沈阳化工大学本科培养方案

信息工程学院

专业名称：物联网工程

专业代码：080905

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2021 年 8 月

物联网工程专业培养方案

一、培养目标

本专业培养适应物联网技术发展需要的能在物联网工程与应用研发领域从事物联网系统分析、设计、开发、应用、管理等方面工作，具有较强的工程实践能力与创新能力的高级工程技术人才。

本专业毕业生具有如下目标预测：

（1）较好地掌握马克思主义、毛泽东思想和邓小平理论，拥护党的基本路线，热爱祖国，遵纪守法，学风严谨，品行端正，身心健康，勇于追求真理，有较强的事业心和献身科学的精神，积极为社会主义现代化建设服务。

（2）具有扎实的理论基础，具备适应物联网领域发展的专业能力和专业视野，能够运用数学、自然科学、专业知识以及交叉学科知识，对物联网及相关领域的复杂工程问题的解决方案进行分析和设计。（专业知识）

（3）具有在企业与社会环境下，运用现代工具对物联网及相关领域的信息获取、传输、处理和信息集成等工程领域进行分析、设计、研究、开发和应用的能力。（工程能力）

（4）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、环境与可持续发展等因素，具有坚持公众利益优先的素质。（综合素质）

（5）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，能够适应物联网技术的发展动态以及职业发展需求，形成终生学习习惯，实现能力和技术水平的提升。（就业领域职业发展）

二、专业方向

物联网工程应用与数据集成

三、毕业要求

毕业能力要求及其指标点分解：

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、工程基础和物联网专业知识用于解决复杂工程设计、研发、制造和应用的问题。	1-1.能够将数学、自然科学、工程基础和专业知识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识用于数据采集、传输和智能应用。
	1-3.能将工程基础和专业知识用于物联网系统单元的设计、研发与分析。
	1-4.综合运用工程基础和专业知识解决物联网工程的信息获取、传输和智能处理的集成应用。
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物联网工程设计、集成和应用	2-1.能够运用数学、自然科学和工程科学的基本原理，识别物联网工程及相关领域的数据采集、传输、处理等单元设计、研发及应用系统的复杂工程问题中的关键环节。
	2-2.能够通过数据模拟分析、设备运行操作过程数据采集、数据集成等指标正确表达物联网工程的关键环节单元设计、研发及应用系统的复杂工程问题。

中的复杂工程问题，以获得有效结论。	2-3.能够通过文献研究来分析物联网工程及相关领域的数据采集、集成单元设计、研发及应用系统的复杂工程问题，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，能够针对物联网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，对物联网工程中 RFID、传感器等采集模块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，设计合理的物联网工程集成方案及应用系统。
	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，通过对物联网工程集成、研发及应用系统设计方案进行优化，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物联网工程设计、研发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，根据工程对象特性，选择研究路线。
	4-2.能够基于科学原理并采用科学方法对物联网工程及相关领域的数据采集、集成及应用系统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. 能够针对物联网工程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：能够针对物联网工程领域相关复杂工程问题，具有开发、选择与使用恰当技术、资源、现代工程工具和信息技术工具进行工程实践的能力，包括对复杂工程问题的数据采集、分析与预测，并理解其局限性。	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. 能够正确开发、选择与使用仿真工具、人机界面集成工具等技术、资源，对物联网工程相关的复杂工程问题进行预测与分析。
	5-3. 在解决物联网工程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：能够基于物联网工程领域相关背景知识进行合理分析，评价工程实践对社会、健康、安全、法律和文化问题的影响，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，能够基于物联网工程相关的背景知识进行合理分析。
	6-2. 亲身体验并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，理解在物联网工程相关工程实践中应承担的责任。
	6-3.依据社会、健康、安全、法律以及文化等方面的相关知识，设计满足相关要求的复杂工程问题
毕业要求 7： 环境和可持续发展：能够理解和评价物联网相关产品和系统对环境、社会可持续发展的影响，能够构建并实施兼具环境保护和绿色生产效能的工程。	7-1. 理解和亲身体验针对物联网工程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. 运用环境与可持续发展等相关法律法规分析、评价针对物联网工程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。
	7-3. 在设计、研发和综合应用等相关的物联网工程，符合环境保护和绿色生产的要求
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.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所肩负的责任和使命。
	8-3. 理解工程师的职业性质和责任；在物联网工程实践中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：具有良好的组织和团队协作能力，能够在多学科背景下承担个体、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：能够就物联网工程领域相关的复杂工程问题与业界同行	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。

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。	10-2. 能够熟练阅读专业外语文献资料，就物联网工程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。
	10-3.能够运用本专业的知识撰写物联网工程报告能力，清晰表达自己的观点，接受并理解业界同行及社会公众的观点。
毕业要求 11： 项目管理：能够理解并掌握工程项目管理和经济决策方法，并能够在多学科工程实践中应用。	11-1.理解并掌握一定的工程管理原理与经济决策分析方法，并进行有效管理。
	11-2. 能够应用工程管理原理与经济决策方法对物联网工程相关的复杂工程问题进行有效分析和综合评价。
	11-3.运用经济决策方法，设计满足其要求物联网工程。
毕业要求 12： 终身学习：能够适应社会发展和实现个体发展的需要，具有自主学习和终身学习的意识，有不断学习、持续学习和适应发展的能力。	12-1. 掌握终身学习的语言工具或计算机工具，具有自主学习能力，能够通过自主查阅资料，获取解决问题的知识和方法。
	12-2. 充分认识到物联网工程相关的工程领域的快速发展以及自主学习、终身学习的重要性，具有健康良好的心理、身体素质，以适应工作中的各种任务。
	12-3.学习和运用所学物联网工程相关的新技术，并运用新技术解决物联网工程问题。

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矩阵。

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

信息获取与物联网工程

五、专业核心课程

信息识别与处理、集成类课群、电路电子类课群、计算机技术类课群、网络和通信技术类课群。

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 166 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	25.0
		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	73	73	69.0
		专业基础类				
	学科实践课程	-	实践			
专业教育课	专业核心课程	-	必修	11.5	37.5	
	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	4	
课外环节	课外通识实践	人文社会实践	课外实践	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					166	100%

IoT Major 2021 Undergraduate Education Program

I. Training Objectives

This major cultivates senior engineering and technical personnel who can adapt to the development of Internet of things technology, work in the field of Internet of things engineering and application research and development from the aspects of Internet of things system analysis, design, development, application and management, and have strong engineering practice ability and innovation ability.

Graduates should obtain knowledge and competences as follows:

（1）Have a solid theoretical foundation, professional ability and vision to adapt to the development of the Internet of things, be able to use mathematics, natural science, professional knowledge and interdisciplinary knowledge to analyze and design solutions to complex engineering problems in the Internet of things and related fields.(Professional Knowledge)

（2）Obtain the ability to use modern tools to analyze, design, research, develop and apply the information acquisition, transmission, processing, information integration and other engineering fields of the Internet of things and related fields in the enterprise and social environment.(Engineering Ability)

（3）With a high sense of social responsibility and moral cultivation, sound personality, good psychological quality and humanities literacy and inclusive team spirit, effective communication and expression ability and project management ability, comprehensive consideration of legal, environmental and sustainable development factors in engineering practice, and the quality of adhering to the priority of public interest.(Comprehensive Quality)

（4）It has a broad international vision, actively adapts to the changing situation and environment at home and abroad, updates knowledge through a variety of learning channels, adapts to the development trend of Internet of things technology and the needs of career development, forms lifelong learning habits, and improves ability and technical level.(Career Development)

II. Major Direction

Engineering Application and Data Integration of Internet of Things

III. Graduation Requirements

Graduates should obtain knowledge and competences as follows:

Graduation Requirements	Indices
Requirement 1： Engineering knowledge: master the professional knowledge of mathematics, natural science, engineering foundation and Internet of things to solve the problems of complex engineering design, R &	1-1. Be able to apply mathematics, natural science, engineering foundation and professional knowledge to the proper expression of complex engineering problems.
	1-2. Be able to use engineering foundation and professional knowledge for data acquisition, transmission and intelligent application
	1-3. Be able to apply engineering foundation and professional knowledge to the design, development and analysis of IOT system unit.
	1-4.The integrated application of engineering foundation and professional knowledge to

D, manufacturing and application.	solve the information acquisition, transmission and intelligent processing of Internet of things project
Requirement 2： Problem analysis: be able to apply the basic principles of mathematics, natural science and engineering science to identify, express and analyze complex engineering problems in the engineering design, integration and application of the Internet of things through literature research, so as to obtain effective conclusions.	2-1. Be able to use the basic principles of mathematics, natural science and engineering science to identify the key links in the complex engineering problems of unit design, R & D and application system of data acquisition, transmission and processing in the Internet of things engineering and related fields.
	2-2. Be able to correctly express the complex engineering problems of the key link unit design, R & D and application system of the Internet of things project by data simulation analysis, equipment operation process data collection, data integration and other indicators.
	2-3. Be able to analyze the complex engineering problems of data acquisition, integrated unit design, R & D and application system in the Internet of things engineering and related fields by literature research, , so as to obtain effective conclusions.
Requirement 3： Design / development solutions: under the premise of comprehensive consideration of social, health, safety, legal, cultural and environmental factors, we can design solutions for complex engineering problems of the Internet of things, design systems and units to meet specific needs, and embody the sense of innovation in the design process.	3-1. Be able to design solutions to the complex engineering problems of RFID, sensors and other acquisition modules and application systems in the Internet of things project in the comprehensive consideration of social, health, safety, environment, legal and other practical constraints,
	3-2. Be able to design reasonable IOT engineering integration scheme and application system according to the specific needs of users.
	3-3. Be able to comprehensively consider the social, health, safety, environment, legal and other practical constraints, reflecting the sense of innovation by the optimization of IOT engineering integration, R & D and application system design.
Requirement 4： Research: it can study the complex engineering problems in the design, research and application of Internet of things based on the scientific principle and scientific methods, including design experiment, analysis and interpretation data, and get reasonable and effective conclusion through information synthesis.	4-1. Be able to select research routes based on professional theory and characteristics of engineering objects.
	4-2. Be able to design experimental schemes, carry out experiments, analyze and interpret data for complex engineering problems of data acquisition, integration and application systems in the Internet of things engineering and related fields based on scientific principles and scientific methods .
	4-3. Be able to carry out application research on complex engineering problems related to the Internet of things, and get reasonable and effective conclusions through information synthesis.
Requirement 5： Using modern tools: be able to develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for engineering practice, including data collection, analysis and prediction of complex engineering problems, and understand their limitations.	5-1. Master the basic methods of literature retrieval, data inquiry and the use of modern information technology to obtain relevant information.
	5-2. Be able to correctly develop, select and use simulation tools, human-machine interface integration tools and other technologies and resources to predict and analyze complex engineering problems related to the Internet of things.
	5-3. In the practice of solving complex engineering problems related to the Internet of things, improve the application ability of modern tools, and be able to understand their limitations.

Requirement 6： Engineering and society: be able to conduct reasonable analysis based on the relevant background knowledge in the field of Internet of things engineering, evaluate the impact of engineering practice on social, health, safety, legal and cultural issues, and understand the responsibilities to be undertaken.	6-1. Master the relevant knowledge of society, health, safety, law and culture, and be able to make reasonable analysis based on the background knowledge of Internet of Things Engineering.
	6-2. Personally experience and evaluate the impact of engineering practice and scheme on society, health, safety, law and culture, and understand the responsibilities in the engineering practice of Internet of things.
	6-3. According to the relevant knowledge of society, health, safety, law and culture to design complex engineering problems to meet the relevant requirements
Requirement 7： Environment and sustainable development: be able to understand and evaluate the impact of IOT related products and systems on environment and social sustainable development, and be able to build and implement projects with both environmental protection and green production efficiency.	7-1. Understand and experience the impact of engineering practice of IOT relevant complex engineering problems on the sustainable development of environment and society.
	7-2. Analyze and evaluate the impact of engineering practice on the sustainable development of environment and society by using relevant laws and regulations such as environment and sustainable development.
	7-3. In the design, research and development ,comprehensive application of Internet of things projects, meeting the requirements of environmental protection and green production
Requirement 8： Professional norms: have humanities and social science literacy, sense of social responsibility, be able to understand and abide by engineering professional ethics and norms in engineering practice, and fulfill responsibilities.	8-1. Cultivate a good world outlook and outlook on life, and understand national and social development.
	8-2. establish and practice the socialist core values, understand the relationship between individuals and society, understand China's national conditions, and clarify the responsibilities and missions of individuals as builders of the socialist cause.
	8-3. Understand the professional nature and responsibilities of engineers. Abide by the engineering professional ethics and norms, and fulfill the responsibility.in the Internet of things engineering practice,
Requirement 9： Individual and team: have good organization and team cooperation ability, and be able to take on the role of individual, team member and person in charge under the multi-disciplinary background.	9-1. Be able to play an individual role in a multidisciplinary team and give full play to individual advantages.
	9-2. Be able to play the role of team member with team spirit in a multidisciplinary team.
	9-3. Be able to play the role of team leader with management ability in a multidisciplinary team.
Requirement 10： Communication: be able to effectively communicate with peers in the industry and the public on complex engineering issues related to the Internet of things engineering, including writing reports and design manuscripts, making statements,	10-1. Have the ability of foreign language communication and a certain international vision, be able to communicate and exchange in the cross-cultural background.
	10-2. Be able to skillfully read professional foreign language literature, and effectively communicate by oral and writing with peers in the industry and the public on complex engineering issues related to the Internet of things.

clearly expressing or responding to instructions, and have a certain international vision to communicate and exchange in a cross-cultural context.	10-3. Be able to use the professional knowledge to write IOT engineering report, express their views clearly, accept and understand the views of peers in the industry and the public.
Requirement 11： Project management: be able to understand and master the methods of project management and economic decision-making, and be able to apply them in multidisciplinary engineering practice.	11-1. Understand and master certain engineering management principles and economic decision-making methods.
	11-2. Be able to effectively analyze and comprehensively evaluate the complex IOT engineering problems by applying the engineering management principles and economic decision-making methods.
	11-3. Using the method of economic decision-making, to design the IOT project meeting the requirements
Requirement 12： Lifelong learning: it can adapt to the needs of social development and individual development, has the consciousness of autonomous learning and lifelong learning, and has the ability of continuous learning, continuous learning and adapting to development.	12-1. Master the language tools or computer tools of lifelong learning, have the ability of autonomous learning, and be able to obtain the knowledge and methods to solve problems through independent access to information.
	12-2. Fully aware of the rapid development of the Internet of things engineering related engineering fields and the importance of self-learning and lifelong learning, with good psychological and physical fitness to adapt to various tasks in the work.
	12-3. Learn and use the new technology related to the Internet of things, to solve the problems of the Internet of things.

The relationship between graduation requirements and educational objectives

Graduation Requirements	**Educational Objectives**			
	Tranining Objectives 1	**Tranining Objectives 2**	**Tranining Objectives 3**	**Trainning Objectives 4**
1：Engineering Knowledge	√			√
2：Problem Analysis	√	√		
3：Design/Development Solutions	√	√		
4：Research		√		√
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

Information acquisition and Internet of things Engineering

V. Core Courses

Information Recognition and Processing, Integration Class, Circuit and Electronics Class, Computer Technology Class, Network and Communication Technology Class.

VI. Duration

The duration of undergraduate program is 4 years and the flexible duration is 3-6 years according to the credit system management.

VII. Confer Degrees

Students should obtain at least 166 credits before graduation. The Bachelor of engineering degree can be granted to those who meet the degree awarding requirements of the relevant regulations on the awarding of bachelor's degree for graduates of Shenyang University of Chemical Technology (revised in March 2017).

VIII. Credit Requirements

Course Type	Course Modules		Course Nature	Credit Requirement	Subtotal	Proportion（%）
General Education	Compulsory Course	Ideological and Political Education	Compulsory	17	41.5	25.0
		Foreign Languages		12		
		Computer		2.5		
		Military Security		2		
		Labor Sports		5		
		Innovation and Entrepreneurship		2		
		Mental Health		1		
	Elective Subjects	Aesthetic Education (400)	Elective	2	8	4.8
		China and the World (500)		2		
		Four Histories (600)		1		
		Economic Management (700)		1		
		Traditional Culture (900)		2		
	Practice Course	Military Training	Practice	2	2	1.2
Discipline Education	Basic Subject Courses	Public Basic Class	Compulsory	61.5	73	69.0
		Professional Foundation				
	Subject Practice course	-	Practice	11.5		
Specialized Education	Professional Core Courses	-	Compulsory	11.5	37.5	
	Professional Elective Courses	-	Elective	4		
	Professional Practice Courses	-	Practice	22		
Competency Development	Professional Characteristic Courses	-	Compulsory (or Practice)	4	4	
Extracurricular Practice	Extracurricular General Knowledge Practice	Humanistic Social Practice	Extracurricular Practice	4		
		Physical and Mental Health Practice				
		Foreign Language Skills Practice				
	Innovation and Entrepreneurship Practice	Innovation Training		4		
		Innovation Competition				
		Maker Activities				
	Career Education	Growth Planning		1		
Total Credits / Proportion					166	100%

九、物联网工程专业教学进程表

Table of Teaching Schedule for IoT 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 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	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								
			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					
			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				
			0710012301	形势与政策 ||Current Situation and Policies	2.0	64	64				2	2	2	2	2	2	2	2	
		外语类 Foreign Language Courses	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
				大学外语III(进阶英语) ||College English III(Advanced English CET6-Orientated)	3.0	48	48						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	
通识教育课 General Education	必修 Compulsory	外语类 Foreign Language Courses	0241003301	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					五选一
				大学外语IV(英语写作表达与交流) ||College English IV (English Writing 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					
				大学外语IV(进阶英语) ||College English IV(Advanced English CET6-Orientated)	3.0	48	48							3					
				大学外语IV(英语口语表达与交流) ||College English IV (English Oral Expression and 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							
		军事安全类 Military and Safety	0140011001	军事理论 ||Military Theory	1.0	16	16					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	
通识教育课 General Education	必修 Compulsory	Courses	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 ||Labour 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	576	144	12	64	11.0	15.0	11.0	13.0	4.0	2.0	2.0	1.0	
	选修		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,																

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	Optional		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		8.0														
	实践 Practice		0415102011	军训 ‖military training	2.0	48				48	+2								集中
	合计 Total				2.0														
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					
			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						
			1510251002	复变函数 Function of Complex Variable	1.5	24	24					2							
		工程基础类 Foundation Engineering	1510163002	电路分析基础* ‖ Fundamentals of Circuit Analysis*	3.5	56	56					4							
			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					

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	工程基础类 Foundation Engineering	1510141002	电气工程制图及 CAD ||Electrial Engineering Drawing and CAD	1.5	26	20		6			2							
		专业基础类 Subject Foundation Requisite	1518811002	物联网工程专业概论 ||Introduction to Internet of Things Engineering	1	16	16				2								
			1514822002	电磁场与电磁波 ||Electromagnetic Field and Wave	2	32	32							2					
			1514883002	信号与系统I* ||Signal and SystemI*	3	50	44	6					3						
			1517122002	通信原理I* ||Principles of Communications*	2.5	42	36	6							3				
			1514892002	数字信号处理* || Digital Signal Processing	2.5	42	36	6						3					
			1514922002	数据库原理与应用 || Principle and Application of Database	2	36	24		12						3				
			1513272002	算法与数据结构 ||Algorithm and Data Structure	2.5	44	32		12				3						
			1514902002	高频电子与通信电路* ||High Frequency Electronics and Communication Circuit*	2.5	42	36	6								3			
			1517032002	计算机网络* || Computer Network*	2.5	44	32		12							2			
			1514832002	信息论与编码 || Information Theory and Coding	2	32	32									2			
			1513822002	单片机原理与应用 ||Principle and Application of MCU	2.5	44	32	12							3				
			1514962002	现代检测技术及系统 ||Modern Detection Technology and System	2.0	34	28	6								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	1515751002	电子信息类专业外语 ‖ Specialized English on Telecommunication	1	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	16	16									2			
			小计 Subtotal		61.5	1032	916	70	30	16									
	实践 Practice		0310081211	大学物理实验 II ‖Physical experiment of collegeII	1.0	24	6	18					3					分散	
			1514242022	工程数学实践 ‖Practice of Engineering Mathematics	2	48		48						+2				集中	
			1510150012	电路分析基础实验 ‖ Basic Experiment of Circuit Analysis	0.5	12		12				2						分散	
			2110071031	金工实习 ‖ Metalworking Practice	1	24		24				+1						集中	
			1514501022	模拟电子课程设计 ‖ Analog electronic course design	1	24		24							2			分散	
			1514511022	数字电子课程设计 ‖ Digit Electronic Course Design	1	24		24							2			分散	
			1512212032	电子工艺实习 ‖ Electronic Craft Practice	2	48		48					+2					集中	
			1516991022	电子线路 CAD 设计实践 ‖ CAD Design Practice of Electronic Circuit	1	24		24								2		分散	
			1518602032	生产实习 ‖Production Practice	2.0	48		48									+2	集中	
			小计 Subtotal		11.5	276	6	270											
	合计 Total				73	1308	922	340	30	16									

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	必修 Compulsory	1524932002	面向对象程序设计 || Object Oriented Programming	2	36	24		12					3					
		1526982002	计算机组成原理* || Principles of Computer Organization *	2.5	42	36	6							3				
		1514662002	化工过程信息处理与传输||Chemical Process Information Processing Transmission	2.0	32	32								2				
		1528722002	传感器原理与应用 ||Principle and Application of Sensor	2.5	42	36	6								3			
		1528732002	RFID 射频识别技术 ||RFID Technology	2.5	44	32	12								3			
		小计 Subtotal		11.5	200	152	36	12										
	选修 Optional	1537242002	Matlab 程序设计 ||Matlab Programming	2	36	24		12				2						
		1534842002	Python 数据分析与应用 ||Python Data Analysis and Application	2	36	24		12					2					
		1531552002	自动控制原理II || Principle of Automatic Control II	2	34	28	6						2					
		1534962002	C#程序设计 ||C program design	2	36	24		12						2				
		1534863002	大数据原理与技术 ||Principle and technology of big data	3	56	32		24							4			
		1538563002	ZigBee 技术应用及无线传感器网络 ||ZigBee technology and wireless sensor networks	3	52	40	12							3				
		1534872002	语音信息处理 ||Speech Signal Processing	2	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	
专业教育课 Specialized Education	选修 Optional	1538642002	信息安全基础 || Fundamentals of Information Security	2	36	24	12							2				
		1537073002	移动通信 || Mobile Communication	3	52	40	12								3			
		小计 Subtotal		4.0	374	260	42	72										
		（修读要求 4.0 学分）																
	实践 Practice	1518351032	工程认识实习 || Engineering Cognition Practice	1	24		24					2						
		1514522022	信号处理课程设计|| Course Design of Signal Processing	2	48		38									+1	集中	
		1514531022	程序实践 | Procedure Practice	1	24		24							2			分散	
		1518692022	物联网工程实践 || Engineering Practice of Internet of things	2	48		48									+2	集中	
		1514562022	信息集成综合实践 ||Comprehensive practice of information integration	2	48		2									+2	集中	
		1518811042	毕业设计（论文） ||Graduation Design（Thesis)	14	336												+14	
		小计 Subtotal		22	420													
	合计 Total																	
能力拓展课 Competency Development	必修或实践 Compulsory or Practice																	
		1527802002	现代通信与信息技术 ||Modern communication and information technology	2	34	28	6								2			
		1529972002	嵌入式系统原理 || Embedded system Principle	2	36	24	12								2			
		小计 Subtotal		4	70	52	18											
		（修读要求 Fill in the Study Requirements）4.0																

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	
总计 Sum					167														
课外环节 Extracurricular practice	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 ||Labour 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					
		能力与创新实践 Capability and Innovation Practice	1511712022	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、物联网专业学士学位课程一览表 A list of bachelor's degree programs in IoT

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* Elementary Theory of Marxism*	3	3
		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	0310014101	高等数学I* Advanced Mathematics I*	5	1
	物理 Physics	4	0310063101	大学物理I* University Physics I*	3	2
	工程基础 Engineering Foundation	5	1510163002	电路分析基础* Fundamentals of Circuit Analysis*	3.5	2
		6	1510223002	数字电子技术* Digital Electronic Technology*	3.5	4
	专业基础 Subject Foundation Requisite	7	1514882002	信号与系统I* Signal and SystemI*	2.5	3
		8	1513272002	算法与数据结构* Algorithm and Data Structure*	2.5	3
		9	1515751002	电子信息类专业外语 Specialized English on Telecommunication	1	5
		10	1517122002	通信原理I* Principles of Communications*	2.5	5
		11	1514892002	数字信号处理* Digital Signal Processing*	2.5	4
		12	1513822002	单片机原理与应用 ||Principle and Application of MCU	2.5	5
专业教育课 Specialized Education	物联网工程类 IOT	13	1526982002	计算机组成原理* Principles of Computer Organization *	2.5	4
		14	1528722002	传感器原理与应用 Principle and Application of Sensor	2.5	5
		15	1528732002	RFID 射频识别技术 RFID Technology	2.5	5

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》

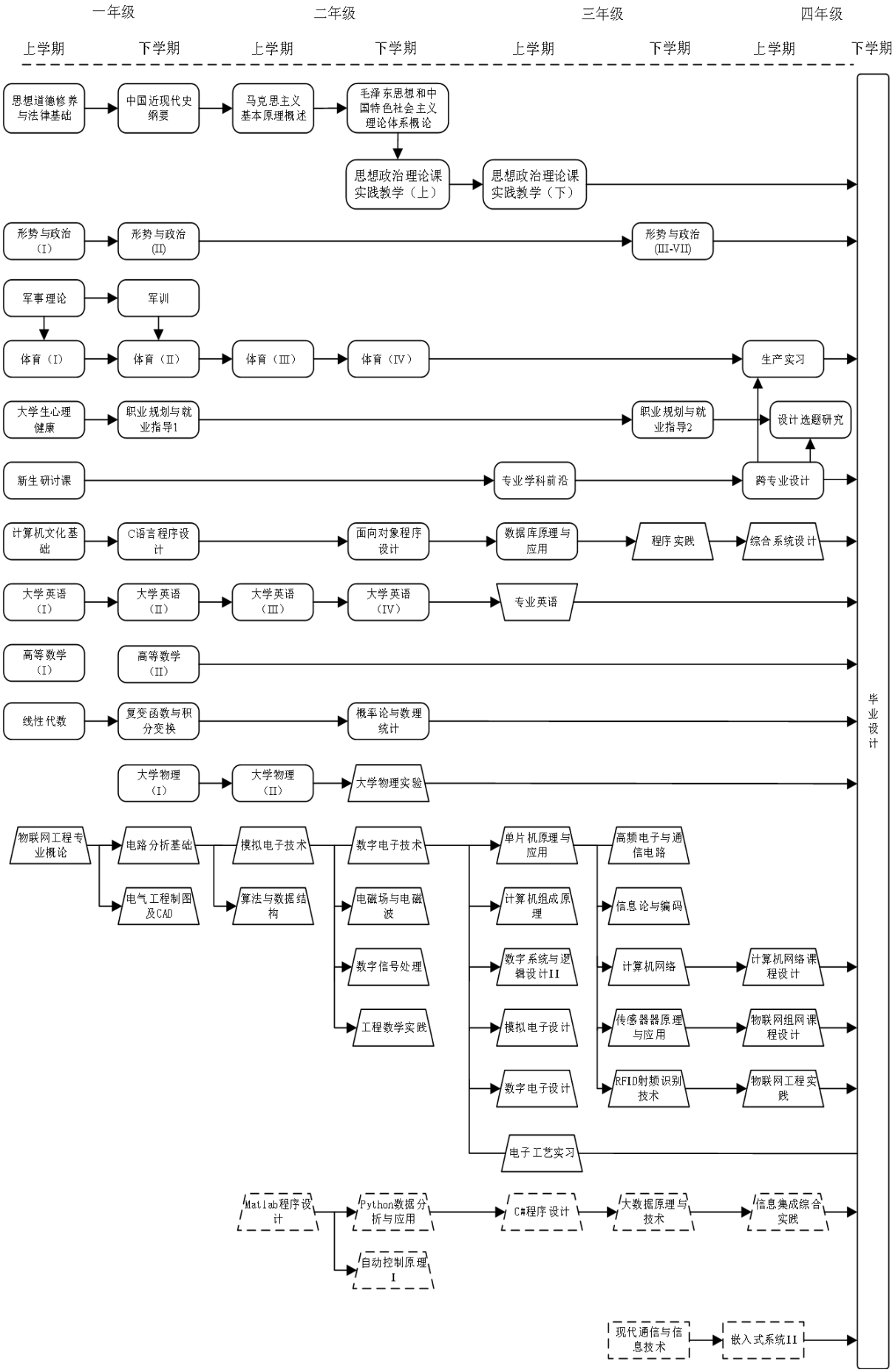
十一、全学程实践环节周历安排 Weekly Calendar of all Practice Sessions

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																		::	::	·		
四															P	P		::	::	·	·	
五				P	P													::	::	·		
六																△		::	::	·	·	
七	△	△	△	/	/	△												::	::	·		
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	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	11.1	11.2	12.1	12.2
马克思主义基本原理概论* ||Basic Principles of Marxism*																				H									
中国近现代史纲要 ||Outline of Chinese Contemporary and Modern History																				M									
思想道德修养与法律基础 ||Ideological Morality and the Rule of Law																					H								
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									
形势与政策 ||Current Situation and Policies										H						M		H										L	
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					
大学体育 ||College Physical Education																				L		L							
大学外语 ||College English																									H				
高等数学*	H																												

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	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	11.1	11.2	12.1	12.2
‖Advanced Mathematics*																													
线性代数 ‖Linear Algebra	M				L																								
概率论与数理统计 ‖Probability and Statistics		H			M																								
复变函数与积分变换 ‖Function of Complex Variable and Integral Transformation						M						L																	
工程数学实践 ‖Practice of Engineering Mathematics							M																						H
大学物理* ‖University Physics*	H																												
大学物理实验 ‖Physical Experiment of College												H																	
C 语言程序设计 ‖C Language Programming														H															
电气工程制图及 CAD ‖Electrial Engineering Drawing and CAD														M															
电路分析基础* ‖Fundamentals of Circuit Analysis*	M																												
模拟电子技术* ‖Analog Electronic Technology*		M																											
数字电子技术* ‖Digital Electronic Technology*		M																											
电磁场与电磁波 ‖Electromagnetic Field and Wave		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	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	11.1	11.2	12.1	12.2
信号与系统I ||Signal and System			H		H																								
数字信号处理 ||Digital Signal Processing			H																										
高频电子与通信电路* ||High Frequency Electronics and Communication Circuit*					M																								
信息论与编码 ||Information Theory and Coding			M																										
通信原理I* |||Principles of Communications*			M																										
算法与数据结构* ||Algorithm and Data Structure*						H			H																				
数据库原理与应用 ||Principle and Application of Database						M			M																				
计算机网络* ||Computer Network*						M																							
单片机原理与应用 ||Principle and Application of Single Chip Microcomputer									H																				
电子信息类专业外语 I ||Specialized English on Telecommunication											L														M				
电子信息类科技论文写作与文献检索（双语） ||Scientific Thesis Writing and Documentation																							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	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	11.1	11.2	12.1	12.2
Retrieval for Electronic Information Field （bilingual）																													
面向对象程序设计 ||Object Oriented Programming			M			M																L							
传感器原理与应用 ||Principle and Application of Sensor						H	M			L																			
计算机组成原理 ||Principles of Computer Organization					M							M																	
数字系统与逻辑设计 II ||Digital System and Logic Design II									M																				
RFID 射频识别技术 ||RFID Technology						H	M																						
现代通信与信息技术 ||Modern Communication and Information Technology						M	M		L			L																	
创业基础 ||Entrepreneurial Foundation																					L						L		
创造性思维与创新方法 ||Creative Thinking and Innovative Methods										H																			
自动控制原理 II ||Principle of Automatic Control II															L														
大学生素质拓展与创新创业实践 ||Quality Development and Innovation Practice																H						H	H	H	H		H		
职业规划与就业指导 ||Career Planning and Employment Guidance																					M							H	

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	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	11.1	11.2	12.1	12.2
大学生心理与健康教育 ||Mental and Health Education for College Students																								L					
军事理论 ||Military Theory																												M	
传统文化 || Traditional Culture																									M				
经济管理类 || Economic Management																	H									H	L		
军训 ||Military Ttraining																				L				L					M
电路分析基础实验 ||Basic Experiment of Circuit Analysis																	M												
模拟电子课程设计 ||Analog Electronic Course Design												M			M														
数字电子课程设计 ||Digit Electronic Course Design												M			M														
电子工艺实习 ||Electronic Craft Practice																		M	H										
工程认识实习 ||Engineering Cognition Practice																L				L			L						
生产实习 ||Production Practice																	M		H		M								
金工实习 ||Metalworking Practice																	L												
计算机网络课程设计 ||Computer Network Course Design									M					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	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	11.1	11.2	12.1	12.2
毕业设计（论文） ||Graduation Design（Thesis)							H	H		M			H											M	L		M		
物联网工程实践 ||Engineering Practice of Internet of things				M								H	H		H														
程序实践 ||Procedure Practice									M			H																	
综合系统设计 ||Integrated System Design							L	M			H												H						H
信息集成实训综合实践 ||Comprehensive practice of information integration				H				M														H							
嵌入式系统原理 || Embedded system Principle			M			M						L			L														
电子线路 CAD 设计实践 || CAD Design Practice of Electronic Circuit	M											L																	