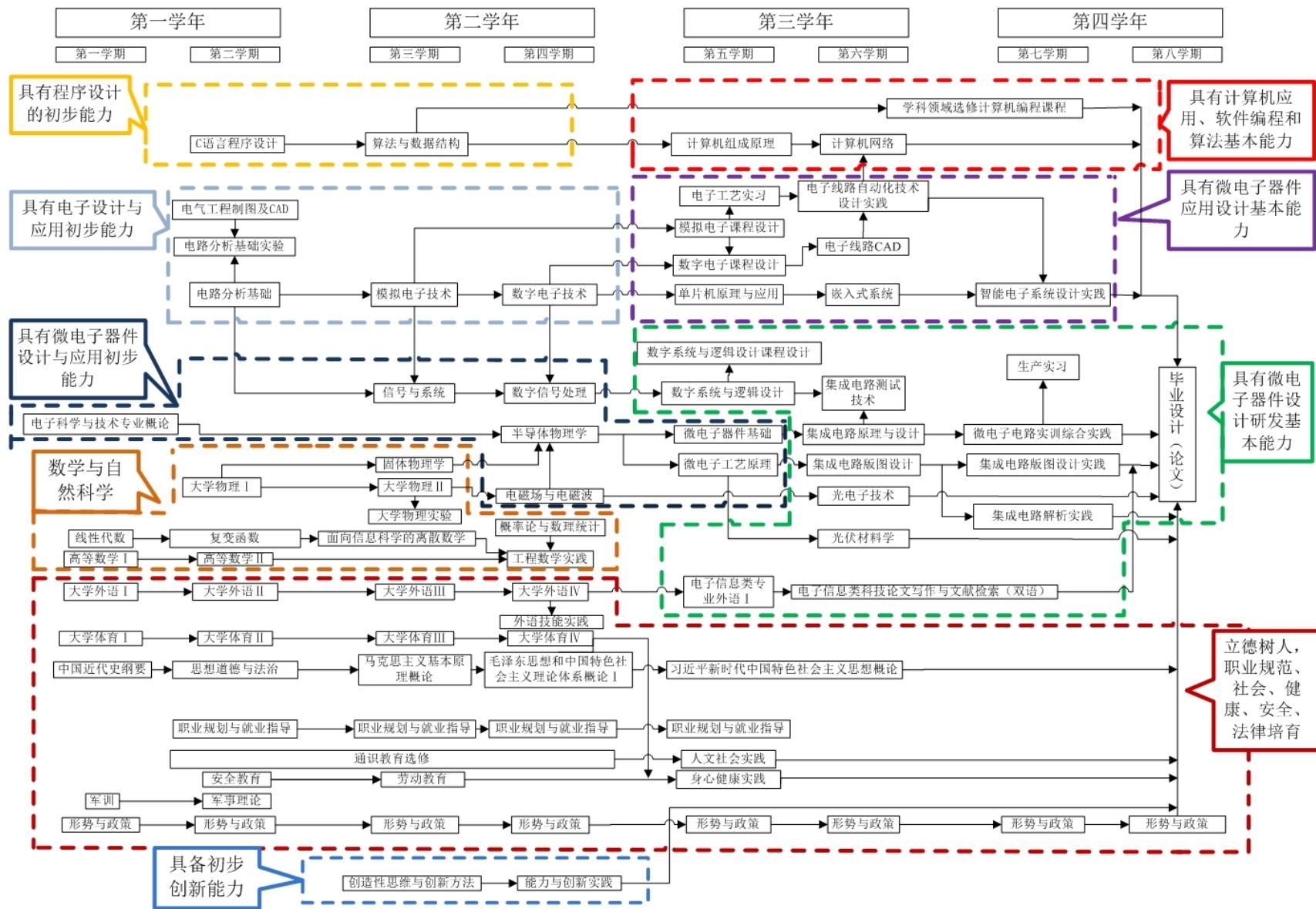
十一、全学程实践环节周历安排 Weekly Calendar of all Practice Sessions

学期	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	备注
一		☆	☆															::	::	·		
二			※															::	::	·		
三				P	P	▼												::	::	·		
四															P	P		::	::	·		
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八	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=					

符号说明(Symbol Description):

※金工实习||Metalworking Practice △课程设计||Curriculum Design /生产实习||Specialized Production Practice L 专业实验||Specialty Experiment P 各类实训、学年论文||Practical Training、Term Paper :: 考试||Examination ▼ 认识实习||Cognition Practice ☆军训||Military Training = 毕业设计(论文)||Graduation Project(Thesis) ·小学期||Primary Term

十二、课程体系配置图 Curriculum System Configuration Diagram



十三、主要课程与毕业能力要求关系矩阵图(相关性强 H,相关性中 M, 相关性弱 L)

Correlation Matrix between Key Courses and Graduation Requirements (High Correlation—H, Medium Correlation—M, Low Correlation—L)

课程 (Courses)	毕业能力要求 (Graduation Requirements)																																	
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	8.3	9.1	9.2	9.3	10.1	10.2	11.1	11.2	12.1	12.2		
思想道德与法治 Ideological Morality and the Rule of Law																						M	M	H										
中国近现代史纲要 Outline of Chinese Contemporary and Modern History																						M												
习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era																						M												
马克思主义基本原理* Basic Principles of Marxism*																						M												
毛泽东思想和中国特色社会主义理论体系概论* Mao Zedong Thought and Theory of Socialism with Chinese Characteristics*																				M		H	M											
形势与政策 Current Situation and Policies																						H						M	M					
大学外语 College English																												M	M					M

课程 (Courses)	毕业能力要求 (Graduation Requirements)																															
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	8.3	9.1	9.2	9.3	10.1	10.2	11.1	11.2	12.1	12.2
微电子器件基础* Fundamentals of Microelectronic Devices*				M							M																					
单片机原理与应用 The Application and Principal of MCU				M					M																							
算法与数据结构 Algorithm and Data Structure																M																
光电子技术* Optoelectronic Technology*		M																												M		
计算机网络* Computer Networks*														M																		
电子线路 CAD CAD in Electronic Circuit				L											M																	
集成电路版图设计 Integrated Circuits Layout Design								M		M																						
电子信息类专业外语 Specialized English on Telecommunication																											H	M				
电子信息类科技论文写作与文献检索 Scientific Thesis Writing and Documentation Retrieval for Electronic Information Field							M							H														M		M		
大学物理实验 II Physical experiment of college II													M		M										L							
工程数学实践 Engineering Mathematics Practice					M																					L						

