

沈阳化工大学本科培养方案

信息工程学院

专业名称：自动化

专业代码：080801

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2021年8月

自动化专业培养方案

一、培养目标

本专业培养能在流程工业等领域从事自动化系统的分析、设计、开发、运行及管理等方面工作的高素质应用型工程技术人才。

毕业 5 年后的学生：

(1) 具有扎实的理论基础，具备适应自动化工程技术发展及职业拓展需求的能力，能够综合运用数学等自然科学、专业知识及交叉学科知识，分析自动化及相关领域中的复杂工程问题并提供系统性解决方案；

(2) 能够运用现代工具理解和解决复杂流程工业过程自动控制系统的分析、设计、集成和服务等实际工程问题；

(3) 具有高度的社会责任感、健全的人格、良好的人文科学素养、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，具有坚持公众利益优先的素质；

(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。

二、专业方向

过程控制。

三、毕业要求

根据本专业人才培养目标以及我校自动化学科多年的人才培养经验，从适应社会发展的需求出发，明确现阶段本专业的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、工程基础和自动化专业知识，能够运用其理论和方法解决流程工业信息化、自动化相关的复杂工程问题。	1-1.能将数学、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.能针对一个系统或过程建立合适的数学模型，并利用恰当的方法进行求解。
	1-3.能将工程基础和专业知识用于流程工业过程的判别和分析。
	1-4.能将工程基础和专业知识用于流程工业过程的设计、控制和改进。
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、并通过文献研究分析流程工业信息化、自动化相关的复杂工程问题，以获得有效结论。	2-1.能运用数学、自然科学和工程科学的基本原理，识别流程工业信息化、自动化相关的复杂工程问题中的关键环节。
	2-2.能通过建立数学模型、稳定性分析、系统集成分析、基于工艺和设备运行操作指标分析等方法正确表达流程工业信息化、自动化相关的复杂工程问题。
	2-3.能通过文献研究来分析流程工业信息化、自动化相关的复杂工程问题，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，能够针对流程工业信息化、自动化相关的复杂工程问题设计解决方案，设计满足特定需求的系统、单元（部件），并能够在设计环节中体现创新意识。	3-1.能够根据用户需求确定设计目标，并能够在安全、环境、法律等现实约束条件下，对设计方案的可行性进行研究。
	3-2.能够通过建模进行工艺计算，集成单元过程进行流程控制设计，并对流程过程设计方案进行优选，体现创新意识。
	3-3.掌握单元、系统等自动化工程设计知识，能够应用其针对流程工业信息化、自动化相关的复杂工程问题设计解决方案。

<p>毕业要求 4:</p> <p>研究:能够基于科学原理并采用科学方法对流程工业信息化、自动化相关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。</p>	4-1.能够基于专业理论,根据对象特性,选择研究路线。
	4-2.能够基于先进控制方法、过程监控方法等对流程工业信息化、自动化相关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.能够针对流程工业信息化、自动化相关的复杂工程问题进行控制系统应用研究,并通过信息综合得到合理有效的结论。
<p>毕业要求 5:</p> <p>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,能够针对流程工业信息化、自动化相关的复杂工程问题,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,包括对流程工业信息化、自动化相关的复杂工程问题的预测与模拟,并能够理解其局限性。</p>	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,对流程工业信息化、自动化相关的复杂工程问题进行预测与模拟。
	5-3.在解决流程工业信息化、自动化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。
<p>毕业要求 6:</p> <p>工程与社会:能够基于流程工业信息化、自动化相关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。</p>	6-1.掌握社会、健康、安全、法律以及文化等方面的相关知识,能够基于流程工业信息化、自动化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,理解在流程工业信息化、自动化相关工程实践中应承担的责任。
<p>毕业要求 7:</p> <p>环境和可持续发展:能够理解和评价针对流程工业信息化、自动化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。</p>	7-1.理解和亲身体验针对流程工业信息化、自动化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、评价针对流程工业信息化、自动化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。
<p>毕业要求 8:</p> <p>职业规范:具有人文社会科学素养、社会责任感,能够在流程工业信息化、自动化的工程实践中理解并遵守工程职业道德和规范,履行责任。</p>	8-1.培养良好的世界观、人生观;了解国家与社会发展。
	8-2.具有良好的人文社会科学素养、社会责任感。
	8-3.理解工程师的职业性质和责任;在流程工业信息化、自动化的工程实践中遵守工程职业道德和规范,并履行责任。
<p>毕业要求 9:</p> <p>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。</p>	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。
<p>毕业要求 10:</p> <p>沟通:能够就流程工业信息化、自动化相关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。</p>	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.能够熟练阅读专业外语文献资料,就流程工业信息化、自动化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。
<p>毕业要求 11:</p> <p>项目管理:理解并掌握工程管理原理与经济决策方法,并能在多学科环境中应用。</p>	11-1.理解并掌握一定的工程管理原理与经济决策方法。
	11-2.能够应用工程管理原理与经济决策方法对流程工业信息化、自动化相关的复杂工程问题进行有效分析和综合评价。
<p>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。</p>	12-1.掌握终身学习的语言工具和计算机工具,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.充分认识到流程工业信息化、自动化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。

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

控制科学与工程

五、专业核心课程

电路分析基础、数字电子技术、模拟电子技术、微机原理及应用、自动控制原理、现代控制理论、过程检测技术与传感器、过程建模技术、过程控制工程、计算机控制技术。

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 170 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。按照形成性评价规范、达到人才培养方案规定辅修要求的学生，获沈阳化工大学自动化专业新工科（实验班）辅修证书。

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	18	42.5	24.85
		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	4.68
		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	1.17
	学科平台课	学科基础课程	公共基础类	必修	56.5	62
专业基础类						
	学科实践课程	-	实践	5.5		
专业教育课	专业核心课程	-	必修	16.5	48.5	
	专业选修课程	-	选修	3		
	专业实践课程	-	实践	29		
能力拓展课	专业特色课程	-	必修 (或实践)	8	8	
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		
辅修课程	-	-	必修	24		
总学分/比例					171	100

Automation Major 2021 Undergraduate Education Program

I. Educational Objectives

This major trains high-quality applied engineering and technical personnel who can be engaged in the analysis, design, development, operation and management of automation systems in process industries and other fields.

Students 5 years after graduation:

(1) Having a solid theoretical foundation, and the ability to adapt to the development of automation engineering technology and career development needs: being able to use mathematics and other natural science, professional knowledge and interdisciplinary knowledge to analyze complex engineering problems in automation and related fields and provide systematic solutions;

(2) Being able to use modern tools to understand and solve practical engineering problems such as analysis, design, integration and service of complex process of industrial process and automatic control system;

(3) Having a high sense of social responsibility, sound personality, good humanity literacy, harmonious and inclusive team spirit, effective communication and expression ability and project management ability. In engineering practice, graduates can comprehensively consider factors such as law, environment and sustainable development, and have the quality of giving priority to public interests;

(4) Having a broad international vision: actively adapting to the changing situation and environment at home and abroad: being able to update knowledge through a variety of learning channels to form the habit of lifelong learning.

II. Major direction

Process control

III. Graduation Requirements

According to the talent training objectives of this major and the many years of talent training experience of Automation Discipline in our university, starting from the needs of social development, it is clear that the graduation requirements and indexes of this stage, which are as follows:

Graduation Requirements	Indices
Requirement 1: master the professional knowledge of mathematics, natural science, engineering foundation and automation, and be able to use its theories and methods to solve complex engineering problems related to informationization and automation of process industry.	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 establish appropriate mathematical model for a system or process and solve it with appropriate methods.
	1.3 Be able to apply engineering foundation and professional knowledge to the process of identification and analysis in process industry.
	1.4 Be able to apply engineering foundation and professional knowledge to the design, control and improvement of process industry.

Requirement 2: The basic principles of mathematics, natural science and engineering science can be applied to identify, express and analyze complex engineering problems related to informatization and automation of process industry 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 complex engineering problems related to process industry informatization and automation.
	2.2 Be able to correctly express complex engineering problems related to informatization and automation of process industry by establishing mathematical model, stability analysis, system integration analysis, technical process and equipmental operation index analysis, etc.
	2.3 Be able to analyze complex engineering problems related to informatization and automation of process industry through literature research, so as to obtain effective conclusions.
Requirement 3: On the premise of comprehensive consideration of social, health, safety, legal, cultural and environmental factors, we can design solutions for complex engineering problems related to informationization and automation of process industry, design systems and units (components) that meet specific needs, and embody innovative consciousness in the design process.	3.1 Be able to determine the design objectives according to the needs of users, and be able to study the feasibility of the design scheme under the realistic constraints of safety, environment and law.
	3.2 Be able to carry out process calculation through modeling, integrate unit process to make process control design, and optimize process design scheme to reflect innovative consciousness.
	3.3 Master the knowledge of unit and system automation engineering design, and be able to apply it to design solutions for complex engineering problems related to process industry informatization and automation.
Requirement 4: Based on scientific principles and scientific methods, we can study complex engineering problems related to informationization and automation of process industry, including designing experiments, analyzing and interpreting data, and obtaining reasonable and effective conclusions through information synthesis.	4.1 Be able to choose research routes based on professional theory and object characteristics.
	4.2 Be able to design experimental schemes, carry out experiments, analyze and interpret data for complex engineering problems related to process industry informatization and automation based on advanced control methods and process monitoring methods.
	4.3 Be able to study the application of control system for complex engineering problems related to process industry informatization and automation, and get reasonable and effective conclusions through information synthesis.
Requirement 5: master the basic methods of document retrieval, data query and using modern information technology to obtain relevant information, and be able to develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for complex engineering problems related to informationization and automation of process industry, including forecasting and simulating complex engineering problems related to informationization and automation of process industry, and be able to understand their limitations.	5.1 Master the basic methods of document retrieval, data inquiry and by the use of modern information technology obtain relevant information.
	5.2 Be able to correctly develop, select and use simulation tools, human-computer interface integration tools and other technologies and resources, and predict and simulate complex engineering problems related to process industry informatization and automation.
	5.3 Improve the application ability of modern tools in solving complex engineering problems related to process industry informatization and automation, and understand its limitations.
Requirement 6: based on the background knowledge related to informatization and automation of process industry, it can make reasonable analysis, evaluate the impact of	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 process industry informatization and automation.

professional engineering practice and complex engineering problem solutions on society, health, safety, law and culture, and understand the responsibilities to be undertaken.	6.2 Personally experience and evaluate the impact of engineering practice and engineering schemes on society, health, safety, law and culture, and understand the responsibilities in process industry informatization and automation related to engineering practice.
Requirement 7: to understand and evaluate the impact of engineering practice on the sustainable development of environment and society, aiming at complex engineering problems related to informatization and automation of process industry.	7.1 Understand and experience the impact of engineering practice on the sustainable development of environment and society on complex engineering problems related to process industry informatization and automation.
	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.
Requirement 8: with humanistic and social science literacy and social responsibility, be able to understand and abide by professional ethics and norms of engineering and fulfill responsibilities in the engineering practice of informatization and automation of process industry.	8.1 Cultivate a good world outlook and outlook on life; Understand national and social development.
	8.2 Have good humanity and social science literacy and sense of social responsibility.
	8.3 Understand the professional nature and responsibilities of engineers; In the process industry informatization and automation engineering practice, abide by the engineering professional ethics and norms, and fulfill the responsibility.
Requirement 9: being able to assume the roles of individual, team member and person in charge in a team with multidisciplinary background.	9.1 Be able to play an individual role and give full play to individual advantages in a multidisciplinary team.
	9.2 Be able to play the role of team member and demonstrate team spirit in a multidisciplinary team.
	9.3 Be able to play the role of team leader and demonstrate management ability in a multidisciplinary team.
Requirement 10: being able to effectively communicate and communicate with industry peers and the public on complex engineering issues related to informatization and automation of process industry, including writing reports and design manuscripts, making statements, expressing or responding to instructions clearly, having a certain international perspective, and being able to communicate and communicate in a cross-cultural context.	10.1 Have the ability of foreign language communication, have a certain international vision, and be able to communicate and exchange in a cross-cultural context.
	10.2 Be able to skillfully read professional foreign language literature, and effectively exchange oral and written information with industry peers and the public on complex engineering issues related to process industry informatization and automation.
Requirement 11: understand and master the principles of project management and economic decision-making methods, and be able to apply them in multidisciplinary environment.	11.1 Understand and master certain engineering management principles and economic decision-making methods.
	11.2 Be able to effectively analyze and comprehensively evaluate complex engineering problems related to informatization and automation of process industry by applying engineering management principles and economic decision-making methods.
Requirement 12: have the awareness of autonomous learning and lifelong learning, and have the ability of continuous learning and adapting to development.	12.1 Master the language tools and computer tools of lifelong learning, have the ability of self-learning, and be able to obtain the knowledge and methods of solving problems through self-access to information.
	12.2 Fully realize the rapid development of process industry informatization and automation related to engineering fields, as well as the importance of autonomous learning and lifelong learning, and have good psychological and physical quality to adapt to various tasks in the work.

The relationship between graduation requirements and educational objectives

Graduation Requirements	Educational Objectives			
	Educational Objectives 1	Educational Objectives 2	Educational Objectives 3	Educational 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

Control Science and Engineering

V. Core Courses

Fundamentals of Circuit Analysis, Electronic Technology, Microcomputer Principles and Application, Electric Drive Fundamentals, Power Electronics, Automatic Control Theory, Modern Control Theory, Process Detecting Technology and Sensor, Process Modelling Technology, Process Control Engineering, Computer Control Technology etc.

VI. Educational System

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

VII. Confer Degrees

Students should complete at least 170 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). According to the formative evaluation criteria, students who meet the minor requirements specified in the talent

training program have obtained the minor certificate of new engineering (experimental class) of automation major of Shenyang University of chemical technology.

VIII. Credit Requirements

Course Type	Course Modules		Course Nature	Credit Requirements	Subtotal	Proportion (%)
General Education	Subject Platform Course General Education Compulsory Course	Ideological and Political Education	Compulsory	17	41.5	24.41
		Foreign Languages		12		
		Computer		2.5		
		Military Security		2		
		Labor Sports		5		
		Innovation and Entrepreneurship		2		
		Mental Health		1		
	General Education Elective Subjects	Aesthetic Education (400)	Elective	2	8	4.71
		China and the World (500)		2		
		Four Histories (600)		1		
		Economic Management(700)		1		
		Traditional Culture (900)		2		
	General Education Practice Course	Military Training	Practice	2	2	1.18
Discipline Education	Basic Subject Courses	Public Basic Class	Compulsory	56.5	62	
		Professional Foundation				
	Subject Practice course	-	Practice	5.5		
Specialized Education	Professional Core Courses	-	Compulsory	16.5	48.5	69.70
	Professional Elective Courses	-	Elective	3		
	Professional Practice Courses	-	Practice	29		
Competency Development	Professional Characteristic Courses	-	Compulsory (or Practice)	8	8	
Extracurricular Links	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				
Minor Courses	-	-	Compulsory	24		
Total Credits / Proportion					170	100

九、自动化专业教学进程表

Table of Teaching Schedule for Automation 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								
			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					1	1	1	1	1	1	1	1	
			0211003101	大学外语I College English I	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	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	外语类 Foreign Language Courses	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 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							五选一
				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							

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	外语类 Foreign Language Courses	0241003401	大学外语IV（跨文化交际） ∥ College English IV（Intercultural Communication）	3.0	48	48													
				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													
		计算机类 Computer Courses	1511372002	C 语言程序设计 ∥C Language Programming	2.5	44	32			12		3								
		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 ∥Labour Education	1.0	16	16					2								
			0410011101	大学体育I ∥College Physical EducationI	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 Education IV	1.0	36		36						2						
		创新创业类 Innovation and Entrepreneurs hip 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						

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	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	11	16	9	13	5	2	2	1	41.5	
	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				8.0	128	128				1	1	1	1	1	1	1	1		
	实践 Practice	0415102011	军训 military training		2.0	48				48	+2									集中	
	合计 Total				51.5	956	680	144	12	120	14	1	10	14	6	3	3	2	51.5		
学科平台课 Discipline Education	必修 Compulsory	数学与自然科 学类 Mathematics & Natural Science	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							

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 Platform Education	数学与自然科学类 Mathematics & Natural Science	0310063101	大学物理 I* College Physics I*	3.0	48	46	2				3									
		0310063201	大学物理 II* College Physics II*	3.0	48	46	2					3								
		1111042003	化学工艺学 Chemical Process Technology	1.0	16	16								2						
	工程基础类 Foundations of Engineering	必修 Compulsory	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						
			1532862002	电机及拖动基础 Fundamental of Electric Drive	2.0	34	28	6							2					
			1514992002	微机原理及应用 Microcomputer Principle and Application	2.5	42	36	6								3				
			1532852002	电力电子技术基础 Fundamentals of Power Electronics	2.0	34	28	6								2				
1110072001	化学工程基础 Unit Operations of Chemical Engineering		2.0	32	32								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 Platform Education	必修 Compulsory	专业基础类 Professional Basic Courses	1511392002	仿真技术 Simulation Technology	2.0	36	24		12				2						
			1511851002	自动化专业外语 Specialty English for Automation	1.5	24	24						2						
			1511051002	自动化专业概论 Introduction to Automation	1.0	18	12	6			2								
			1511461002	科技论文写作与文献检索 Literature Searching and Scientific Papers Writing	1.0	16	16								2				
			1511364002	自动控制原理* The Principle of Automatic Control*	4.0	68	56	8	4					4					
			1511383002	现代控制理论 Modern Control Theory	3.0	52	40	8	4					3					
			小计 Subtotal		56.5	950	840	68	26	16	11	17	11	15	10	2	0	0	56.5
	实践 Practice	0310081011	大学物理实验 Physical Experiment of College	1.0	24	6	18					3							
		2110071031	金工实习 Metalworking Practice	1.0	24		24				+1						集中		
		1511422022	工程数学实践 Engineering Mathematics Practice	2.0	48	8	40					4					分散		
		1510150012	电路分析基础实验 Basic Experiment of Circuit Analysis	0.5	12		12				2						分散		
		1511261022	电子设计与制作 Electronic Design and Production	1.0	24		24					+1					集中		
		小计 Subtotal		5.5	132	14	118	0	0	0	3	3	5	0	0	0	5.5	5.5	
	合计 Total		62	1082	854	186	26	16	11	20	14	20	10	2	0	0	62		

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	1511423002	过程建模技术* Process Modeling Technology*	3.0	52	40	8	4						3					
		1511503002	过程控制工程* Process Control Engineering*	3.5	60	48	12								4				
		1511413002	计算机控制技术* Computer Control Technology*	3.0	52	40	10	2							3				
		1511882002	集散控制系统(DCS) Distributed Control System	2.5	44	32	12								2				
		1511892002	可编程控制器原理及应用 The Principle and Application of Programmable Controller	2.0	34	28	6								2				
		1513042002	过程检测技术与传感器 Process Detection Techniques and Sensors	2.5	42	36	6							3					
		小计 Subtotal		16.5	284	224	54	6	0	0	0	0	0	5.5	11	0	0	16.5	
	选修 Optional	1537042002	计算机网络与通信技术 Computer Network and Communication Technology	2.0	32	32									2				
		1532242002	电气控制技术 Electrical Control Technology	2.0	34	28	6						2						
		1532252002	工程电磁场 Engineering Electromagnetic Field	2.0	34	28	6						2						
		1533992002	机器人控制 Robot Control	2.0	36	24	12								2				
		1533112002	单片机应用基础 MCU Application Basis	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		
专业教育课 Specialized Education (续)	选修 Optional	1534863002	大数据原理与技术 Big Data Principle and Technology	3	56	32		24							4				
		1534302002	信号与系统II Signals and Systems II	2.0	34	28	6					2							
		小计 Subtotal		14.0	260	200	36	24	0	0	0	2	4	2	8				
		修读要求 Fill in the Study Requirements		3	48	48											3		3
	实践 Practice	1511362022	控制工程课程设计 Course Design of Control Engineering	2.0	48		48										+2		集中
		1511402022	工程实训 Engineering Practice	2.0	48		48										+2		集中 CDIO 课程
		1511382022	过程建模技术课程设计 Course Design of Process Modeling Technology	2.0	48		48								4				分散
		1512212032	电子工艺实习 Electronic Process Practice	2.0	48		48					+2							集中
		1511372022	计算机控制系统集成设计 Integrated Design of Computer Control System	2.0	48		48										+2		集中
		1511412022	自动化装置综合实训 Comprehensive Practice and Training of Automation Devices	2.0	48		48								4				分散
		1511351032	认识实习 Cognition Practice	1.0	24		24					4							分散
		1511162032	生产实习 Production 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 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th		
专业教育课 Specialized Education (续)	实践 Practice	1511721042	毕业设计(论文) Graduation Design (or Thesis)	14.0	336		336										+1 4	集中	
		小计 Subtotal			29	696	0	696	0	0	0	0	6	0	0	8	8	14	29
	合计 Total				48.5	1028	272	750	6	0	0	0	6	0	6	19	8	17	48.5
能力拓展课 Competency Development	必修或实践 Compulsory or Practical	1511852002	人工智能基础 Fundamentals of Artificial Intelligence	2.0	34	28		6				2							
		1511862002	机器学习 Machine Learning	2.0	34	28		6					2						
		1511872002	Python 数据分析与应用 Python Data Analysis and Application	2.0	36	24		12					2						
		1511392022	仿真课程设计 Course Design of Simulation	2.0	48		48						4						分散
		小计 Subtotal			8	152	80	48	24	0	0	0	0	8	2	0	0	0	8
		(此处填写修读要求 Fill in the Study Requirements) 8.0																	
课外环节 Extracurricular	课外实践 Extracurricular practice	人文社会实践 Culture and Society Practice	1511701032	社会调查 Social Survey	0.5	12											0.5	分散	
		身心健康社会 实践 Mentally and Physically Social Practice	0410050751	课外体育锻炼 Extracurricular Physical Exercise	0.5	12												0.5	分散
			2640030011	劳动教育实践 Labour Education Practice	0.5	12													分散
			0510070311	心理健康辅导 Mental Health Counseling	0.5	12												0.5	分散

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	
课外环节 Extracurricular	外语技能实践类 Foreign Language Proficiency Training and Practice	0210010011	外语技能实践（初级） Foreign Language Proficiency Training Practice (elementary)	2.0	48				48				2					分散 (二选一)	
		0210020011	外语技能实践（高级） Foreign Language Proficiency Training and Practice (advanced)			48				48				2					
	课外实践 Extracurricular practice	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 for College Students	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					9	232	40	0	0	192	0	0.5	4	2	1	0	1.5	0	9

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)".

辅修 课程 Minor course	必修 Compulsory	1511802	调查与实验设计方法 The Method of Investigation and Experiment Design	2.0	44	8	36			4								
		1511812	全新思维 A Whole New Mind	2.0	44	8	36					4						
		1511822	机器学习 Machine Learning	2.0	44	8	36							4				
		1511832	情商 2.0 实战 Emotional Intelligence 2.0 Practice	2.0	44	8	36			4								
		1511842	领导力 2.0 实战 Leadership 2.0 Practice	2.0	44	8	36			4								
		1511852	新控制工程师 Creativity and Innovation for control Engineers	2.0	44	8	36					4						
		1511862	一年制项目 Year-long project teams	2.0	44	8	36							4	4			
		1511872	发现自动化之旅 Discover the Journey of Automation	2.0	44	8	36			4								
		1511882	创新的艺术 The Art of Innovation	2.0	44	8	36					4						
		1511892	创业的轨迹 Entrepreneurship Trajectory	2.0	44	8	36							4				
		1511902	Python 程序设计 Python programming	2.0	44	8	36							4				
		1511912	社会实践能力提升 The Promotion of Social Practice Ability	2.0	44	8	36											
		小计 Subtotal				24	528	96	432	0	0	4	4	2	4	4	4	2
总计 Sum				170	3218	1886	1128	68	136	25	36	30	42	24	24	11	19	170

十、自动化专业学士学位课程一览表

A list of bachelor's degree programs in Automation Major

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	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	0310014101	高等数学I* Advanced Mathematics I*	4.5	1	
	物理 Physics	4	0310063101	大学物理I College Physics I	3	2	
	工程基础 Engineering Foundation	5	1510063002	电路分析基础* Fundamentals of Circuit Analysis*	3.5	2	
		6	1510923002	数字电子技术* Digital Electronic Technology*	3.5	4	
		7	1514992002	微机原理及应用 Microcomputer Principle and Application	2.5	5	
	专业基础 Professional Foundation	8	1511851002	自动化专业外语 Specialty English for Automation	1.5	5	
		9	1511392002	仿真技术 Simulation Technology	2	4	
		10	1511364002	自动控制原理* The Principle of Automatic Control*	4	4	
		11	1511383002	现代控制理论 Modern Control Theory	3	5	
	专业教育课 Professional Education	过程控制 Process Control	12	1511503002	过程控制工程* Process Control Engineering*	3.5	6
			13	1511413002	计算机控制技术* Computer Control Technology*	3.0	6
14			1511423002	过程建模技术* Process Modeling Technology*	3	5	
15			1511532002	集散控制系统(DCS) Distributed Control System	2.5	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》

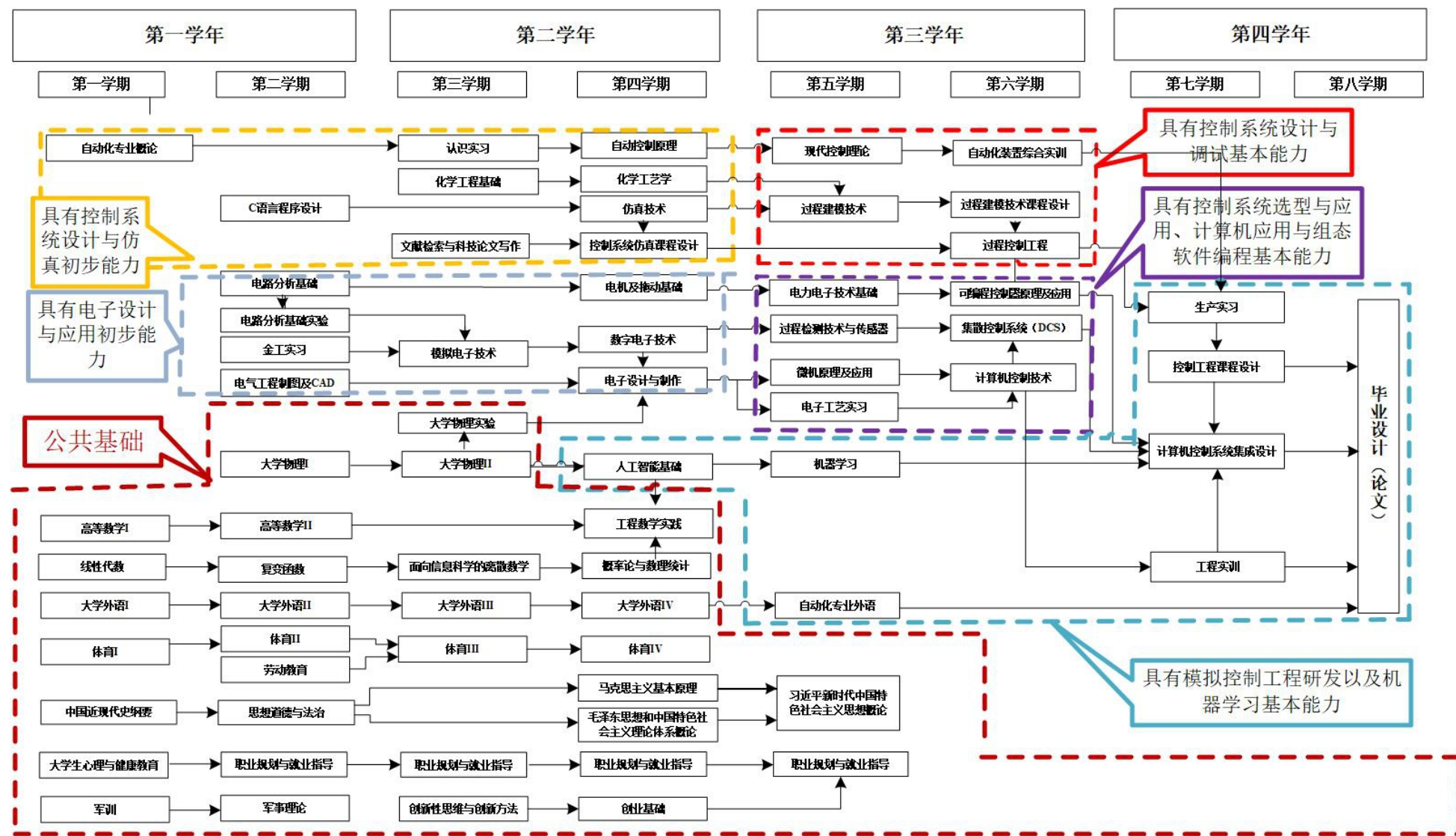
十一、全学程实践环节周历安排 Weekly Calendar of all Practice Sessions

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													※					::	::	·	·		金工实习
三																		::	::	·			
四												△						::	::	·	·		电子设计与制作
五												P	P					::	::	·			电子工艺实习
六																		::	::	·	·		
七	△	△	/	/			△	△	△	△											·		控制工程课程 设计；生产实习；计 算机控制系统集成 设计；工程实训
八	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=						毕业设计

符号说明(Symbol Introduction):

※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||Mini-term

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



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	
可编程控制器原理及应用 The Principle and Application of Programmable Controller											M				H																		
过程检测技术与传感器 Process Detection Techniques and Sensors				M							H																						
职业规划与就业指导 Career Planning and Employment Guidance																							L	M									
形势与政策 Current Situation and Policies								M														L						M					
大学生心理与健康教育 Mental and Health Education for College Students																							M										
军事理论 Military Theory																							M	L									
安全教育 Safety Education								M									M	L											M				
劳动教育 Labour Education																						M		M		M							
军训 Military Training																						M	M			M							
大学物理实验 II College Physics Experiment II													M	M																			
金工实习																		L	M				L			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		
Metalworking Experience																																		
电路分析基础实验 Basic Circuit Analysis Experiment						M																		M										
认识实习 Cognition Practice																			M	L														
电子设计与制作 Electronic Design and Production										M																								
生产实习 Production Practice																		L	M					L					M				M	
毕业设计 (论文) Graduation Design (or Thesis)							M		M				M			M					L							M		L		M		
电子工艺实习 Electronic Process Practice								H									L						M			L								
仿真课程设计 Course Design of Simulation									M							M																	M	
创造性思维与创新方法 Creative Thinking and Innovative Methods																													M				M	M
创业基础 Entrepreneurial Foundation																									L	L	M		M	H				
化学工艺学 Chemical Process Technology	L				M																													
工程数学实践 Engineering Mathematics Practice	L						M																			L								

