电子信息类本科人才培养方案

Undergraduate Program for the Discipline of Electronic Information

一、大类专业简介（Brief Introduction to the Discipline）

电子信息大类涵盖电子信息工程（代码：080701）、通信工程（代码：080703）、光电信息科学与工程（代码：080705）等 3 个专业，采用 “1+3”培养模式。

电子信息大类坚持“学生为中心、成果产出为导向、持续改进”的工程教育理念，面向工业、面向未来、面向世界，落实立德树人的根本任务。以省级重点学科“信息与通信工程”、国防特色学科“通信与信息系统”、控制科学与工程博士点“网络传输与组网控制方向”、四川省双一流“信息与控制学科群”建设为牵引，立足西部、面向全国、辐射“一带一路”， 充分发挥区域产学研联合办学优势和军民融合特色，培养品德优良，身心健康，基础理论扎实，工程实践能力突出，视野开阔，具有责任意识、科学精神和人文素养，能够适应“电子信息+”和泛信息化时代，德智体美劳全面发展的复合型人才。

电子信息工程专业开办于 1997 年，是学校最早的两个重点本科专业之一， 2001 年被评为四川省电子信息工程本科人才培养基地，是国防特色专业、省级特色专业，省级卓越工程师计划专业。

通信工程专业开办于 2001 年，在无线通信、网络通信、物联网系统及软件方面独具特色，所依托的通信与信息系统学科是国防特色学科，四川省重点学科。

光电信息科学与工程专业开办于2001年，经历了理科（2002-2012年光信息科学与技术）到工科（2013年光电信息科学与工程）两个阶段，已连续 14 届为国家和社会培养本科毕业生共 1023 人。该专业以激光技术及加工、照明与新型显示、光电传感与检测等国家和四川省战略性新兴产业应用为引导，有机整合光电、机械、计算机等完整的知识链条，突出以光子和电子为信息基本载体的信息特征，旨在培养具有国际视野的高级人才。

The electronic and information discipline， including photoelectric information science and engineering， electronic information engineering and communication engineering majors， adopts “1+3” talent-training model.

The discipline of electronic information adheres to the concept of engineering education， which is student-centered， results-oriented and continuous improvement. It is oriented to industry， the future and the world， and carries out the fundamental task of cultivating people. Taking “information and communication engineering” of provincial key disciplines， “communication and information system” of national defense discipline， “network transmission and networking control direction” of the doctoral program of control science and engineering， “information and control discipline group” of Sichuan’s double first class as the traction， based on the western China， facing to the whole country， and implementing the Belt and Road Initiative， the discipline of electronic information gives full play to the advantages of joint school of regional integration of enterprises， universities and research institutes， and the integrating features of the military and

civilian. Compound talents with good moral character， good physical and mental health， solid theoretical foundation， outstanding engineering practice ability， broad vision， sense of responsibility， scientific spirit and humanistic quality， being able to adapt to the era of "electronic information +" and pan-informatization， who also have the all-round development in morality， intelligence， physical fitness， beauty and labor will be cultivated.

The specialty of electronic information engineering was founded in 1997. It is one of the two earliest key undergraduate majors in our school. In 2001， it was appraised as the undergraduate talent training base of Sichuan province's electronic information engineering. It is a specialty of national defense， provincial characteristics and provincial outstanding engineer program.

The specialty of communication engineering was founded in 2001. It has its own characteristics in wireless communication system， internet communication，internet of things system and software. It relies on the discipline of communication and information system， which is a special subject of national defense and a key subject of Sichuan province.

The photoelectric Information Science and engineering major in our university has 18 years of educational history， and has gone through two stages： science and engineering. It has trained 1023 graduates for the country and society in 14 consecutive sessions. Guided by the strategic emerging industries in Sichuan even whole China such as laser processing technology， lighting system，display technology， and photoelectric sensing and detection， this major integrates complete knowledge chains of photoelectric information， mechanical engineering and computer， highlights the information characteristics regarding photon and electronics as the underlying carriers of information， and aims to cultivate advanced talents with international vision.

二、大类培养阶段教学进程计划表（Courses Schedule of Educational Stages for the Discipline）

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Credit	理论学时 Theory	实践学时 Experiment		
通识教育平台（必修） Basic Courses in General Education （Required）								
1	XG160010	入学教育 Entrance education	0.5	8	0	8	1	
2	FX160020	大学生心理健康教育 Mental health education of college students	1	16	8	8	1	
3	GF190010	军事理论 Military Theory	0.5	36	20（授课）+16（网络）	0	1	
4	BW190010	军事技能训练	0.5	112	0	14 天	1	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Credit	理论学时 Theory	实践学时 Experiment		
		Military Skill Training						
5	自选项目	体育俱乐部 Sports Club	2	60	0	60	1-7	
6	TY190010	运动基础 Sports Fundamental	1	28	0	28	1	
7	自选项目	体育选项 Sports Options	1	28	0	28	3/5/7	
8	TY190020	限选 2 学分 游泳 Swimming	1	28	0	28	3/5/7	
9	TY190030	团体操 Group Callisthenics	1	28	0	28	2/4/8	
10	MY160360	中国近现代史纲要 Conspectus of Chinese Modern History	2	32	32	0	1	
11	MY160210	思想道德修养与法律基础 Thought Morals Tutelage and Legal foundation	3	48	48	0	2	
12	MY190011	形势与政策 1 Situation and Policy 1	0.25	8	8	0	1	
13	MY190012	形势与政策 2 Situation and Policy 2	0.25	8	8	0	2	
14	WY160371	综合英语 1 Comprehesive English 1	3	48	48	0	1	★
15	WY160372	综合英语 2 Comprehesive English 2	3	48	48	0	2	
小计 Subtotal			19					
学科（大类）教育平台（必修） Basic Courses in Discipline （Majors） Education （Elective）								
1	LX160071	高等数学 A1 Advanced Mathematics A1	6	96	96	0	1	
2	LX160072	高等数学 A2 Advanced Mathematics A2	6	96	96	0	2	★
3	LX190971	大学物理 B1（电子信息类） University Physics B1	2	32	32	0	1	
4	LX190972	大学物理 B2（电子信息类） University Physics B2	4	64	64	0	2	
5	LX190010	线性代数 Linear Algebra	3	48	48	0	2	
6	GC160040	工程训练 D Engineering Training D	2	32	0	32	2	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Credit	理论学时 Theory	实践学时 Experiment		
7	XX190340	电子信息类新生研讨课 Freshman Seminar Courses of Electronic Information	1	16	16	0	1	
8	XX190350	电子信息类专业认识实习 Cognition Practice of Electronic Information	1	16	0	16	1	
9	JK160210	程序设计基础 B（C 语言） C Language Programming Foundation B	2	32	32	0	1	
10	JK160170	程序设计基础 B（C 语言）实验 Experiment of C Language Programming Foundation B	1	16	0	16	1	
11	XX160031	电路分析基础 A1 Circuit Analysis Fundamentals A1	2	32	32	0	2	
12	XX160041	电路分析基础实验 A1 Experiments of Circuit Analysis Fundamentals A1	0.5	8	0	8	2	
小计 Subtotal			**30.5**					
个性化培养平台（选修课） Charateristic Education Course （Elective）								
1	XX190180	单片机基础与实践 SCM Basis and Practice	1.5	24	24	0	2	
2	XX190190	单片机基础与实践课程实验 Experiments of SCM Basis and Practice	1	16	0	16	2	
小计 Subtotal			**2.5**	**40**	**24**	**16**		

三、专业培养阶段方案（分专业培养方案）

（Undergraduate Program for Majors under the Discipline）

电子信息工程专业培养方案

（Undergraduate Program for the Major of electronic information engineering）

专业负责人：王学渊　　主管院长：姚远程　　院学术委员会主任：邹传云

Director of Major： Xueyuan Wang　　Executive Dean： Yuancheng Yao

Academic Committee Director： chuanyun Zou

□培养目标（Educational Objectives）

本专业以国家战略及区域经济发展为导向，立足四川，面向西部，服务全国，以重基础、宽口径、通术业、强实践为目标，培养爱国进取、勇于创新思辨，具有良好的思想道德品质，扎实的数理与计算机知识、国际化视野和一定创新能力，可在电子信息工程相关领域从事科学研究、技术开发、工程应用、设备运行维护、工程项目管理的复合型高级工程技术人才。

本专业要求学生系统掌握电子信息工程的专业知识，具备数字与模拟电路设计开发能力、计算机软硬件应用能力、电子信息系统设计及分析能力、微波系统及天线技术等方面的综合应用能力，成为电子信息技术领域的高级技术人才。

毕业五年后达到以下目标：

1. 职业素养：具有较高的思想素质和法律伦理水平，能够在工程实践中遵守职业规范，履行社会责任。

2. 专业能力：能够综合运用系统的科学技术知识，分析和解决电子信息工程领域的复杂工程问题。

3. 交流合作：具有一定的组织能力，能与同行、客户和社会公众有效沟通，适应团队工作环境，有全球化意识和一定的国际视野。

4. 终身学习：具有终身学习能力，通过不断学习，实现工作能力的自我提升。

This major is guided by national strategy and regional economic development， based in Sichuan， facing the west， serving the whole country， and aiming at laying stress on foundation， wide caliber， general skill and strong practice. To train advanced engineering and technical personnel who are patriotic， enterprising， innovative and speculative， have good ideological and moral qualities， solid mathematical and computer knowledge， international vision and certain innovative ability. It can be engaged in scientific research， technology development， engineering application， equipment operation and maintenance， project management in the related fields of electronic information engineering.

This major requires students to master the professional knowledge of electronic information engineering systematically， possess the comprehensive application abilities of digital and analog circuit design and development， computer software and hardware application， electronic information system design and analysis， microwave system and antenna technology， etc.， and become senior technical personnel in the

field of electronic information technology.

Five years after graduation， the following goals will be achieved：

1. Professional accomplishment： with high ideological quality and legal ethical level， can abide by professional norms in engineering practice， and fulfill social responsibility.

2. Professional competence： Ability to analyze and solve complex engineering problems in the field of electronic information engineering by synthetically utilizing scientific and technological knowledge of the system.

3. Exchange and cooperation： Have a certain organizational ability， can effectively communicate with peers， customers and the public， adapt to the team working environment， have a sense of globalization and a certain international perspective.

4. Lifelong learning： with lifelong learning ability， through continuous learning， to achieve self-improvement of working ability.

□毕业要求（Graduation Requirements）

毕业生应获得以下几方面的知识和能力：

1. 工程知识：掌握本专业所需的数学、自然科学、工程基础和电子信息工程的专业知识，并能够将上述知识用于解决本专业所涉及领域的复杂工程问题。

2. 问题分析：能够应用数学、自然科学和电子信息工程科学的基本原理，识别、表达和有效地分解复杂的电子信息工程问题，并通过文献查阅等多种方式对其进行分析，以获得有效结论。

3. 设计/开发解决方案：能够针对电子信息工程领域的复杂工程问题提出解决方案，设计满足特定需求的电子信息系统和功能模块，并能够在设计环节中体现创新意识；能够综合考虑其对社会、健康、安全、法律、文化及环境的影响。

4. 研究：能够基于科学原理并采用科学方法对电子信息工程领域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。

5. 使用现代工具：能够针对电子信息工程领域的复杂工程问题，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。

6. 工程与社会：能够基于工程相关背景知识进行合理分析，评价本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。

7. 环境和可持续发展：基于环境保护和可持续发展的基本方针、政策和法律、法规，能够理解和评价针对电子信息工程领域复杂工程问题的专业工程实践对环境、社会可持续发展的影响。

8. 职业规范：具有人文科学素养、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。

9. 个人和团队：能够在多学科背景的团队中承担个体、团队成员以及负责人的角色，能够听取其他团队成员的意见和建议，充分发挥团队协作的优势。

10. 沟通：具备良好的表达和沟通能力，能够就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；并至少掌握一门外语，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。

11. 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、跨职能环境中合理应用。

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。

Graduates should acquire the following knowledge and abilities：

1．**Engineering knowledge**： Master knowledge of mathematics， natural science，engineering fundamentals andan engineering specialisation required for electronic information engineering， and be able to apply them to the solution of complex engineering problems in the fields covered by this major.

2．**Problem analysis**： Identify， formulate， research literature and analyse complex engineering problems in the field of electronic information engineering， reaching substantiated conclusions using first principles of mathematics， natural sciences and engineering sciences.

3．**Design/development solutions**： Design a reasonable solution for complex engineering problems in the field of electronic and information engineering， and design systems， components or processes that meet specified needs with appropriate consideration for public health， and safety， cultural， societal and environmental considerations.

4．**Investigation**： Conduct investigations of complex problems using research-based knowledge in the field of electronic and information engineering and research methods including design of Experiment，analysis and interpretation of data， and synthesis of information to provide valid conclusions.

5．**Modern tool usage**： Create， select and apply appropriate techniques， resources and modern engineering and IT tools，including prediction and modeling，to complex engineering problems in the field of electronic information engineering， with an understanding of the limitations.

6．**The engineer and society**： Apply reasoning informed by contextual knowledge to assess societal，health， safety， legal and cultural issues and the consequent responsibilities relevant to electronic information engineering practice and solutions to complex engineering problems.

7．**Environment and sustainability**： Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts in the field of electronic information engineering.

8．**Ethics**： Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice in the field of electronic information engineering.

9．**Individual and teamwork**： Function effectively as an individual， and as a member or leader in diverse teams and in multi-disciplinary settings.

10．**Communication**： Communicate effectively on complex engineering activities withthe engineering community and society at large， such as being able to comprehend and write effective reports and design

documentation， make effective presentations and give and receive clear instructions.

11．**Project management and finance：** Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work as a member and leader in a team， to manage projects and in multi-disciplinary environments.

12．**Life-long learning：** Recognize the need for， and have the preparation and ability to engage in，independent and life-long learning in the broadest context of technological change.

□培养目标实现矩阵

毕业要求与课程的对应矩阵表

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
1. **工程知识：**掌握本专业所需的数学、自然科学、工程基础和电子信息工程的专业知识，并能够将上述知识用于解决本专业所涉及领域的复杂工程问题。 **Engineering knowledge：** Master knowledge of mathematics， natural science，engineering fundamentals andan engineering specialisation required for electronic information engineering， and be able to apply them to the solution of complex engineering problems in the fields covered by this major.	1.1 能够运用数学、自然科学和工程基础知识定量描述复杂的电子信息工程问题。 Be able to use basic knowledge of mathematics， natural science and engineering to quantitatively describe complex electronic information engineering problems.quantitatively describes complex electronic information engineering problems	高等数学 A1，A2
		线性代数
		概率论与数理统计
		大学物理 B1，B2
	1.2 能够运用电子信息工程的基础知识对复杂的电子信息工程问题进行准确建模，满足实际工程设计的需要。 Beable to use the basic knowledge of electronic information engineering to accurately model complex electronic information engineering problems and meet the needs of practical engineering design	电路分析基础 A1，A2
		模拟电子技术
		数字电子技术
		信号与系统 B
	1.3 能够把电子信息工程的专业知识用于解决电子信息系统设计、信号处理等与本专业相关的复杂工程问题。Can apply professional knowledge of electronic information engineering to solve complex engineering problems related to electronic information system design，signal processing and so on.	电磁场与电磁波
		电子技术项目设计
		信号处理项目设计
		天线与微波技术
2. **问题分析：**能够应用数学、自然科学和电子信息工程科学的基本原理，识别、表达和有效地分解复杂的电子信息工程问题，并通过文献查阅等多种方式对其进行分析，以获得有效结论。 Problem analysis：Identify，formulate， research literature and analyse complex engineering problems in the field of electronic information engineering， reaching substantiated conclusions using first principles of mathematics， natural sciences and engineering sciences.	2.1 能够应用数学、自然科学的基本原理和工程科学基础知识对复杂的工程问题进行识别、表达和有效分解 Can apply basic principles of mathematics and natural science and basic knowledge of Engineering science to Identify， express and decompose complex engineering problems effectively.	复变函数与积分变换
		线性代数
		概率论与数理统计
		大学物理 B1，B2
		电路分析基础 A1，A2
	2.2 能够针对电子信息系统，识别和表达其复杂工程问题的关键环节和参数，并对有效分解后的问题进行分析。 Can identify and express the key links and parameters of complex engineering problems for electronic information systems， and analyze the problems after effective decomposition.	模拟电子技术
		数字电子技术
		电磁场与电磁波
		信号与系统 B
		随机信号分析

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
	2.3 通过图书馆资料现刊、数据库、网上检索等文献查阅方式开展研究，分析复杂电子信息工程问题，以获得有效结论。 Through the literature search of current library materials， databases， online retrieval and so on， carry out research and analyze the complex electronic information engineering problems in order to obtain effective conclusions.	电子信息工程专业生产实习
		电子信息工程专业综合设计
		电子信息工程专业毕业设计
3. **设计/开发解决方案：**能够针对电子信息工程领域的复杂工程问题提出解决方案，设计满足特定需求的电子信息系统和功能模块，并能够在设计环节中体现创新意识；能够综合考虑其对社会、健康、安全、法律、文化及环境的影响。 Design/development solutions：Design a reasonable solution for complex engineering problems in the field of electronic and information engineering， and design systems， components or processes that meet specified needs with appropriate consideration for public health， and safety， cultural， societal and environmental considerations	3.1 掌握设计/开发电子信息工程领域复杂工程问题解决方案所需要的设计概念、原理和方法。 Master the design concepts， principles and methods needed to design/develop solutions to complex engineering problems in the field of Electronic Information Engineering	数字信号处理
		随机信号分析
		现代通信原理
		天线与微波技术
		通信电路
	3.2 综合利用电子信息工程领域的专业知识，针对特定需求完成信息系统或其功能模块的设计。 Comprehensive utilization of professional knowledge in the field of electronic information engineering， to complete the design of information system or its functional modules for specific needs.	电磁场与电磁波实验
		模拟电子技术实验
		数字电子技术实验
		通信电路实验
		数字信号处理实验
	3.3 能够对系统设计方案的合理性进行论证，根据要求设计出满足性能指标的电子信息系统，并体现创新意识。 Can demonstrate the rationality of the system design scheme， design the electronic information system that meets the performance index according to the requirements， and embody the innovative consciousness.	电子技术项目设计
		信号处理项目设计
		电子信息工程专业综合设计
		电子信息工程专业毕业设计
	3.4 能够在系统方案设计环节中考虑社会、健康、安全、法律、文化以及环境等因素。 Ability to consider social， health， safety， legal， cultural and environmental factors in system design	思想道德修养与法律基础
		形势与政策
4. **研究：**能够基于科学原理并采用科学方法对电子信息工程领域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。 Investigation： Conduct investigations of complex problems using research-based knowledge in the field of electronic and information engineering and research methods including design of Experiment， analysis and interpretation of data， and synthesis of information to provide valid conclusions.	4.1 能够对电子信息工程领域的核心功能模块进行理论分析和仿真。 Can theoretically analyze and simulate the core function modules in the field of electronic information engineering.	数字信号处理
		现代通信原理
		计算机原理及应用
		通信电路
	4.2 能够针对电子信息工程领域的复杂工程问题设计实验方案，基于已构建的实验平台获取实验数据，并 能够对实验结果进行合理分析、解释。 Can design experimental scheme for complex engineering problems in the field of electronic information engineering， acquire experimental data based on the built experimental platform， and reasonably analyze and explain the experimental results.	模拟电子技术实验
		现代通信原理实验
		通信电路实验
		天线与微波技术实验
		数字信号处理实验
	4.3 能够针对复杂问题的多个子问题进行关联分析，找出冲突点，进行平衡，通过实验数据分析、信息综合等手段得到合理有效的结论。 Can analyze multiple sub-problems of complex problems， find conflict points， balance them， and get reasonable and effective conclusions by means of experimental data analysis and information synthesis.	电路分析基础 A1，A2 实验
		大学物理实验 A1，A2
		程序设计基础 B（C 语言）实验
		电子信息工程专业毕业设计
		计算机网络实验

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
5. **使用现代工具：**能够针对电子信息工程领域的复杂工程问题，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。 Modern tool usage： Create， select and apply appropriate techniques， resources and modern engineering and IT tools， including prediction and modeling， to complex engineering problems in the field of electronic information engineering， with an understanding of the limitations.	5.1 掌握基本的计算机操作和应用（至少掌握一种软件开发语言），并能够进行较复杂的程序设计。 Master basic computer operations and applications （at least one software development language）， and be able to carry out more complex programming.	计算机原理及应用 计算机网络 C 程序设计基础 B（C 语言） 工程训练 D
	5.2 通过掌握电子信息工程专业仪器和仿真软件的基本原理与操作方法，并运用现代信息工具，能够针对复杂的综合型工程设计问题进行有效的预测与模拟，并据此理解所使用工具的使用要求和局限性。 By mastering the basic principles and operation methods of electronic information engineering instruments and simulation software， and using modern information tools， we can effectively predict and simulate complex integrated engineering design problems， and understand the requirements and limitations of the tools used accordingly.	计算机原理及应用实验 现代通信原理实验 电子技术项目设计 信号处理项目设计 电子信息工程专业综合设计 电子信息工程专业毕业设计
6. **工程与社会：**能够基于工程相关背景知识进行合理分析，评价本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。 The engineer and society： Apply reasoning informed by contextual knowledge to assess societal， health， safety， legal and cultural issues and the consequent responsibilities relevant to electronic information engineering practice and solutions to complex engineering problems.	6.1 通过经历工程实践和多种实习过程，了解复杂工程问题的解决方案对社会、健康、安全、法律以及文化的影响。 Understanding the impact of solutions to complex engineering problems on society， health， safety， law and culture through engineering practice and various internship processes.	工程训练 D 电子信息工程专业认识实习 电子信息工程专业生产实习 电子信息工程专业毕业实习
	6.2 能够结合相关的工程知识，通过思政、人文、社科类课程学习的知识，综合分析和评价专业工程实践和复杂工程问题的解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。 Be able to integrate relevant engineering knowledge， through ideological and political， humanities， social science courses to learn knowledge， comprehensive analysis and evaluation of professional engineering practice and solutions to complex engineering problems on social，health，safety，legal and cultural impact，and understand the responsibilities to be undertaken.	思想道德修养与法律基础 形势与政策 电子信息工程专业毕业设计 创新创业基础
7. **环境和可持续发展：**基于环境保护和可持续发展的基本方针、政策和法律、法规，能够理解和评价针对电子信息工程领域复杂工程问题的专业工程实践对环境、社会可持续发展的影响。 Environment and sustainability ： Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts in the field of electronic information engineering.	7.1 了解环境保护和社会可持续发展的基本方针、政策及法律法规，能够正确认识针对电子信息工程领域复杂工程问题的专业工程实践对环境和社会的影响。 Understand the basic principles， policies， laws and regulations of environmental protection and sustainable social development. To correctly understand the environmental and social impacts of professional engineering practices on complex engineering problems in the field of Electronic Information Engineering.	形势与政策 电子信息工程专业认识实习
	7.2 能够评价电子信息产品的开发和应用对环境及社会可持续发展的影响。 Be able to evaluate the impact of the development and application of electronic information products on the sustainable development of the environment and society	电子信息工程专业生产实习 创新创业基础 电子信息工程专业毕业实习
8. **职业规范：**具有人文科学素养、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 具有人文社会科学素养，了解国情，理解社会主义核心价值观，树立正确的世界观、人生观和价值观。 Have humanities and Social Sciences literacy， understand the national conditions， understand the socialist core values， and establish a correct world outlook， outlook on life and values.	中国近现代史纲要 马克思主义基本原理概论 毛泽东思想和中国特色社会主义理论

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
Ethics： Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice in the field of electronic information engineering.	8.2 具有健康的身体和心理，具备履行社会责任的基础。 Have a healthy body and mind， have the basis of fulfilling social responsibility.	入学教育
		大学生心理健康教育
		体育俱乐部
		运动基础
		军事技能训练
	8.3 能够在电子信息工程领域所涉及的实践中理解并遵守工程职业道德和规范，履行责任。 Be able to understand and abide by engineering ethics and norms in the practice involved in the field of electronic information engineering and fulfill responsibilities	思想道德修养与法律基础
		电子信息工程专业认识实习
		电子信息工程专业生产实习
		电子信息工程专业毕业实习
9. **个人和团队：**能够在多学科背景的团队中承担个体、团队成员以及负责人的角色，能够听取其他团队成员的意见和建议，充分发挥团队协作的优势。 Individual and teamwork： Function effectively as an individual， and as a member or leader in diverse teams and in multi-disciplinary settings.	9.1 具备良好的团队协作意识，能主动与其他学科的成员共享信息，合作共事，独立完成团队分配的工作。 Have a good sense of teamwork， can actively share information with members of other disciplines， work together， and independently complete team assignment.	军事理论
		军事技能训练
		入学教育
		思想政治理论课实践教学
		创新创业基础
		工程训练 D
	9.2 能够胜任团队成员或负责人的角色，能在团队协作中听取其他团队成员的意见和建议，充分发挥团队协作的优势。 Be able to play the role of team member or leader， to listen to other team members'opinions and suggestions in team collaboration， to give full play to the advantages of team collaboration.	电子信息工程专业综合设计
		电子信息工程专业毕业设计
10. **沟通：**具备良好的表达和沟通能力，能够就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；并至少掌握一门外语，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。 Communication ： Communicate effectively on complex engineering activities withthe engineering community and society at large， such as being able to comprehend and write effective reports and design documentation ， make effective presentations and give and receive clear instructions.	10.1 具有良好的口头表达能力，能够清晰、有条理地表达自己的观点，掌握基本的报告、设计文稿的撰写技能。 Has good oral expression ability， can clearly and systematically express their views， master the basic report， design writing skills.	电子信息类新生研讨课
		电子技术项目设计
		信号处理项目设计
	10.2 至少掌握一门外语，具备一定的国际视野，并了解基本的国际文化礼仪。 Master at least one foreign language， have a certain international perspective， and understand the basic international cultural etiquette.	综合外语 A1
		综合外语 A2
		综合外语 A3
		综合外语 A4
	10.3 能够就复杂工程问题，综合运用口头、书面、报告、图表等多种形式与国内外业界同行及社会公众进行有效沟通和交流。Be able to effectively communicate and communicate with colleagues and the public at home and abroad on complex engineering issues， using oral， written， report， chart and other forms.	电子信息工程专业综合设计
		电子信息工程专业毕业设计
11. **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、跨职能环境中合理应用。	11.1 理解工程管理与经济决策的重要性，掌握工程管理的基本原理和常用的经济决策方法。 Understand the importance of engineering management and economic decision-making， master the basic principles of engineering management and commonly used economic decision-making methods.	经济管理概论
		马克思主义基本原理概论
		创新创业基础

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
Project management and finance：Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work as a member and leader in a team， to manage projects and in multi-disciplinary environments.	11.2 能够在多学科、跨职能环境中合理运用工程管理原理与经济决策方法。 Can reasonably use engineering management principles and economic decision-making methods in a multi-disciplinary and cross-functional environment.	电子信息工程专业综合设计
		电子信息工程专业毕业设计
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。 Life-long learning：Recognize the need for， and have the preparation and ability to engage in， independent and life-long learning in the broadest context of technological change.	12.1 理解自主学习的必要性，具有自主学习和终身学习的意识。 Understand the necessity of autonomous learning， with the awareness of autonomous learning and lifelong learning.	马克思主义基本原理
		创新创业基础
	12.2 掌握跟踪本专业学科前沿、发展趋势的基本方法和途径，能够通过文献查询、网络培训等多种渠道进行终身学习，以适应职业发展的需求。 To grasp the basic methods and ways to track the frontier and development trend of this major， lifelong learning can be carried out through literature search， network training and other channels to meet the needs of career development.	电子信息工程专业生产实习
		电子信息工程专业毕业实习
		电子信息工程专业毕业设计

毕业要求对培养目标的支撑关系

The Support Relation between Graduation Requirements and Educational Objectives

毕业要求 \ 培养目标	培养目标 1 Educational Objectives1	培养目标 2 Educational Objectives2	培养目标 3 Educational Objectives3	培养目标 4 Educational Objectives4
毕业要求 1 Graduation Requirements1		√		√
毕业要求 2 Graduation Requirements2		√		√
毕业要求 3 Graduation Requirements3		√		
毕业要求 4 Graduation Requirements4		√		
毕业要求 5 Graduation Requirements5		√		√
毕业要求 6 Graduation Requirements6	√			
毕业要求 7 Graduation Requirements7	√			
毕业要求 8 Graduation Requirements8	√			
毕业要求 9 Graduation Requirements9			√	

毕业要求 / 培养目标	培养目标 1 Educational Objectives1	培养目标 2 Educational Objectives2	培养目标 3 Educational Objectives3	培养目标 4 Educational Objectives4
毕业要求 10 Graduation Requirements10			√	
毕业要求 11 Graduation Requirements11			√	
毕业要求 12 Graduation Requirements12				√

□专业培养阶段教学进程计划表

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Total	理论学时 Theory	实践学时 Practice		
通识教育平台（必修） Basic Courses in General Education （Required）								
1	MY160080	马克思主义基本原理概论 Introduction to the basic principles of Marxism	3	48	48	0	3	
2	MY160280	思想政治理论课实践教学 The Practice Teaching of Ideological and Political Theory	2	32	0	32	3	
3	MY160110	毛泽东思想与中国特色社会主义理论体系概论 An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics	4	64	64	0	4	
4	MY190013	形势与政策 3 Situation and Policy 3	0.25	4	4	0	3	
5	MY190014	形势与政策 4 Situation and Policy 4	0.25	4	4	0	4	
6	MY190015	形势与政策 5 Situation and Policy 5	0.25	4	4	0	5	
7	MY190016	形势与政策 6 Situation and Policy 6	0.25	4	4	0	6	
8	MY190017	形势与政策 7 Situation and Policy 7	0.25	4	4	0	7	
9	MY190018	形势与政策 8 Situation and Policy 8	0.25	4	4	0	8	
10	WY160203	综合英语 3 Comprehesive English 3	2	32	32	0	3	
11	WY160104	综合英语 4 Comprehesive English 4	2	32	32	0	4	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Total	理论学时 Theory	实践学时 Practice		
12	JW190010	创新创业基础 Fundamentals of Innovation and Entrepreneurship	2	32	32	0	4	
小计 Subtotal			**16.5**	**264**	**232**	**32**		
学科（大类）教育平台（必修） Basic Courses in Discipline （Majors） Education （Elective）								
1	LX160011	大学物理实验 A1 University Physics Experiment A1	1.5	24	0	24	3	
2	LX160012	大学物理实验 A2 University Physics Experiment A2	1.5	24	0	24	4	
3	LX190020	概率论与数理统计 Probability and Mathematical Statistics	3	48	48	0	3	
4	LX190030	复变函数与积分变换 Functions of Complex Variable and Integral Transforms	3	48	48	0	3	
5	XX160032	电路分析基础 A2 Circuit Analysis Fundamentals A2	2	32	32	0	3	★
6	XX160042	电路分析基础实验 A2 Experiment of Circuit Analysis Fundamentals A2	0.5	8	0	8	3	
7	XX160880	数字电子技术 Digital Electronic Technology	3.5	56	56	0	4	★
8	XX160890	数字电子技术实验 Experiment of Digital Electronic Technology	1	16	0	16	4	
9	XX160700	模拟电子技术 Analog Electronic Technology	3.5	56	56	0	3	★
10	XX160710	模拟电子技术实验 Experiment of Analog Electronic Technology	1	16	0	16	3	
11	XX161170	信号与系统 B Signals and Systems B	4	64	64	0	4	★
12	XX160610	计算机原理及应用 Computer Principles and Applications	3	48	48	0	5	
13	XX160620	计算机原理及应用实验 Experiment of Computer Principles and Applications	0.5	8	0	8	5	
14	XX160140	电磁场与电磁波 Electromagnetic Field and Electromagnetic Wave	2.5	40	40	0	5	
15	XX160150	电磁场与电磁波实验 Experiment of Electromagnetic Field and Electromagnetic Wave	0.5	8	0	8	5	
小计 Subtotal			31	496	392	104		

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Total	理论学时 Theory	实践学时 Practice		
专业教育平台（必修） Professional Education （Elective）								
1	JK160460	计算机网络 C Computer Networks C	2.5	40	40	0	3	
2	JK160490	计算机网络实验 Experiment of Computer Networks	1	16	0	16	3	
3	XX160400	电子技术课程设计 Course Design of Electronic Technology	2	32	0	32	4	★
4	XX160440	电子信息工程专业生产实习 Production Practice of Electronic Information Engineering	2	32	0	32	4	
5	XX161770	通信电路 communication Circuit	3	48	48	0	5	★
6	XX161790	通信电路实验 Experiment of communication Circuit	1	16	0	16	5	
7	XX160910	数字信号处理 Digital Signal Processing	2.5	40	40	0	5	
8	XX190630	数字信号处理实验 Experiment of Digital Signal Processing	0.5	8	0	8	5	
9	XX160930	随机信号分析 Stochastic Signal Analysis	2.5	40	40	0	5	
10	XX190660	天线与微波技术 Antenna and Microwave Technology	2.5	40	40	0	5	
11	XX190670	天线与微波技术实验 Experiment of Antenna and Microwave Technology	0.5	8	0	8	5	
12	XX161880	现代通信原理 Modern Communication Principles	4	64	64	0	6	
13	XX161140	现代通信原理实验 Experiment of Modern Communication Principles	1	16	0	16	6	
14	XX190910	信号处理项目设计 Design of Signal Processing Project	2	32	0	32	6	
15	XX160450	电子信息工程专业综合设计 Comprehensive Design of Electronic Information Engineering	3	48	0	48	7	★
16	XX160420	电子信息工程专业毕业实习 Graduation Practice of Electronic Information Engineering	3	48	0	48	8	
17	XX160410	电子信息工程专业毕业设计 Graduation Design of Electronic Information Engineering	12	192	0	192	8	
小计 Subtotal			45	720	272	448		

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Total	理论学时 Theory	实践学时 Practice		
个性化培养平台 Charateristic Education Course								
通识选修课 General Education（Elective）								
1	自选项目	素质选修课 Quality Elective Course	3	48	学生需至少选择 3 学分，1-8 学期开设			
2	自选项目	经济管理/工程管理二选一 Economic management or engineering management	2	32	经济管理/工程管理二选一			
3	自选项目	全人教育微学会 Micro credit of Holistic Education	3	48	学术报告/科研项目/创新创业项目/科技竞赛等，1-8 学期开设			
小计 Subtotal			8	128				
信息处理技术方向（必选） Direction of Information Processing Technolog（required）								
1	XX190330	电子工程技术基础实验 Experiment of Introduction to Electronics Engineering Technology	1.5	24	0	24	3	
2	XX190320	电子工程技术基础 Introduction to Electronics Engineering Technology	1.5	24	24	0	3	
3	XX190040	EDA 与软件技术项目设计 Design of Software Technology and EDA Project	2	32	0	32	5	
4	XX190640	数字音视频处理技术 Digital Audio and Video Processing Technology	2	32	32	0	6	
5	XX190650	数字音视频处理技术实验 Experiment of Digital Audio and Video Processing Technology	1	16	0	16	6	
6	XX190050	FPGA 技术 FPGA Technology	1.5	24	24	0	6	
7	XX190060	FPGA 技术实验 Experimentof FPGA Technology	1.5	24	0	24	6	
小计 subtotal			11	176	80	96		
射频与微波技术方向（必选） Direction of RF and Microwave Technology（required）								
1	XX190680	通信电路项目设计 Design of Communication Circuit Project	2	32	0	32	5	
2	XX190220	电磁兼容导论 Introduction to Electromagnetic Compatibility	2	32	32	0	6	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Total	理论学时 Theory	实践学时 Practice		
3	XX190230	电磁兼容导论实验 Experiment of Introduction to Electromagnetic Compatibility	1	16	0	16	6	
4	XX190740	微波/射频电路 Microwave/Radio-Frequency Circuit	2	32	32	0	6	
5	XX190750	微波/射频电路实验 Experiment of Microwave/Radio-Frequency Circuit	1.5	24	0	24	6	
6	XX190420	雷达与遥测技术 Radar and Remote Telemetry	2	32	32	0	7	
7	XX190430	雷达与遥测技术实验 Experiment of Radar and Remote Telemetry	0.5	8	0	8	7	
小计 subtotal			11	176	96	80		
任选课（9 学分） **Optional Course（9 credits）** **注：** 二个方向课程组里的课也可以作为相互的选修课；理论课程和相应的实验课程需要一起选								
1	XX160750	软件技术基础 Software Technology Foundation	2	32	32	0	3	
2	XX190530	软件技术基础实验 Experiment of Software Technology Foundation	0.5	8	0	8	3	
3	XX190070	JAVA 程序设计及应用 JAVAProgrammingandApplication	1.5	24	24	0	4	
4	XX190080	JAVA 程序设计及应用实践 Pratice of JAVAProgrammingandApplication	1.5	24	0	24	4	
5	XX160380	电子测量 Electronic Measurement	2.5	40	32	8	5	
6	XX160780	射频识别基础 Radio Frequency Identification	2.5	40	32	8	6	
7	XX190180	单片机基础与实践 SCM Basis and Practice	1.5	24	24	0	1	
8	XX190190	单片机基础与实践课程实验 Experiment of SCM Basis and Practice	1	16	0	16	1	
9	XX190490	嵌入式系统设计 B Embedded System Design B	1.5	24	24	0	6	
10	XX190500	嵌入式系统设计 B 实验 Experiment of Embedded System Design B	1.5	24	0	24	6	
11	XX160850	视频信息处理与传输 Video Information Processing and Transmission	3	48	40	8	6	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Total	理论学时 Theory	实践学时 Practice		
12	XX190030	DSP 技术 DSP Technology	2.5	40	24	16	7	
13	XX161830	无线电测向综合技术 Radio Direction Finding Integrated Technology	2	32	4	28	7	
14	XX190550	软件无线电技术 Soft-Defined Radio Technology	2	32	32	0	6	
15	XX190560	软件无线电技术实验 Experiment of Soft-Defined Radio Technology	1	16	0	16	6	
小计			26.5	424	268	156		

□集中实践环节

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	实践学时 Practice Hours	开课学期 Semester	学位课 Degree Course
1	BW190010	军事技能训练 Military Skill Training	0.5	112	1	
2	TY190010	运动基础 Sports Fundamental	1	28	1	
3	JK160170	程序设计基础 B（C 语言）实验 Experiment of C Language Programming Foundation	1	16	1	
4	LX160011	大学物理实验 A1 University Physics Experiment A1	1.5	24	1	
5	XX190350	电子信息类专业认识实习 Cognition Practice of Electronic Information	1	16	1	
6	自选项目	体育俱乐部 Sports Club	2	64	1-7	
7	GC160040	工程训练 D Engineering Training D	2	32	2	
8	XX160041	电路分析基础实验 A1 Experiment of Circuit Analysis Fundamentals A1	0.5	8	2	
9	LX160012	大学物理实验 A2 University Physics Experiment A2	1.5	24	2	
10		体育选修 Sports Elective	2	64	2-7	
11	MY160280	思想政治理论课实践教学 The Practice Teaching of Ideological and Political Theory	2	32	1-8	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	实践学时 Practice Hours	开课学期 Semester	学位课 Degree Course
12	XX160042	电路分析基础实验 A2 Experiment of Circuit Analysis Fundamentals A2	0.5	8	3	
13	XX160710	模拟电子技术实验 Experiment of Analog Electronic Technology	1	16	3	
14	JK160490	计算机网络实验 Experiment of Computer Network	1	16	3	
15	XX160150	电磁场与电磁波实验 Experiment of Electromagnetic Field and Electromagnetic Wave	0.5	8	4	
16	XX160890	数字电子技术实验 Experiment of Digital Electronic Technology	1	16	4	
17	XX160400	电子技术课程设计 Course Design of Electronic Technology	2	32	4	
18	XX190670	天线与微波技术实验 Experiment of Antenna and Microwave Technology	0.5	8	5	
19	XX160440	电子信息工程专业生产实习 Production Practice of Electronic Information Engineering	2	32	4	
20	XX160620	计算机原理及应用实验 Experiment of Computer Principles and Applications	0.5	8	5	
21	XX190630	数字信号处理实验 Experiment of Digital Signal Processing	0.5	8	5	
22	XX161770	通信电路实验 Experiment of communication Circuit	1	16	5	
23	XX161140	现代通信原理实验 Experiment of Modern Communication Principles	1	16	6	
24	XX190910	信号处理项目设计 Design of Signal Processing Project	2	32	6	
25	XX160450	电子信息工程专业综合设计 Comprehensive Design of Electronic Information Engineering	3	48	7	
26	XX160420	电子信息工程专业毕业实习 Graduation Practice of Electronic Information Engineering	3	48	8	
27	XX160410	电子信息工程专业毕业设计 Graduation Design of Electronic Information Engineering	12	192	8	
28		专业选修实验 Specialized Elective Experiment	6	96	6-8	
小计 Subtotal			52.5	1020		

□核心课程和学位课程（Core Courses and Diploma Courses）

核心课程：高等数学 A1、高等数学 A2、线性代数、概率论与数理统计、复变函数与积分变换、大

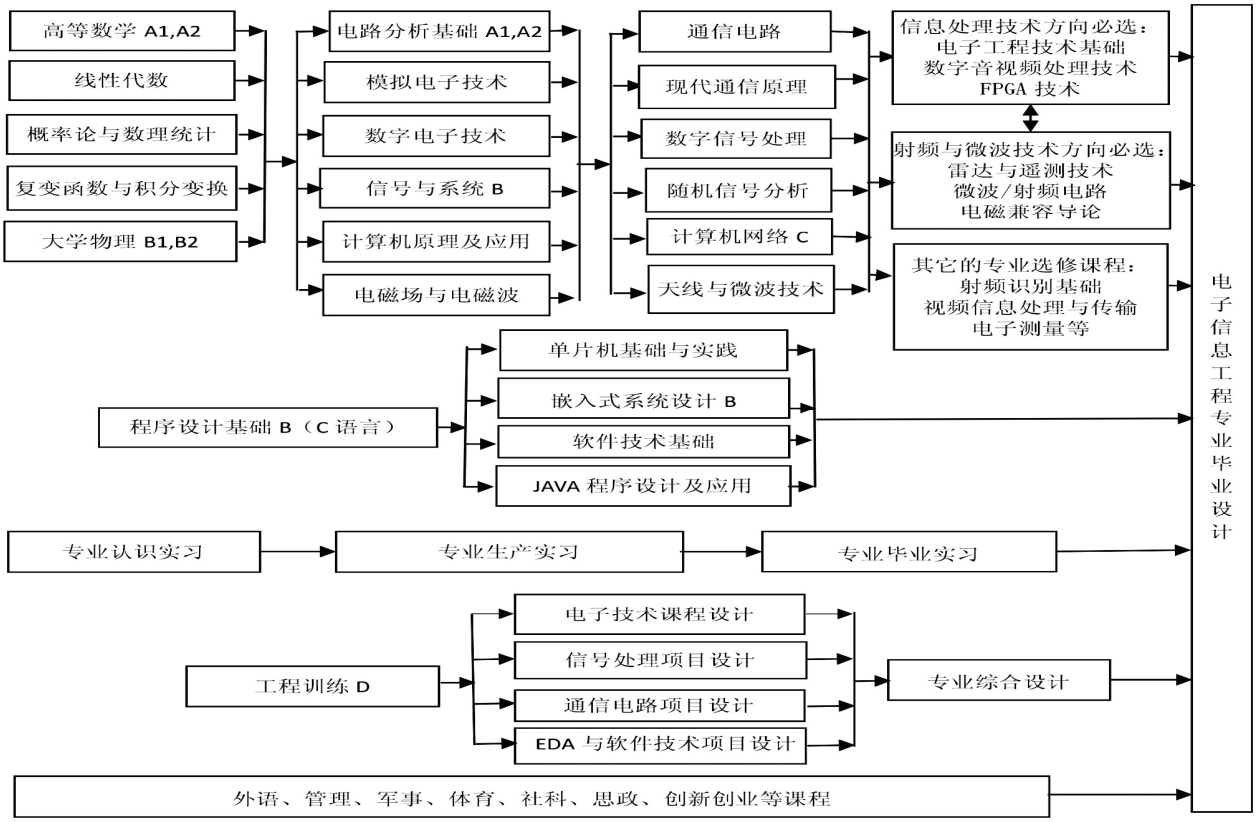
学物理 B1、大学物理 B2、工程训练 D、电路分析基础 A1、电路分析基础 A2、模拟电子技术、数字电子技术、信号与系统 B、电磁场与电磁波、通信电路、数字信号处理、现代通信原理、计算机原理及应用、程序设计基础 B（C 语言）、随机信号分析、计算机网络 C、天线与微波技术等。

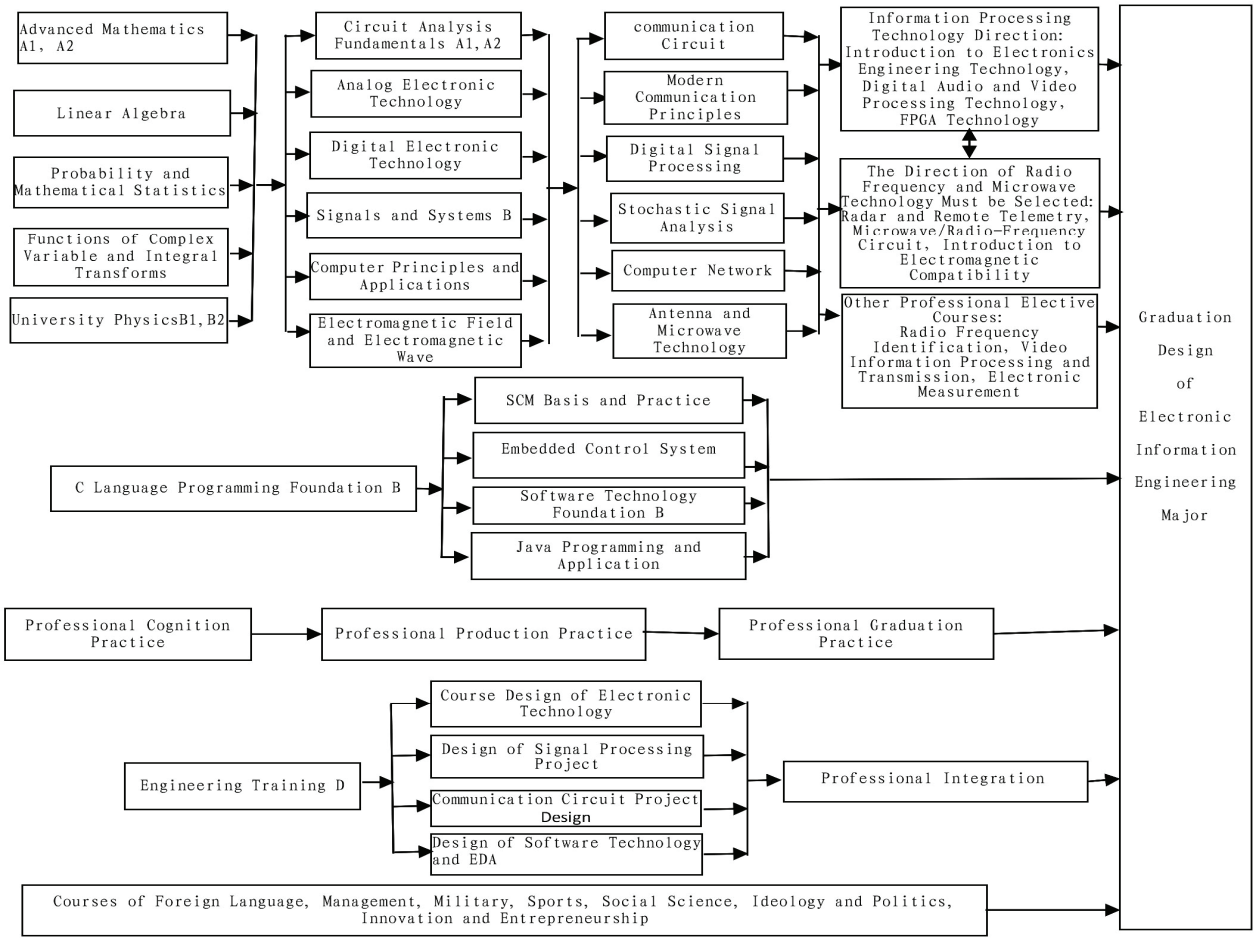
学位课程：综合英语 2、程序设计基础 B（C 语言）、高等数学 A1、电路分析基础 A 1、电路分析基础 A 2、数字电子技术、模拟电子技术、信号与系统 B、通信电路、电子技术项目设计、电子信息工程专业综合设计。

Core Courses：Advanced Mathematics A1，Advanced Mathematics A2，Linear Algebra，Probability and Mathematical Statistics，Functions of Complex Variable and Integral Transforms，University Physics B1，University Physics B2，Engineering Training D，Circuit Analysis Fundamentals A1，Circuit Analysis Fundamentals A2，Analog Electronic Technology，Digital Electronic Technology、Signals and Systems，Electromagnetic Field and Electromagnetic Wave，communication Circuit，Digital Signal Processing，Modern Communication Principles，Computer Principles and Applications，Language Programming Foundation C，Stochastic Signal Analysis，Computer Network，Antenna and Microwave Technology.

Diploma Courses： Comprehesive English 2， Language Programming Foundation C，Advanced Mathematics A1，Circuit Analysis Fundamentals A1，Circuit Analysis Fundamentals A2，Digital Electronic Technology，Analog Electronic Technology，Signals and Systems，Communication Circuit，Design of Electronic Technology，Comprehensive Design of Electronic Information Engineering.

□课程体系结构图（The Curriculum Chart）


高等数学 A1,A2
线性代数
概率论与数理统计
复变函数与积分变换
大学物理 B1,B2
电路分析基础 A1,A2
模拟电子技术
数字电子技术
信号与系统 B
计算机原理及应用
电磁场与电磁波
通信电路
现代通信原理
数字信号处理
随机信号分析
计算机网络 C
天线与微波技术
信息处理技术方向必选：
电子工程技术基础
数字音视频处理技术
FPGA 技术
射频与微波技术方向必选：
雷达与遥测技术
微波/射频电路
电磁兼容导论
其它的专业选修课程：
射频识别基础
视频信息处理与传输
电子测量等
电子信息工程专业毕业设计
单片机基础与实践
嵌入式系统设计 B
软件技术基础
JAVA 程序设计及应用
程序设计基础 B（C 语言）
专业认识实习
专业生产实习
专业毕业实习
电子技术课程设计
信号处理项目设计
通信电路项目设计
EDA 与软件技术项目设计
工程训练 D
专业综合设计
外语、管理、军事、体育、社科、思政、创新创业等课程


Advanced Mathematics A1, A2
Linear Algebra
Probability and Mathematical Statistics
Functions of Complex Variable and Integral Transforms
University PhysicsB1,B2
Circuit Analysis Fundamentals A1,A2
Analog Electronic Technology
Digital Electronic Technology
Signals and Systems B
Computer Principles and Applications
Electromagnetic Field and Electromagnetic Wave
communication Circuit
Modern Communication Principles
Digital Signal Processing
Stochastic Signal Analysis
Computer Network
Antenna and Microwave Technology
Information Processing Technology Direction: Introduction to Electronics Engineering Technology, Digital Audio and Video Processing Technology, FPGA Technology
The Direction of Radio Frequency and Microwave Technology Must be Selected: Radar and Remote Telemetry, Microwave/Radio-Frequency Circuit, Introduction to Electromagnetic Compatibility
Other Professional Elective Courses: Radio Frequency Identification, Video Information Processing and Transmission, Electronic Measurement
Graduation Design of Electronic Information Engineering Major
SCM Basis and Practice
Embedded Control System
Software Technology Foundation B
Java Programming and Application
C Language Programming Foundation B
Professional Cognition Practice
Professional Production Practice
Professional Graduation Practice
Course Design of Electronic Technology
Design of Signal Processing Project
Communication Circuit Project Design
Design of Software Technology and EDA
Engineering Training D
Professional Integration
Courses of Foreign Language, Management, Military, Sports, Social Science, Ideology and Politics, Innovation and Entrepreneurship

□学制及学分要求（Duration of Schooling and Credit Requirements）

1. 学制：（Length of Schooling）：4 年（Four years）

2. 学分要求：学生在校期间必须修满本方案规定的 170 学分方能毕业，其中，各环节的具体学分要求如下表。The students must complete 170 credits stipulated in this program before theycan graduate from this major. Among them， the specific credit requirements for each link are as follows.

	通识教育平台 General Education Courses	学科（大类）教育平台 Discipline Coureses	专业教育平台 Major Courses	个性化培养平台 Customized Education Courses	总学分 Total Credits
必修课 Required Courses	35.5	61.5	45	/	170
选修课 SelectiveCourses	/	/	/	28	

□授予学位（Degree Conferred）

毕业时符合学位授予条件的学生，授予工学学士学位。A bachelor's degree in engineering shall be awarded to those students who meet the conditions for conferring degrees upon graduation.

□说明（Notes）

各学期应修学分建议（Credit Allotment for Each Semester）

学期 Semester	一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th	学分合计 Total
建议应修学分 Credits	25	25	24	24	24	23	10	15	170

通信工程专业培养方案

Undergraduate Program for the Major of Communication Engineering

专业负责人：秦明伟　　主管院长：姚远程　　院学术委员会主任：邹传云

Director of Specialty：Qin Mingwei　**Executive Dean**：Yao Yuancheng　**Academic Committee Director**：Zou Chuanyun

□培养目标（Educational Objectives）

本专业旨在培养品德优良，身心健康，**基础理论扎实，专业宽厚，工程实践能力突出**，视野开阔，具有终身学习意识、责任意识、科学精神和人文素养，德智体美劳全面发展，**能够适应“电子信息+”和泛信息化时代**，可在军、民等通信工程相关领域从事设计、开发、调测、运维、工程项目管理等工作，服务区域社会经济发展的复合型人才。

学生毕业就业 **5** 年左右，经过自身学习和行业锻炼，预期达到下列目标：

■目标 1 专业能力：能够进行通信工程研究、产品开发、工艺与设备设计和生产管理。（由毕业要求 1、2、3、4、5、11 支撑）

■目标 2 职业素养：具有良好的人文社会科学素养、社会责任感、法律意识和道德水准。（由毕业要求 6、7、8 支撑）

■目标 3 终身学习：有意愿创新实践，能够通过自主学习和终身学习拓展自己的知识和能力。（由毕业要求 6、7、10、12 支撑）

■目标 4 交流合作：具有良好的交流能力、合作精神以及组织管理能力，能够成为团队的骨干或者领导。（由毕业要求 9、10、11 支撑）

The major aims to train the healthy and good-moralitied talents with a solid theoretical foundation and expertise. They should have outstanding engineering practice ability and broad vision. Besides， they should also have the lifelong learning awareness， responsibility awareness， scientific spirit and humanistic quality with the comprehensive development in morality， intelligence， physical fitness， beauty and labor. The talents can adapt to the era of “electronic information +” and pan-informatization. They can work on designing， developing， survey， maintenance， engineering project management in military and civilian communication projects， and serve social and economic development in different regions.

Students are expected to achieve the following goals through their own learning and industry training after their employment of five years：

Objective 1 Professional ability： They are able to conduct communication engineering research， product development， process and equipment designing and production management. （Supported by graduation requirements 1， 2， 3， 4， 5， 11）

Objective 2 Professional accomplishment： They can possess good humanities and social sciences accomplishment， sense of social responsibility， legal awareness and moral standards.（Supported by graduation requirements 6， 7 and 8）

Objective 3 Lifelong learning： They are willing to innovate， practice and expand their knowledge and ability through self-learning and lifelong learning.（Supported by graduation requirements 6， 7， 10， 12）

Objective 4 Exchange and cooperation：They should have good communication skills，cooperation spirit and organizational management ability， and become the backbone or leader of the team.（Supported by graduation requirements 9， 10 and 11）

□毕业要求（Graduation Requirements）

通信工程专业学生应德智体美劳全面发展，知识、能力、素质同步提高。学生应具有扎实的数学、自然科学、人文社会科学和通信工程基础理论，宽厚的通信工程专业知识和突出的工程实践能力；具有良好的职业素养、团队合作能力和终身学习意识，适应“电子信息+”和泛信息化时代，服务区域社会经济发展。为此，毕业生应获得以下几方面的知识、能力和素养：

1. 工程知识——能够将数学、自然科学、工程基础和专业知识用于解决通信工程相关领域的复杂工程问题（支撑培养目标 1）

2. 问题分析——能够应用数学、自然科学和通信工程专业的基本原理与方法，识别、表达并通过文献研究分析通信工程相关领域的复杂工程问题，以获得有效结论。（支撑培养目标 1）

3. 设计/开发解决方案——能够针对通信工程领域的复杂问题提供解决方案，设计/开发满足特定需求的通信系统、单元（部件）或工艺流程，并能够体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。（支撑培养目标 1）

4. 研究——能够基于科学原理并采用科学方法对通信工程领域复杂问题进行研究，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。（支撑培养目标 1）

5. 使用现代工具——能够针对通信工程领域复杂问题，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。（支撑培养目标 1）

6. 工程与社会——能够基于通信工程领域相关背景知识进行合理分析，评价专业工程实践和复杂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。（支撑培养目标 2 和 3）

7. 环境和可持续发展——能够理解和评价针对通信工程领域复杂问题的工程实践对环境、社会可持续发展的影响。（支撑培养目标 2 和 3）

8. 职业规范——具有人文社会科学素养、社会责任感，能够在通信工程实践中理解并遵守工程职业道德和规范，履行责任。（支撑培养目标 2）

9. 个人和团队——具有团队协作意识，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。（支撑培养目标 4）

10. 沟通——能够就通信工程中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

写相关报告和设计文稿、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。（支撑培养目标 3 和 4）

11. 项目管理——理解通信工程管理原理与经济决策方法，并能在多学科环境中应用。（支撑培养目标 1 和 4）

12. 终身学习——了解本专业前沿发展现状和趋势，具有终身学习意识和适应通信工程技术发展的能力。（支撑培养目标 3）

Students majoring in communication engineering should develop comprehensively in morality， intelligence， physical fitness， beauty and labor， and improve their knowledge， ability and quality simultaneously. What's more， they should have solid basic theories of mathematics， natural sciences， humanities and social sciences and communication engineering. They should have broad professional knowledge of communication engineering and outstanding engineering practice ability. They should have good professional quality， team cooperation ability and lifelong learning consciousness， adapt to the era of "electronic information +" and pan-informatization， and serve social and economic development in different regions. To this end， graduates should acquire the following knowledge， abilities and accomplishments：

1. Engineering knowledge： Students are able to apply mathematics， natural sciences， engineering foundations and expertise to solve complex engineering problems in related fields of communication engineering （Supporting training objective 1）

2. Problem analysis： Students can identify， express and analyze complex engineering problems in related fields of communication engineering by applying the basic principles and methods of mathematics， natural sciences and communication engineering， so as to obtain effective conclusions. （Supporting training objective 1）

3. Design / development solutions： Students can provide solutions to complex problems in the field of communication engineering， design / develop communication systems， units （components） or processes that meet specific needs， and reflect innovative awareness， taking into account social， health， safety， legal， cultural and environmental factors. （Supporting training objective 1）

4. Research： Students can adopt scientific methods based on scientific principles to study complex problems in the field of communication engineering， including designing experiments， analyzing and interpreting data， and obtaining reasonable and effective conclusions through information synthesis. （Supporting training objective 1）

5. Using modern tools： For complex problems in the field of communication engineering， students can develop， select and use appropriate technologies， resources， modern engineering tools and information technology tools， including prediction and simulation of complex engineering problems， and they can also understand their limitations. （Supporting training objective 1）

6. Engineering and society： Students are able to conduct a reasonable analysis based on relevant

background knowledge in the field of communication engineering， evaluate the impact of professional engineering practices and complex problem solutions on society， health， safety， law and culture， and they can also understand the responsibilities to be undertaken. （Supporting training objectives 2 and 3）

7. Environment and sustainable development： Students are able to understand and evaluate the impact of engineering practices on the sustainable development of the environment and society for complex problems in the field of communication engineering. （Supporting training objectives 2 and 3）

8. Professional norms： With humanities and social sciences literacy， sense of social responsibility， students can understand and abide by engineering professional ethics and norms in the practice of communication engineering， and fulfill their responsibilities. （Supporting training objective 2）

9. Individuals and teams： Students should have a sense of teamwork and can play the roles of individuals， team members and leaders in a multidisciplinary team. （Supporting training objective 4）

10. Communication： Students can communicate effectively with industry counterparts and the public on complex engineering issues in communication engineering， including writing relevant reports and design manuscripts， presenting statements， expressing clearly or responding to instructions， and communicate in cross-cultural context with a certain international perspective. （Supporting objectives 3 and 4）

11. Project management： Students are able to understand the principles of communication engineering management and economic decision-making methods which can be applied in a multidisciplinary environment. （Supporting objectives 1 and 4）

12. Lifelong learning： Student should understand the current situation and trend of the frontier development of this major， with a sense of lifelong learning and the ability to adapt to the development of communication engineering technology. （Supporting training objective 3）

□培养目标实现矩阵（毕业要求与课程的对应矩阵）Realization Matrix of Educational Objectives （Graduation Requirements by Courses）

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
1.工程知识——能够将数学、自然科学、工程基础和专业知识用于解决通信工程相关领域的复杂工程问题 **1. Engineering knowledge：** Mathematics， natural science， engineering foundation and expertise can be used to solve complex engineering problems in related fields of communication engineering.	**1.1** 能够用数学、自然科学的语言对工程问题进行初步描述。 1.1 The engineering problems can be described preliminarily in the language of mathematics and natural science.	高等数学 A 概率论与数理统计 线性代数 复变函数与积分变换 大学物理 B 大学物理实验 A
	1.2 能够将工程基础知识应用于信号、电路与电子系统的计算与分析。 1.2 Basic engineering knowledge can be applied to the calculation and analysis of signals， circuits and electronic systems.	电路分析基础 A 模拟电子技术 数字电子技术 信号与系统 电磁场与电磁波

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
	1.3 能够将专业基础知识应用于通信系统设计方案/模型的建模、计算与验证。 1.3 Professional knowledge can be applied to the modeling, calculation and verification of communication system design schemes / models.	现代通信原理 数字信号处理 Matlab 通信建模与仿真 计算机原理及应用 计算机网络 软件技术基础/无线与移动通信系统
	1.4 能够将通信工程专业知识用于解决通信系统或单元等相关领域的复杂工程问题。 1.4 Communication engineering expertise can be used to solve complex engineering problems in related fields such as communication systems or units.	通信电路 电子技术课程设计 软件技术项目设计 处理器技术项目设计 通信技术项目设计 软件无线电技术/网络互联技术
2.问题分析——能够应用数学、自然科学和通信工程专业的基本原理与方法，识别、表达并通过文献研究分析复杂工程问题，以获得有效结论。 **2. Problem analysis：** The basic principles and methods of mathematics, natural science and communication engineering can be applied to identify, express and analyze complex engineering problems through literature research in order to obtain effective conclusions.	**2.1** 能够运用数学、自然科学的相关知识技术识别、表达工程技术问题。 2.1 Relevant knowledge and technology of mathematics and natural science can be applied to identify and express engineering technical problems.	复变函数与积分变换 电路分析基础 A 模拟电子技术 数字电子技术 信号与系统
	2.2 能够运用通信工程基本原理及专业知识识别、表达工程技术问题。 2.2 Being able to identify and express engineering technical issues by using basic principles and expertise of communication engineering.	通信电路 计算机原理及应用 计算机网络 现代通信原理 电磁场与电磁波 数字信号处理 软件无线电技术/网络互联技术
	2.3 能够运用通信工程专业知识，并通过查阅文献，研究分析复杂工程问题，提出对策，获得有效解决思路及结论。 2.3 Being able to use professional knowledge of communication engineering, and through consulting literature, study and analyze complex environmental engineering problems, put forward countermeasures, and obtain effective solutions and conclusions.	通信技术项目设计 通信工程专业项目实训 通信工程专业毕业设计
3.设计/开发解决方案——能够针对通信工程领域的复杂问题提供解决方案，设计满足特定需求的通信系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。 **3. Design / development solutions：** Being able to provide solutions to complex problems in the field of communication engineering, design communication systems, units （components） or processes to meet specific needs, and embody innovative awareness in the design process, taking into account social, health, safety, legal, cultural and	**3.1** 熟悉通信工程设计和产品开发全周期、全流程的基本设计/开发方法和技术，了解影响设计目标和技术方案的各种因素。 3.1 Being familiar with the basic design / development methods and technologies of design and product development cycle and process of communication engineering, and understanding the various factors affecting the design objectives and technical solutions.	FPGA 技术/嵌入式系统设计 B C++程序设计及应用/JAVA 程序设计及应用 软件技术基础/无线与移动通信系统
	3.2 能够针对特定需求，选择合理化解决方案，完成单元（部件）的设计。 3.2 Being able to select reasonable solutions to meet specific needs and complete the design of units （components）.	电子技术课程设计 软件技术项目设计 处理器技术项目设计 通信技术项目设计
	3.3 能够针对特定需求，进行系统或工艺流程设计，在设计中体现创新意识。 3.3 According to the specific needs, the system or process design can be carried out, reflecting the innovative	通信工程专业项目实训 创新创业实践系列项目 创新思维与方法

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
environmental factors.	consciousness in the design.	
	3.4 能够在设计中考虑安全、健康、法律、文化及环境等制约因素。 3.4 Safety， health， legal， cultural and environmental constraints can be considered in the design.	形势与政策 1-4 思想道德修养与法律基础 通信工程专业毕业设计
4.研究——能够基于科学原理并采用科学方法对通信工程领域复杂问题进行研究，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. Research： Being able to study complex problems in the field of communication engineering based on scientific principles and scientific methods， including designing experiments， analyzing and interpreting data， and obtaining reasonable and effective conclusions through information synthesis.	**4.1** 能够理解实验目标并实施实验，对自然科学、电路、电子器件等相关物理现象、电子电气特性进行研究和实验分析。 4.1 Being able to understand the experimental objectives， implement the experiment， study and analyze the physical phenomena， electronic and electrical characteristics of natural sciences， circuits， electronic devices， etc.	大学物理实验 A 电路分析基础实验 A 模拟电子技术实验 数字电子技术实验 电磁场与电磁波实验
	4.2 能够针对通信工程专业知识的相关原理，开展研究与仿真、实验，分析实验结果。 4.2 Being able to carry out research， simulation and experiment according to the relevant principles of communication engineering expertise， and analyze the experimental results.	计算机原理及应用实验 通信电路实验 计算机网络实验 现代通信原理实验 Matlab 通信建模与仿真实验 数字信号处理实验 软件技术基础/无线与移动通信系统
	4.3 针对通信工程复杂工程问题，能够设计合理的实验方法、构建实验系统、开展实验，并对实验数据进行分析、解释和处理，以给出有效结论。 4.3 For the complex engineering problems of communication engineering， being able to design reasonable experimental methods， construct experimental systems， carry out experiments， and analyze， interpret and process experimental data to give effective conclusions.	C++程序设计及应用实验/JAVA 程序设计及应用实践 软件无线电技术实验/网络互联技术实验 通信工程专业毕业设计
5.使用现代工具——能够针对通信工程领域复杂问题，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，包括对复杂问题的预测与模拟，并能够理解其局限性。 **5. Using modern tools：** Being able to develop， select and use appropriate technologies， resources， modern engineering tools and information technology tools for complex problems in the field of communication engineering， including prediction and simulation of complex problems， and understand their limitations.	**5.1** 能够正确使用软件工具、仪器仪表，进行通信工程中基本单元的软件设计、电路绘图、仿真与测试。 5.1 Being able to correctly use software tools， instruments to carry out software design， circuit drawing， simulation and testing of basic units in communication engineering.	程序设计基础（C 语言） 程序设计基础实验（C 语言） 电路分析实验 数字电子技术实验 模拟电子技术实验 现代通信原理实验 电磁场与电磁波实验 软件技术基础/无线与移动通信系统
	5.2 能够选择与使用恰当的微处理器、开发环境、仿真平台，用于通信工程中复杂工程问题的设计、仿真、预测与模拟，并理解其局限性； 5.2 Being able to select and use appropriate microprocessors， development environment and simulation platform to design， simulate， predict and simulate complex engineering problems in communication engineering， and understand their limitations.	电子技术课程设计 Matlab 通信建模与仿真实验 C++程序设计及应用/JAVA 程序设计及应用 FPGA 技术/嵌入式系统设计 B 软件无线电技术实验/网络互联技术实验 软件技术项目设计 处理器技术项目设计
	5.3 能够利用信息技术工具检索，整理主要信息，找出复杂工程问题的解决思路。 5.3 Being able to use information technology tools to retrieve， collate the main information and find solutions to complex engineering problems.	通信工程专业项目实训 通信工程专业毕业设计

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
6.工程与社会——能够基于通信工程领域相关背景知识进行合理分析，评价专业工程实践和复杂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. Engineering and society：** Being able to conduct rational analysis based on relevant background knowledge in the field of communication engineering， evaluate the impact of professional engineering practices and solutions to complex problems on society， health， safety， law and culture， and understand the responsibilities to be undertaken.	**6.1** 熟悉与环保相关的技术标准、产业政策和法律法规。 6.1 Being familiar with technical standards， industrial policies，laws and regulations related to environmental protection.	入学教育 思想道德修养与法律基础、 形势与政策 电子信息类专业新生研讨课 电子信息类专业认识实习
	6.2 能正确认识和评价通信工程问题解决方案与实践活动对客观世界和社会的影响，理解应承担的社会责任。 6.2 Being able to correctly understand and evaluate the impact of solutions and practices of communication engineering problems on the objective world and society， and understand the social responsibilities that should be undertaken.	工程训练 D 创新创业基础 通信工程专业生产实习 通信工程专业毕业实习
7.环境和可持续发展——能够理解和评价针对通信工程领域复杂问题的工程实践对环境、社会可持续发展的影响。 **7. Environment and sustainable development：** Being able to understand and evaluate the impact of engineering practices on the sustainable development of the environment and society for complex problems in the field of communication engineering.	**7.1** 理解复杂通信工程问题的工程实践对环境保护和可持续发展的影响。 7.1 Understand the impact of engineering practice on environmental protection and sustainable development of complex communication engineering problems.	电子信息类新生研讨课 电子信息类专业认识实习 通信工程专业生产实习
	7.2 能够评价复杂通信工程问题的工程实践对环境、社会可持续发展的影响。 7.2 Being able to evaluate the impact of engineering practice of complex communication engineering problems on the sustainable development of environment and society.	通信工程专业毕业实习 通信工程专业毕业设计
8.职业规范——具有人文社会科学素养、社会责任感，能够在通信工程实践中理解并遵守工程职业道德和规范，履行责任 **8. Professional norms ：** With humanities and social sciences literacy，sense of social responsibility， being able to understand and abide by engineering professional ethics and norms in communication engineering practice ， and fulfill their responsibilities.	**8.1** 有正确的价值观，具有人文社会科学素养和社会责任感，了解中国国情。 8.1 Have correct values， humanities and social sciences literacy and social responsibility， and understand China’s national conditions.	中国近现代史纲要 毛泽东思想与中国特色社会主义理论体系概论 马克思主义基本原理概论
	8.2 具有健康的身体和心理，具备履行社会责任的基础。 8.2 Have a healthy body and psychology， and have the basis of fulfilling social responsibility.	体育俱乐部 运动基础 体育选项/游泳/团体操（3 选 2） 军事理论 大学生心理健康教育
	8.3 能够在通信工程实践中理解并遵守工程职业道德和规范，履行责任。 8.3 Being able to understand and abide by engineering professional ethics and norms in communication engineering practice， and fulfill responsibilities.	思想道德修养与法律基础 思想政治理论课实践教学 创新创业实践系列项目 工程训练 D 通信工程专业生产实习 通信工程专业毕业实习
9.个人和团队——具有团队协作意识，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. Individuals and teams：** With team spirit， being able to play the roles of individuals，team members and leaders in a multi-disciplinary team.	**9.1** 具备基本的人际交往与沟通能力，了解多学科背景下团队的构成以及不同角色成员的职责； 9.1 Have basic interpersonal and communication skills，understand the composition of the team and the responsibilities of members with different roles under the multidisciplinary background.	军事理论 军事技能训练 思想政治理论课实践教学

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
	9.2 能够在多学科背景下的团队中担当团队成员或团队负责人的角色。 9.2 Being able to play the role of team member or team leader in a multidisciplinary team.	工程训练 D 通信工程专业项目实训 通信工程专业毕业实习
10.沟通——能够就通信工程中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，包括撰写相关报告和设计文稿、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. Communications：** Being able to effectively communicate with industry counterparts and the public on complex engineering issues in communication engineering，including writing relevant reports and design manuscripts，presenting statements， clearly expressing or responding to instructions， and with a certain international perspective，being able to communicate in a cross-cultural context.	**10.1** 能够将研究设计与实验等形成报告和设计文稿，并能够就相关问题陈述发言，进行有效沟通和交流。 10.1 Being able to form reports and design manuscripts on research design and experiment， make statements on related issues， and communicate effectively.	电子技术课程设计 软件技术项目设计 处理器技术项目设计 通信技术项目设计
	10.2 能够阅读外文文献资料，能就通信工程专业问题在跨文化背景下进行沟通，具备一定的国际视野。 10.2 Being able to read foreign literature， communicate on communication engineering professional issues in a cross-cultural context， and have a certain international perspective.	综合英语 通信工程专业毕业设计
11.项目管理——理解通信工程管理原理与经济决策方法，并能在多学科环境中应用。 **11. Project Management：** Being able to understand the principles of communication engineering management and economic decision-making methods， and apply in a multidisciplinary environment.	**11.1** 理解通信工程实践中涉及的工程管理与经济决策方法。 11.1 Understand the engineering management and economic decision-making methods involved in communication engineering practice.	马克思主义基本原理概论 电子信息类专业认识实习 通信工程专业生产实习
	11.2 能够在与通信工程相关的多学科环境下（ 包括模拟环境），运用工程管理与经济决策方法，具有一定的组织和管理能力。 11.2 Being able to use engineering management and economic decision-making methods in the multidisciplinary environment related to communication engineering （including simulation environment）， and have certain organizational and managerial capabilities.	创新创业基础 通信工程专业项目实训 通信工程专业毕业设计
12.终身学习——了解本专业前沿发展现状和趋势，具有终身学习意识和适应通信工程技术发展的能力。 **12. Lifelong learning：** Understand the current situation and trend of the frontier development of this major，have the awareness of lifelong learning and the ability to adapt to the development of communication engineering technology.	**12.1** 能在社会发展的大背景下，认识到自主和终身学习的必要性。 12.1 Being able to recognize the necessity of self-determination and lifelong learning in the context of social development	马克思主义基本原理概论 毛泽东思想与中国特色社会主义理论体系概论 电子信息类新生研讨课 电子信息类专业认识实习
	12.2 具有自主学习的能力，能够适应工程技术的发展，适应社会竞争与合作。 12.2 With the ability of self-learning， Being able to adapt to the development of engineering technology and social competition and cooperation.	通信工程专业生产实习 通信工程专业毕业实习 通信工程专业毕业设计

毕业要求与培养目标的支撑关系

毕业要求 \ 培养目标	**培养目标 1** Educational Objectives1	**培养目标 2** Educational Objectives2	**培养目标 3** Educational Objectives3	**培养目标 4** Educational Objectives4
毕业要求 1 Graduation Requirements1	√			
毕业要求 2 Graduation Requirements2	√			
毕业要求 3 Graduation Requirements3	√			
毕业要求 4 Graduation Requirements4	√			
毕业要求 5 Graduation Requirements5	√			
毕业要求 6 Graduation Requirements6		√	√	
毕业要求 7 Graduation Requirements7		√	√	
毕业要求 8 Graduation Requirements8		√		
毕业要求 9 Graduation Requirements9				√
毕业要求 10 Graduation Requirements10			√	√
毕业要求 11 Graduation Requirements11	√			√
毕业要求 12 Graduation Requirements12			√	

□专业培养阶段教学进程计划表 （Courses Schedule of Educational Stages for the Major）

序号 No.	**课程编号 Course Code**	**课程名称 Course Name**	**学分 Credits**	**学时 Hours**			**开课学期 Semester**	**学位课 Degree Course**
				总学时 Credit	**理论学时 Theory**	**实践学时 Experiment**		
通识教育平台（必修） Basic Courses in General Education （Required）								
1	MY160080	马克思主义基本原理概论 Introduction to the basic principles of Marxism	3	48	48	0	3	
2	MY160280	思想政治理论课实践教学 The Practice Teaching of Ideological and Political Theory	2	32	0	32	3	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Credit	理论学时 Theory	实践学时 Experiment		
3	MY160110	毛泽东思想与中国特色社会主义理论体系概论 An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics	4	64	64	0	4	
4	MY190013	形势与政策 3 Situation and Policy 3	0.25	8	8	0	3	
5	MY190014	形势与政策 4 Situation and Policy 4	0.25	8	8	0	4	
6	MY190015	形势与政策 5 Situation and Policy 5	0.25	8	8	0	5	
7	MY190016	形势与政策 6 Situation and Policy 6	0.25	8	8	0	6	
8	MY190017	形势与政策 7 Situation and Policy 7	0.25	8	8	0	7	
9	MY190018	形势与政策 8 Situation and Policy 8	0.25	8	8	0	8	
10	WY160203	综合英语 3 Comprehesive English 3	2	32	32	0	3	
11	WY160104	综合英语 4 Comprehesive English 4	2	32	32	0	4	
12	JW190010	创新创业基础 Fundamentals of Innovation and Entrepreneurship	2	32	32	0	4	
小计 Subtotal			**16.5**					
学科（大类）教育平台（必修） Basic Courses in Discipline （Majors） Education （Elective）								
1	LX190091	大学物理实验 A1 University Physics Experiment A1	1.5	24	0	24	3	
2	LX190092	大学物理实验 A2 University Physics Experiment A2	1.5	24	0	24	4	
3	LX190020	概率论与数理统计 Probability and Mathematical Statistics	3	48	48	0	3	
4	LX190030	复变函数与积分变换 Functions of Complex Variable and Integral Transforms	3	48	48	0	3	
5	XX160032	电路分析基础 A2 Circuit Analysis Fundamentals A2	2	32	32	0	3	★
6	XX160042	电路分析基础实验 A2 Experiments of Circuit Analysis Fundamentals A2	0.5	8	0	8	3	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Credit	理论学时 Theory	实践学时 Experiment		
7	XX160880	数字电子技术 Digital Electronic Technology	3.5	56	56	0	3	★
8	XX161740	数字电子技术实验 A Experiment of Digital Electronic Technology A	1	16	0	16	3	
9	XX160700	模拟电子技术 Analog Electronic Technology	3.5	56	56	0	4	
10	XX160710	模拟电子技术实验 Experiments of Analog Electronic Technology	1	16	0	16	4	
11	XX161170	信号与系统 B Signals and Systems B	4	64	64	0	4	★
12	XX160610	计算机原理及应用 Computer Principles and Applications	3	48	48	0	4	★
13	XX160620	计算机原理及应用实验 Experiments of Computer Principles and Applications	0.5	8	0	8	4	
14	XX160140	电磁场与电磁波 A Electromagnetic Field and Electromagnetic Wave	2.5	40	40	0	5	
15	XX160150	电磁场与电磁波实验 A Experiment of Electromagnetic Field and Electromagnetic Wave	0.5	8	0	8	5	
小计 Subtotal			**31**					
专业教育平台（必修） Professional Education （Elective）								
1	XX160400	电子技术课程设计 Course Design of Electronic Technology	2	32	0	32	3	
2	XX161770	通信电路 communication Circuit	3	48	48	0	5	★
3	XX161790	通信电路实验 Experiments of communication Circuit	1	16	0	16	5	
4	JK160460	计算机网络 C Computer Network C	2.5	40	40	0	5	★
5	JK160490	计算机网络实验 Experiments of Computer Network	1	16	0	16	5	
6	XX160910	数字信号处理 Digital Signal Processing	2.5	40	40	0	5	
7	XX190630	数字信号处理实验 Experiments of Digital Signal Processing	0.5	8	0	8	5	

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
					总学时 Credit	理论学时 Theory	实践学时 Experiment		
8	XX190900	现代通信原理 Modern Communication Principles		4	64	64	0	6	★
9	XX161140	现代通信原理实验 Experiments of Modern Communication Principles		1	16	0	16	6	
10	XX190090	Matlab 通信建模与仿真 Modeling and Simulation of Communication Used Matlab		1	16	16	0	6	
11	XX190100	Matlab 通信建模与仿真实验 Experiments of Modeling and Simulation of Communication Used Matlab		1	16	0	16	6	
12	XX190710	通信技术项目设计 Design of Communication Technology Project		2	32	0	32	6	
13	XX160980	通信工程专业生产实习 Production Practice of Communication Engineering		2	32	0	32	7	
14	XX190690	通信工程专业毕业实习 Graduation Practice of Communication Engineering		2	32	0	32	8	
15	XX160950	通信工程专业毕业设计 Graduation Design of Communication Engineering		12	192	0	192	8	
小计 Subtotal				**37.5**					
个性化培养平台（选修课） Charateristic Education Course （Elective）									
1		全人教育微学会		3	学术报告/科研项目/创新创业项目/科技竞赛等，1-8 学期开设				
2		素质选修课		5	学生需至少选择 5 学分，1-8 学期开设				
通信工程方向选必选									
1	XX190010	JAVA 组和 C++ 组共2组课程，任选1组	C++程序设计及应用 C++ Programming and Application	1.5	24	24	0	4	
2	XX190020		C++程序设计及应用实验 Experiments of ++ Programming and Application	1.5	24	0	24	4	
3	XX190070		JAVA 程序设计及应用 JAVA Programming and Application	1.5	24	24	0	4	
4	XX190080		JAVA 程序设计及应用实践 Pratice of JAVA Programming and Application	1.5	24	0	24	4	
5	XX190540	软件技术项目设计 Design of Software Technology Project		2	32	0	32	4	
6	XX190150	处理器技术项目设计 Design of Processor Technology Project		2	32	0	32	5	

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
					总学时 Credit	理论学时 Theory	实践学时 Experiment		
7	XX190050	FPGA 技术 FPGA Technology		1.5	24	24	0	4	
8	XX190060	FPGA 技术实验 Experiments of FPGA Technology		1.5	24	0	24	4	
9	XX190780	无线与移动通信系统 Wireless and Mobile Communication System		2	32	32	0	6	
10	XX190790	无线与移动通信系统实验 Experiments of Wireless and Mobile Communication System		0.5	8	0	8	6	
11	XX190550	软件无线电技术 Soft-Defined Radio Technology		2	32	32	0	6	
12	XX190560	软件无线电技术实验 Experiments of Soft-Defined Radio Technology		1	16	0	16	6	
13	XX190700	通信工程专业项目实训 Project training of Communication Engineering		2	32	0	32	7	★
小计 Subtotal				**17.5**					
1	XX190010	JAVA 组和 C++ 组共2组课程，任选1组	C++程序设计及应用 C++ Programming and Application	1.5	24	24	0	4	
2	XX190020		C++程序设计及应用实验 Experiments of C++ Programming and Application	1.5	24	0	24	4	
3	XX190070		JAVA 程序设计及应用 JAVA Programming and Application	1.5	24	24	0	4	
4	XX190080		JAVA 程序设计及应用实践 Pratice of JAVA Programming and Application	1.5	24	0	24	4	
5	XX160750	软件技术基础 Software Technology Foundation		2	32	32	0	4	
6	XX190530	软件技术基础实验 Experiments of Software Technology Foundation		0.5	8	0	8	4	
7	XX190540	软件技术项目设计 Design of Software Technology Project		2	32	0	32	4	
8	XX190150	处理器技术项目设计 Design of Processor Technology Project		2	32	0	32	5	
9	XX190490	嵌入式系统设计 B Embedded System Design B		1.5	24	24	0	5	
10	XX190500	嵌入式系统设计 B 实验 Experiments of Embedded System Design B		1.5	24	0	24	5	

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
					总学时 Credit	理论学时 Theory	实践学时 Experiment		
11	XX190720	网络互联技术 Network Interconnection Technology		2	32	32	0	6	
12	XX190730	网络互联技术实验 Experiments of Network Interconnection Technology		1	16	0	16	6	
13	XX190700	通信工程专业项目实训 Project training of Communication Engineering		2	32	0	32	7	★
小计 Subtotal				17.5					
任选课（选修 10 学分） 理论课程和相应的实验课程需要一起选									
1	XX190520	人工智能模块（至少选 1 门）	人工智能基础 Fundamentals of Artifical Intelligence	2	32	32	0	5	
2	XX190620		数据挖掘 E Data Mining E	2	32	32	0	5	
3	XX160720		模式识别导论 Introduction toPattern Recognition	2	32	32	0	5	
4	XX161630	系统应用模块（至少选 1 门）	计算机图像处理技术 Computer Image Processing Technology	2	32	24	8	6	
5	XX160540		机器人技术及应用 Robot Techniques and Application	2	32	24	8	5	
6	XX160460		旋翼飞行器入门 Introduction to Multi-Rotor Aircraft	2	32	24	8	6	
7	GF161100		通信对抗原理与应用 Principles and Application of Communication Confrontation	3	48	40	8	7	
8	GF190068		雷达原理及对抗技术 Radar Principles and Combat Techniques	2.5	40	40	0	7	
9	GF190091		信息系统安全与对抗 Information System Security and Countermeasures	2.5	40	40	0	6	
10	XX190420		雷达与遥测技术 Radar and Remote Telemetry Technology	2	32	32	0	7	
11	XX190430		雷达与遥测技术实验 Experiment of Radar and Remote Telemetry	0.5	8	0	8	7	
12	XX161870		现代通信网 A Modern Communication Networks A	2	32	24	8	6	

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
					总学时 Credit	理论学时 Theory	实践学时 Experiment		
13	XX190030	专业知识侧重模块（至少选1门）	DSP 技术 Digital Signal Processor Technology	2.5	40	24	16	6	
14	XX190590		数据库技术 Database Technology	1	16	16	0	6	
15	XX190600		数据库技术实践 Experiments of Database Technology	1	16	0	16	6	
16	XX190660		天线与微波技术 Antenna and Microwave Technology	2.5	40	40	0	7	
17	XX190670		天线与微波技术实验 Experiments of Antenna and Microwave Technology	0.5	8	0	8	7	
18	XX190920		信息论与编码 Information Theory and Coding	2	32	32	0	6	
19	GF160050		操作系统原理与设计 Operating Systems Internals and Design Principles	2.5	40	40	0	7	
20	XX160930		随机信号分析 Stochastic Signal Analysis	2.5	40	40	0	6	
21	LX160430		光通信原理与技术 Principle and Technology of Optical Communication	3	48	48	0	7	
22	LX160650		数学建模 Mathematics Modeling	2	32	32	0	6	
23	XX160750	其它补充模块	软件技术基础 Software Technology Foundation	2	32	32	0	4	
24	XX190530		软件技术基础实验 Experiments of Software Technology Foundation	0.5	8	0	8	4	
25	XX190720		网络互联技术 Network Interconnection Technology	2	32	32	0	6	
26	XX190730		网络互联技术实验 Experiments of Network Interconnection Technology	1	16	0	16	6	
27	XX190780		无线与移动通信系统 Wireless and Mobile Communication System	2	32	32	0	6	
28	XX190790		无线与移动通信系统实验 Experiments of Wireless and Mobile Communication System	0.5	8	0	8	6	
29	XX190550		软件无线电技术 Soft-Defined Radio Technology	2	32	32	0	6	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Credit	理论学时 Theory	实践学时 Experiment		
30	XX190560	软件无线电技术实验 Experiments of Soft-Defined Radio Technology	1	16	0	16	6	
31	XX190490	嵌入式系统设计 B Embedded System Design B	1.5	24	24	0	5	
32	XX190500	嵌入式系统设计 B 实验 Experiments of Embedded System Design B	1.5	24	0	24	5	
33	XX190050	FPGA 技术 FPGA Technology	1.5	24	24	0	5	
34	XX190060	FPGA 技术实验 Experiments of FPGA Technology	1.5	24	0	24	5	
35	XX190010	C++程序设计及应用 C++ Programming and Application	1.5	24	24	0	4	
36	XX190020	C++程序设计及应用实验 Experiments of C++ Programming and Application	1.5	24	0	24	4	
37	XX190070	JAVA 程序设计及应用 JAVA Programming and Application	1.5	24	24	0	4	
38	XX190080	JAVA 程序设计及应用实践 Pratice of JAVA Programming and Application	1.5	24	0	24	4	
39	XX190220	电磁兼容导论 Introduction to Electromagnetic Compatibility	2	32	32	0	6	
40	XX190230	电磁兼容导论实验 Experiments of Introduction to Electromagnetic Compatibility	1	16	0	16	6	
41	XX190740	微波/射频电路 Experiments of Microwave/Radio-frequenct circuit	2	32	32	0	6	
42	XX190750	微波/射频电路实验 Microwave/Radio-frequenct circuit	1.5	24	0	24	6	
43		信号处理项目设计 Design of Signal Processing Project	2	32	0	32	6	
44	XX190680	通信电路项目设计 Design of Communication Circuit Project	2	32	0	32	5	
小计 Subtotal			**77**					

□集中实践环节（Intensive Practical Training Courses）

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	实践学时 Practice Hours	开课学期 Semester	学位课 Degree Course
1	BW190010	军事技能训练 Military Skill Training		0.5	112	1	
2	FX160020	大学生心理健康教育 mental health education of college students		1	6	1	
3	自选项目	限选 2 学分	体育选项 Sports Options	1	28	2/3/8	
4	TY190020		游泳 Swimming	1	28	2/4/6	
5	TY190030		团体操 Group Callisthenics	1	28	3/5/7	
6	MY160280	思想政治理论课实践教学 Practice of Ideological and Political Theory Course Teaching		2	32	4	
7	GC160040	工程训练 D Engineering Training D		2	32	2	
8	XX190350	电子信息类专业认识实习 Cognition Practice of Electronic Information		1	16	1	
9	JK160170	程序设计基础实验（C 语言） Experiments of C Language Programming Foundation		1	16	1	
10	XX160041	电路分析基础实验 A1 Experiments of Circuit Analysis Fundamentals A1		0.5	8	2	
11	XX160042	电路分析基础实验 A2 Experiments of Circuit Analysis Fundamentals A2		0.5	8	3	
12	LX190091	大学物理实验 A1 University Physics Experiment A1		1.5	24	3	
13	LX190092	大学物理实验 A2 University Physics Experiment A2		1.5	24	4	
14	XX161740	数字电子技术实验 Experiments of Digital Electronic Technology		1	16	3	
15	XX160710	模拟电子技术实验 Experiments of Analog Electronic Technology		1	16	4	
16	XX160620	计算机原理与应用实验 Experiments of Computer Principles and Applications		0.5	8	4	
17	XX160150	电磁场与电磁波实验 Experiments of Electromagnetic Field and Electromagnetic Wave		0.5	8	5	
18	XX160400	电子技术课程设计 Course Design of Electronic Technology		2	32	3	
19	XX161790	通信电路实验 Experiments of communication Circuit		1	16	5	

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	实践学时 Practice Hours	开课学期 Semester	学位课 Degree Course
20	JK160490	计算机网络实验 Experiments of Computer Network		1	16	5	
21	XX161140	现代通信原理实验 Experiments of Modern Communication Principles		1	16	6	
22	XX190100	Matlab 通信建模与仿真实验 Experiments of Modeling and Simulation of Communication Used Matlab		1	16	6	
23	XX190630	数字信号处理实验 Experiments of Digital Signal Processing		0.5	8	5	
24	XX190710	通信技术项目设计 Design of Communication Technology Project		2	32	6	
25	XX160980	通信工程专业生产实习 Production Practice of Communication Engineering		2	32	7	
26	XX190690	通信工程专业毕业实习 Graduation Practice of Communication Engineering		2	32	8	
27	XX160950	通信工程专业毕业设计 Graduation Design of Communication Engineering		12	192	8	
28	XX190020	2 选 1	C++程序设计及应用实验 Experiments of C++ Programming and Application	1.5	24	4	
29	XX190080		JAVA 程序设计及应用实践 Pratice of JAVA Programming and Application	1.5	24	4	
30	XX190540	软件技术项目设计 Design of Software Technology Project		2	32	4	
31	XX190150	处理器技术项目设计 Design of Processor Technology Project		2	32	5	
32	XX190700	通信工程专业项目实训 Project training of Communication Engineering		2	32	7	★
33	通信工程方向	FPGA 技术实验 Experiments of FPGA Technology		1.5	24	5	
34		无线与移动通信系统实验 Experiments of Wireless and Mobile Communication System		0.5	8	6	
35		软件无线电技术实验 Experiments of Soft-Defined Radio Technology		1	16	6	
36	网络工程方向	嵌入式系统设计 B 实验 Experiments of Embedded System Design B		1.5	24	5	
37		软件技术基础实验 Experiments of Software Technology Foundation		0.5	8	4	
38		网络互联技术实验 Experiments of Network Interconnection Technology		1	16	6	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	实践学时 Practice Hours	开课学期 Semester	学位课 Degree Course
39		全人教育微学会	3		1-8	
小计 Subtotal			**53.875**			

□核心课程和学位课程（Core Courses and Diploma Courses）

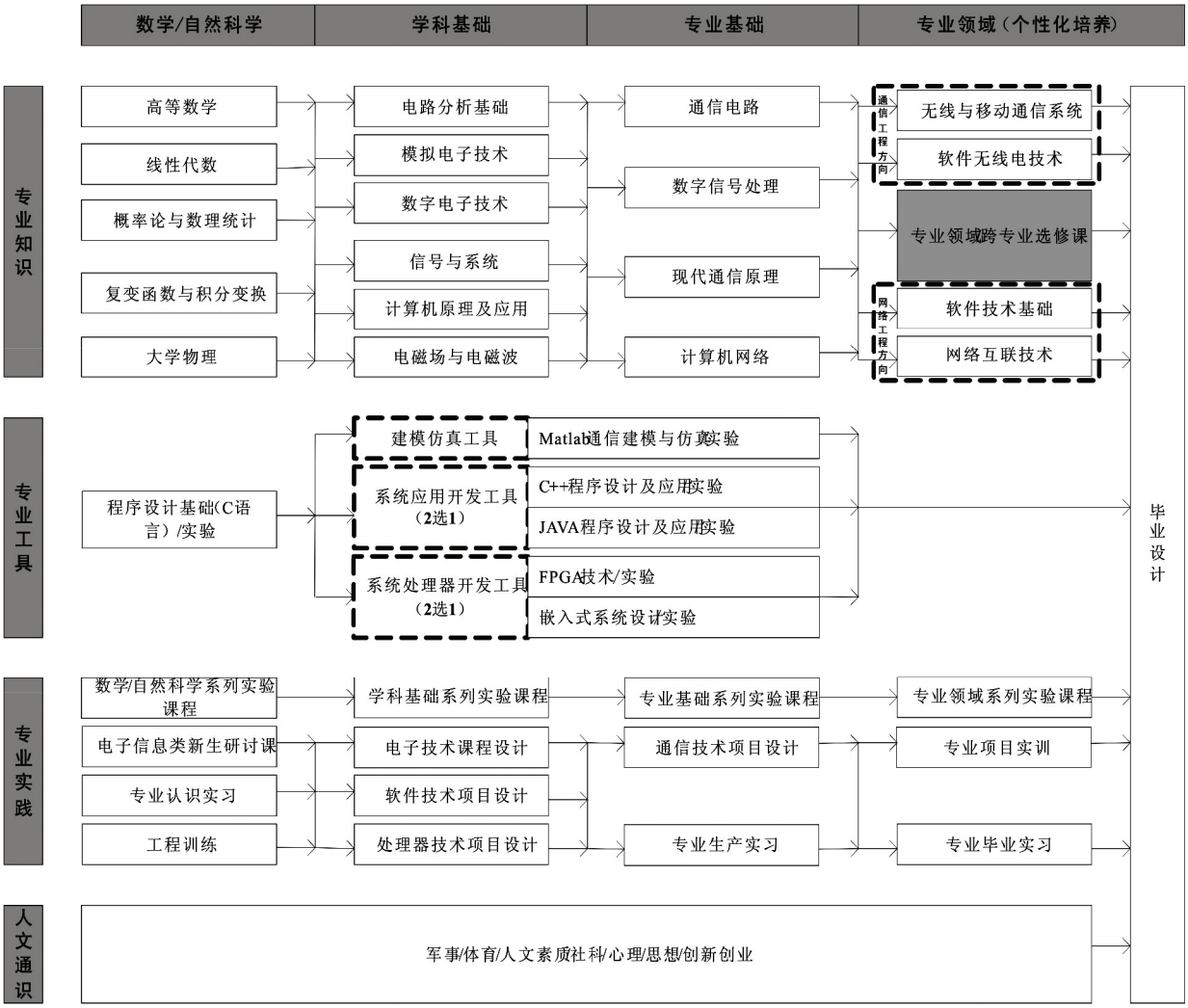
核心课程：综合英语、高等数学 A、电路分析基础 A、数字电子技术、模拟电子技术、信号与系统、计算机原理及应用、通信电路、计算机网络、现代通信原理、C++程序设计及应用/JAVA 程序设计及应用、FPGA 技术/嵌入式系统设计 B、软件无线电技术/网络互联技术、毕业实习、通信专业项目实训、毕业设计。

Core Courses： Comprehesive English， Advanced Mathematics A， Circuit Analysis Fundamentals A，Digital Electronic Technology， Analog Electronic Technology， Signals and Systems， Computer Principles and Applications， communication Circuit， Computer Network， Modern Communication Principles，C++ Programming and Application/JAVA Programming and Application ， FPGA Technology/ Embedded System Design B， Soft-Defined Radio Technology/ Network Interconnection Technology， Graduation Practice of Communication Engineering， Project training of Communication Engineering， Graduation Design of Communication Engineering

学位课程：综合英语 1、高等数学 A2、电路分析基础 A2、数字电子技术、信号与系统、计算机原理及应用、通信电路、计算机网络、现代通信原理、通信专业项目实训。

Diploma Courses：Comprehesive English 1， Advanced Mathematics A，Circuit Analysis Fundamentals A，Digital Electronic Technology，Signals and Systems，Computer Principles and Applications，communication Circuit， Computer Network， Modern Communication Principles， Project training of Communication Engineering

□课程体系结构图（The Curriculum Chart）



□学制及学分要求（Duration of Schooling and Credit Requirements）

1.学制：4 年

2.学分要求：学生在校期间必须修满本方案规定的 170 学分方能毕业，其中，各环节的具体学分要求如下表。

	通识教育平台 General Education Courses	学科（大类）教育平台 Discipline Coureses	专业教育平台 Major Courses	个性化培养平台 Customized Education Courses	总学分 Total Credits
必修课 Required Courses	35.5	61.5	37.5	/	170
选修课 Selective Courses	/	/	/	35.5	

□授予学位（Degree Conferred）

毕业时符合学位授予条件的，授予工学学士学位。

Those who meet the conditions for conferring degrees upon graduation shall be conferred a Bachelor of Engineering degree.

□说明（Notes）

1.各学期应修学分建议（Credit Allotment for Each Semester）

学期 Semester	一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th	学分合计 Total
建议应修学分 Credits	24	23.5	23.5	26.5	23.5	22	13	14	170

2. 建议课堂教学课程和相应的实验教学课程作为一组同时选修。

光电信息科学与工程专业培养方案

Undergraduate Program for Specialty in 3.1

专业负责人：周自刚　　主管院长：周自刚　　院学术委员会主任：周自刚

Director of Specialty： Zhou Zigang　Executive Dean： Zhou Zigang　Academic Committee Director：Zhou Zigang

□培养目标

□Educational Objectives

适应我国适应社会主义现代化强国建设需要，德智体美劳全面发展，基础扎实、理工结合、素质全面、工程实践能力和创造力强的复合型人才。能够胜任光电信息科学与工程相关领域的高新技术产业部门、科研部门、高等院校从事激光技术及加工、照明与新型显示、光电传感与检测等领域的科学研究、教学、技术开发、生产制造和管理等工作。

光电信息科学与工程专业培养的学生毕业就业 5 年左右，经过自身学习和行业锻炼，能达到下列目标：

■目标 1：能够进行光电信息科学与工程研究、产品开发、工艺与设备设计和生产管理。（由毕业要求 №1、2、3、4、5 和 11 支撑）

■目标 2：在光电信息科学与工程及相关行业具备持续的核心竞争优势，或有能力进入更高阶学习和发展。（由毕业要求 №3、4、5、6 和 10 支撑）

■目标 3：具有良好的人文社会科学素养、社会责任感、法律意识和道德水准。（由毕业要求 №6、7 和 8 支撑）

■目标 4:有意愿创新实践,能够通过自主学习和终身学习拓展自己的知识和能力。(由毕业要求 №6、7、10 和 12 支撑）

■目标 5：具有良好的交流能力、合作精神以及组织管理能力，能够成为团队的骨干或者领导。（由毕业要求 №9、10 和 11 支撑）

In order to meet the needs of building a strong socialist modernization country， this specialty aims at cultivating versatile talents who with all-round development of morality， intelligence， sports， beauty and labor， possess solid foundation of both science and technology knowledge， comprehensive quality， and strong engineering practice ability and creativity， and who are competent for the research， teaching， technology development， production and management of high-tech industry departments， scientific research departments and universities relevant to the fields of photoelectric information science and engineering， such as laser technology and processing， lighting and new display， photoelectric sensing and detection.

Expected Targets for Graduates of Photoelectric Information Science and Engineering after 5 Years of

Graduation：

Target 1： Graduates should be able to research Photoelectric Information Science and Engineering，develop products， design technology and equipment， and manage the production.（Supported by Graduation Requirements 1， 2， 3， 4， 5， 11）

Target 2： Graduates should be competitive in Photoelectric Information Science and Engineering and related industries， or capable of higher-level learning. （Supported by graduation requirements 3， 4， 5，6， 10）

Target 3：Graduates should possess humanities and social sciences literacy， sense of social responsibility，legal awareness and moral standards. （Supported by Graduation Requirements 6， 7， 8）

Target 4： Graduates should be willing to innovate and practice， and expand their knowledge and ability through self-learning and lifelong learning. （Supported by Graduation Requirements 6， 7， 10， 12）

Target 5： Graduates should possess good communication skills， cooperative spirit and organizational and managerial skills to become the backbone or leader of the team. （Supported by Graduation Requirements 9，10， 11）

□毕业要求

□Graduation Requirements

学生系统学习数学与物理基础知识，以及光、机、电、算专业基础理论和基本素养，掌握电子信息、激光原理、光纤通信、显示与照明、图像处理和光电传感等专业知识，受到激光技术、光电子技术、光电显示技术、光电传感技术、图像处理技术等方面的基本训练，掌握计算机软件工具，掌握光电子信息系统的基本设计、研究与开发的方法。注重理论与实际结合深度，具备信息获取、工程实践、创新创业和创造能力。

毕业生应获得以下几方面的知识、能力和素质：

№1 工程知识——掌握扎实的基础知识、专业基本原理、方法和手段，能够将数学、自然科学、本专业基础知识和专业知识用于解决复杂工程问题，并接触和掌握光电行业部分营运知识，为解决企业光电技术领域实际复杂问题打下知识基础。（支撑培养目标 1）

№2 问题分析——能够应用数学、自然科学、本专业基本原理、方法和手段和光电行业营运知识，识别、表达、并通过文献研究分析光电信息科学与工程中的复杂问题，以获得有效结论。（支撑培养目标 1）

№3 设计/开发解决方案——能够设计针对光电信息科学与工程领域复杂问题的解决方案，设计满足特定需求的光电系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。（支撑培养目标 1 和 2）

№4 研究——能够基于科学原理并采用科学方法对光电信息科学与工程领域复杂问题进行研究，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。（支撑培养目标 1 和 2）

№5 使用现代工具——能够针对光电信息科学与工程领域复杂问题，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，包括对复杂问题的预测与模拟，并能够理解其局限性。（支撑培养目标 1 和 2）

№6 工程与社会——能够基于光电信息科学与工程领域相关背景知识进行合理分析，评价专业工程实践和复杂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。（支撑培养目标 2、3 和 4）

№7 环境和可持续发展——能够理解和评价针对光电信息科学与工程领域复杂问题的工程实践对环境、社会可持续发展的影响。（支撑培养目标 3 和 4）

№8 职业规范——具有人文社会科学素养、社会责任感，能够在光电信息科学与工程实践中理解并遵守工程职业道德和规范，履行责任。（支撑培养目标 3）

№9 个人和团队——能够在光学工程、机械、电子信息、计算机技术等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。（支撑培养目标 5）

№10 沟通——能够就光电信息科学与工程复杂工程问题与光电行业界同行及社会公众进行有效沟通和交流，包括撰写相关报告和设计文稿、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。（支撑培养目标 2、4 和 5）

№11 项目管理——理解并掌握光电信息科学与工程管理原理与经济决策方法，并能在光学工程等学科环境中应用。（支撑培养目标 1 和 5）

№12 终身学习——了解光电信息科学与工程专业前沿发展现状和趋势，具有终身学习的意识和适应光电信息科学与工程技术发展的能力。（支撑培养目标 4）

Students of this specialty will systematically learn the basic knowledge of mathematics and physics， as well as the basic theory and literacy of photoelectric information， mechanics， electricity and computing. They will master the professional knowledge of laser engineering principle， photoelectric information， optical fiber communication， image processing and photoelectric materials. They will be subjected to related photoelectric information technology， photoelectric sensing technology and image processing technology. Also， they should excel in computer software tools， basic design， research and development methods of photoelectric information system after relative training. Moreover， they need to focus on the depth of integration of theory and practice， with the ability of information acquisition， engineering practice， innovation， entrepreneurship and creativity.

Graduates should acquire the following knowledge， abilities and qualities：

№1Engineering Knowledge - Graduates should master solid basic knowledge， professional basic principles， methods and means， and be able to use mathematics， natural science， professional basic knowledge and expertise to solve complex engineering problems. They also should contact and grasp some operational knowledge of the photoelectric industry to lay a knowledge foundation for solving practical and complex problems in the field of photoelectric technology in enterprises. （Supporting training objective 1）

№2Problem Analysis - Graduates should apply mathematics， natural sciences， basic principles，methods and means of the specialty and operational knowledge of photoelectric industry to identify， express and analyze complex problems in mechanical engineering ， so as to obtain effective conclusions.（Supporting training objective 1）

№3Design/Development of Solutions - Solutions to complex problems in photoelectric Information Science and engineering can be designed to meet specific needs of photoelectric systems，units（components）or processes， and to reflect innovative consciousness in the design process， taking into account social，health， safety， legal， cultural and environmental factors.（Supporting Objectives 1 and 2）

№4Research - Graduates should be able to study complex problems in the field of photoelectric information science and engineering based on scientific principles and scientific methods， including design experiments， analysis and interpretation of data， and obtain reasonable and effective conclusions through information synthesis.（Supporting Objectives 1 and 2）

№5Modern Tools Usage - Graduates should be able to develop， select and use appropriate technologies，resources， modern engineering tools and information technology tools for intricate problems in the field of photoelectric information science and engineering， including prediction and simulation of complex problems，and understand their limitations.（Supporting Objectives 1 and 2）

№6Engineering and Society- Graduates should be able to conduct rational analysis based on relevant background knowledge in photoelectric information Science and engineering， to evaluate the impact of professional engineering practices and solutions to complex problems on society， health， safety， law and culture， and to understand the responsibilities to be undertaken.（Supporting training objectives 2， 3 and 4）

№7Environment and Sustainable Development-Graduates should be capable of understanding and evaluating the impact of engineering practice on the sustainable development of environment and society in the field of photoelectric information science and engineering.（Supporting objectives 3 and 4）

№8 Professional Norms - Graduates should understand and abide by engineering professional ethics and norms in photoelectric engineering practice and fulfill their responsibilities， with humanities and Social Sciences literacy， sense of social responsibility（Supporting training objective 3）

№9People and Team - Graduates should be able to play the roles of individuals， team members and leaders in the team under the background of multiple disciplines， including physics， optical engineering，computer technology， and machinery.（Supporting training objective 5）

№10 Communicate - Graduates should be able to effectively communicate with colleagues and the public on complex engineering issues of photoelectric engineering， including writing relevant reports， designing manuscripts， presenting statements， and clearly expressing or responding to instructions. They also need to communicate and communicate in cross-cultural context with international vision.（Supporting training objectives 2， 4 and 5）

№11 Project Management-Graduates should understand and master the principles of photoelectric engineering management and economic decision-making methods， applying them in physics， optical engineering and other disciplines. （Supporting Objectives 1 and 5）

№ 12 Lifelong Learning - Graduates should comprehend the current situation and trend of the professional frontier， and possess the awareness of lifelong learning and the ability to adapt to the development of photoelectric Information Science and engineering technology. （Supporting training object.

□培养目标实现矩阵（毕业要求与课程的对应矩阵）

□Realization Matrix of Educational Objectives （Graduation Requirements by Courses）

毕业要求 Graduation Requirements	指标点（知识与能力要求） Index Points （Knowledge and Capability Requirements）	支撑课程或培养环节 Supporting courses or training processes
1. 工程知识——掌握扎实的基础知识、专业基本原理、方法和手段，能够将数学、自然科学、本专业基础知识和专业知识用于解决复杂工程问题，并接触和掌握光电行业部分营运知识，为解决企业光电技术领域实际复杂问题打下知识基础 №1Engineering Knowledge - Graduates should master solid basic knowledge， professional basic principles， methods and means， and be able to use mathematics， natural science， professional basic knowledge and expertise to solve complex engineering problems. They also should contact and grasp some operational knowledge of the photoelectric industry to lay a knowledge foundation for solving practical and complex problems in the field of photoelectric technology in enterprises	1.1 能够掌握和应用解决光电信息科学与工程领域相关复杂问题所需要的数学知识 1.1 Master and apply the mathematical knowledge to solve the complex problems in the field of photoelectric engineering.	高等数学 A1、A2 概率论与数理统计 复变函数与积分变换 线性代数 数学物理方程 Advanced Mathematics A1、A2 Probability and Mathematical Statistics B Complex Variable Function and Integral Transform Linear Algebra A Mathematical Physical Equations
	1.2 能够掌握和应用解决光电信息科学与工程领域相关复杂工程问题所需要的自然科学知识 1.2 Master and apply the natural science knowledge to solve the complex engineering problems in the field of photoelectric engineering.	大学物理 B1、B2 大学物理实验 A1、A2 计算机原理与应用（实验） 工程光学（实验） 数学物理方程 University PhysicsB1、B2 University Physics ExperimentsA1、A2 Computer Principles and Applied （Experiment） Engineering Optics （Experiment） Mathematical Physical Equations
	1.3 能够掌握和应用解决光电信息科学与工程领域相关复杂工程问题所需要的工程基础知识 1.3 Master and apply the basic engineering knowledge to solve the complex engineering problems in the field of photoelectric engineering.	工程训练 D 工程光学（实验） 电路分析基础实验 A1、A2 数字电子技术（实验 A） 模拟电子技术（实验） 信息光学（实验） Engineering optics （experimental） Engineering training D Digital Electronics Technology （Experiment A） Analog electronic technology （experimental） Information optics （experimental）

毕业要求 Graduation Requirements	指标点（知识与能力要求） Index Points （Knowledge and Capability Requirements）	支撑课程或培养环节 Supporting courses or training processes
	1.4 能够掌握和应用光电信息科学与工程领域相关复杂工程问题所需要的专业基础知识 1.4 Master and apply the basic professional knowledge to resolve complex engineering problems related to photoelectric Engineering	信息光学（实验） 光电子技术及器件（课程设计） 光学机械设计原理 光机电系统设计 光电图像与处理（课程设计） 机器学习与图像识别 光电显示与照明技术 Information optics （experimental） Optoelectronic Technology and Devices （ Course Design） Principle of optomechanical design Opto-mechanical system design Photoelectric Image and Processing （Course Design） Machine learning and image recognition Photoelectric display and lighting technology
2. 问题分析——能够应用数学、自然科学、本专业基本原理、方法和手段和光电行业营运知识，识别、表达、并通过文献研究分析光电信息科学与工程中的复杂问题，以获得有效结论 №2Problem Analysis - Graduates should apply mathematics，natural sciences， basic principles， methods and means of the specialty and operational knowledge of photoelectric industry to identify， express and analyze complex problems in mechanical engineering， so as to obtain effective conclusions.	2.1 能够运用数学、自然科学的相关知识技术识别、表达工程技术问题 2.1 Identify and express engineering technical problems by using relevant knowledge and technology of mathematics and natural Sciences	高等数学 A1、A2 概率论与数理统计 复变函数与积分变换 线性代数 大学物理 B1、B2 大学物理实验 A1、A2 数学物理方程 光电显示与照明技术 Advanced Mathematics A1， A2 Probability Theory and Mathematical Statistics B Complex variable function and integral transformation Linear algebra A University Physics B1， B2 University Physics Experiments A1， A2 Mathematical physics equation Photoelectric display and lighting technology
	2.2 能够运用光电信息科学与工程基本原理及专业知识识别、表达工程技术问题 2.2 Identify and express engineering and technical issues by using basic principles and professional knowledge of photoelectric Engineering	工程训练 D 综合英语 1、2、3、4 光电子技术及器件（课程设计） 光学机械设计原理 激光工程原理（实验） 薄膜原理与技术 Optoelectronic Technology and Devices （ Course Design） Principle of optomechanical design Principle of laser engineering （experimental） Thin film principle and technology Engineering training D Comprehensive English 1， 2， 3， 4
	2.3 能够运用光电信息科学与工程专业知识，并通过查阅文献，研究分析复杂环境工程问题，提出对策，获得有效解决思路及结论 2.3 The professional knowledge of photoelectric engineering can be used， and through consulting literature ， the complex environmental engineering problems can be studied and analyzed ， and countermeasures can be put forward to obtain effective solutions and conclusions.	文献检索与利用 光电创新创业教育 光电图像与处理（课程设计） 电路分析基础实验 A1、A2 大数据与光电行业分析 机器学习与图像识别 Literature search and utilization Optoelectronic innovation and entrepreneurship education Photoelectric Image and Processing （Course Design） Circuit Analysis Basic Experiments A1， A2 Big data and optoelectronic industry analysis Machine learning and image recognition

毕业要求 Graduation Requirements	指标点（知识与能力要求） Index Points （Knowledge and Capability Requirements）	支撑课程或培养环节 Supporting courses or training processes
3. 设计/开发解决方案——能够设计针对光电信息科学与工程领域复杂问题的解决方案，设计满足特定需求的光电系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素 №3Design/Development Solutions - Solutions to complex problems in photoelectric Information Science and engineering can be designed to meet specific needs of photoelectric systems， units （components） or processes，and to reflect innovative consciousness in the design process， taking into account social， health， safety， legal，cultural and environmental factors.	3.1 掌握光电信息科学与工程设计和产品开发全周期、全流程的基本设计/开发方法和技术，了解影响设计目标和技术方案的各种因素 3.1 Master the basic design/development methods and technologies of photoelectric information science and engineering design and product development in the whole cycle and process， and understand the various factors affecting the design objectives and technical schemes.	工程光学（实验） 激光加工 信息光学（实验） 光学机械设计原理 光电图像与处理（课程设计） 集成电路版图设计 毕业实习 毕业设计 Engineering optics （experimental） laser processing Information optics （experimental） Principle of optomechanical design Photoelectric Image and Processing （Course Design） Analog integrated circuit layout design Graduation internship Graduation Project
	3.2 能够针对特定需求，完成单元（部件）的设计 3.2 Design units （components） for specific needs	光机电系统设计 光电图像与处理（课程设计） 光学系统 CAD 工程训练 D 电路分析基础 A1、A2 集成电路版图设计 Opto-mechanical system design Photoelectric Image and Processing （Course Design） Optical system CAD Engineering training D Circuit Analysis Fundamentals A1， A2 Analog integrated circuit layout design
	3.3 能够进行系统或工艺流程设计，在设计中体现创新意识 3.3 Design system or technological process，reflecting innovative consciousness	电路分析基础实验 A1、A2 光电子技术及器件（课程设计） 信号与系统 B 光机电系统设计 模拟电子技术（实验） 光学系统 CAD 薄膜原理与技术 Optoelectronic Technology and Devices （ Course Design） Signals and Systems Opto-mechanical system design Analog electronic technology （experimental） Optical system CAD Thin film principle and technology
	3.4 在设计中能够考虑安全、健康、法律、文化及环境等制约因素 3.4 Consider constraints on safety， health，legal， culture and environment in the process of design.	大学生心理健康教育 光电创新创业教育 激光工程原理（实验） 光通信原理与技术（实验） 集成电路版图设计 全人教育微学会 College students' mental health education Optoelectronic innovation and entrepreneurship education Principle of laser engineering （experimental）

毕业要求 Graduation Requirements	指标点（知识与能力要求） Index Points （Knowledge and Capability Requirements）	支撑课程或培养环节 Supporting courses or training processes
		Optical communication principle and technology（experimental） Analog integrated circuit design Analog integrated circuit layout design
4. 研究——能够基于科学原理并采用科学方法对光电信息科学与工程领域复杂问题进行研究，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 Research - Graduates should be able to study complex problems in the field of photoelectric information science and engineering based on scientific principles and scientific methods， including design experiments， analysis and interpretation of data， and obtain reasonable and effective conclusions through information synthesis.	4.1 能够基于光电信息科学原理，通过文献研究或相关方法，调研和分析光电信息科学与工程复杂工程问题的解决方案 4.1 Based on the principle of photoelectric science，solve complex photoelectric engineering problems through literature research or related methods， research and analysis of solutions	工程光学（实验） 光电子技术及器件（课程设计） 激光加工 电磁场与电磁波 激光工程原理（实验） 光通信原理与技术（实验） Engineering optics （experimental） Optoelectronic Technology and Devices （ Course Design） laser processing Electromagnetic field and electromagnetic wave Principle of laser engineering （experimental） Optical communication principle and technology（experimental）
	4.2 能够根据对象特征，选择研究路线，设计实验方案 4.2 According to the characteristics of the object，choose the research route and design the experiment scheme.	程序设计基础 B（C 语言） 电磁场与电磁波 集成电路版图设计 薄膜原理与技术 光学系统 CAD 光电检测技术 Programming Foundation C （C Language） Electromagnetic field and electromagnetic wave Analog integrated circuit layout design Thin film principle and technology Optical system CAD Photoelectric detection technology
	4.3 能够根据实验方案构建实验系统，安全地开展实验，正确地采集实验数据 4.3 According to experimental scheme， conduct experimental system， carry out safe experiment and collect correct experimental data.	电磁场与电磁波 工程光学（实验） 光电传感器应用技术（实验） 信号与系统 C 固体物理学 光电检测技术 Electromagnetic field and electromagnetic wave Engineering optics （experimental） Photoelectric sensor application technology（experimental） Signals and Systems Solid state physics Photoelectric detection technology
	4.4 能对实验结果进行分析和解释，并通过信息综合得到合理有效的结论 4.4 Analyze and interpret experimental results and obtain effective conclusions through information synthesis.	光电检测技术 固体物理学 量子力学 半导体物理学 机器学习与图像识别 大数据与光电行业分析 Photoelectric detection technology Solid state physics Quantum mechanics Semiconductor physics Machine learning and image recognition Big data and optoelectronic industry analysis

毕业要求 Graduation Requirements	指标点（知识与能力要求） Index Points （Knowledge and Capability Requirements）	支撑课程或培养环节 Supporting courses or training processes
5. 使用现代工具——能够针对光电信息科学与工程领域复杂问题，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，包括对复杂问题的预测与模拟，并能够理解其局限性 №5 Modern Tools Usage - Graduates should be able to develop， select and use appropriate technologies， resources， modern engineering tools and information technology tools for intricate problems in the field of photoelectric information science and engineering， including prediction and simulation of complex problems， and understand their limitations.	5.1 针对复杂光电信息科学与工程问题，能运用现代信息技术数据库、信息软件，能够开展文献检索和资料查询 5.1 Use modern information technology database and information software to carry out literature retrieval and information query， for complex photoelectric engineering problems	光电创新创业教育 信息光学（实验） 毕业设计 光电子技术及器件（课程设计） 程序设计基础 B（C 语言） 文献检索与利用 大数据与光电行业分析 Optoelectronic innovation and entrepreneurship education Information optics （experimental） Graduation Project Optoelectronic Technology and Devices （ Course Design） Programming Foundation C （C Language） Literature search and utilization Big data and optoelectronic industry analysis
	5.2 能掌握常用的制图、模拟软件等，并运用于解决复杂光电信息科学与工程问题 5.2 Master and apply graphics and stimulation softwares to solve intricate photoelectric problems.	程序设计基础 B（C 语言） 信息光学（实验） 光电图像与处理（课程设计） 集成电路制造技术 半导体物理学 集成电路版图设计 Programming Foundation C （C Language） Information optics （experimental） Photoelectric Image and Processing （Course Design） Integrated circuit manufacturing technology Semiconductor physics Analog integrated circuit layout design
6. 工程与社会——能够基于光电信息科学与工程领域相关背景知识进行合理分析，评价专业工程实践和复杂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 №6Engineering and Society- Graduates should be able to conduct rational analysis based on relevant background knowledge in photoelectric information Science and engineering， to evaluate the impact of professional engineering practices and solutions to complex problems on society， health， safety， law and culture， and to understand the responsibilities to be undertaken.	6.1 具有光电信息科学与工程实习经历，熟悉与环保相关的技术标准、产业政策和法律法规 6.1 Be familiar with environmental protection related technical standards and industrial policies， laws and regulations with internship experience in photoelectric engineering.	电子信息类新生研讨课 电子信息类专业认识实习 形势与政策 思想道德修养与法律基础 文献检索与利用 毕业实习 毕业设计 Electronic Information Renaissance Seminar Electronic information majors understand the internship Situation and Policy Ideological and moral cultivation and legal basis Literature search and utilization Graduation internship Graduation Project
	6.2 能正确认识和评价光电信息科学与工程问题解决方案与实践活动对客观世界和社会的影响 6.2 Understand and evaluate correctly the impact of photoelectric engineering problem solutions and practical activities on the objective world and society	大学生心理健康教育 思想道德修养与法律基础 电子信息类专业认识实习 量子力学 形势与政策 毕业实习 College students' mental health education Ideological and moral cultivation and legal basis Electronic information majors understand the internship Situation and Policy Graduation internship

毕业要求 Graduation Requirements	指标点（知识与能力要求） Index Points （Knowledge and Capability Requirements）	支撑课程或培养环节 Supporting courses or training processes
7. 环境和可持续发展——能够理解和评价针对光电信息科学与工程领域复杂问题的工程实践对环境、社会可持续发展的影响 №7Environment and Sustainable Development - Graduates should be capable of understanding and evaluating the impact of engineering practice on the sustainable development of environment and society in the field of photoelectric information science and engineering.	7.1 知晓和理解光电信息科学与工程环境保护和可持续发展的理念和内涵 7.1Know and understand the concept and connotation of photoelectric environmental protection and sustainable development	电子信息类新生研讨课 思想道德修养与法律基础 电子信息类专业认识实习 形势与政策 实验室安全规范 毕业实习 Electronic Information Renaissance Seminar Ideological and moral cultivation and legal basis Electronic information majors understand the internship Situation and Policy Laboratory safety specification Graduation internship
	7.2 能够站在环境保护和可持续发展的角度思考光电信息科学与工程实践的可持续性，评价产品周期中可能对人类和环境造成的损害和隐患 7.2 Consider the sustainability of photoelectric engineering practice and evaluate the possible damage and hidden dangers to human beings and the environment in the product cycle， from the perspective of environmental protection and sustainable development.	军事理论 电子信息类专业认识实习 形势与政策 文献检索与利用 人工智能与传感技术 光电创新创业教育 毕业设计 Military theory Electronic information majors understand the internship Situation and Policy Literature search and utilization Artificial intelligence and infrared technology Optoelectronic innovation and entrepreneurship education Graduation Project
8. 职业规范——具有人文社会科学素养、社会责任感，能够在光电信息科学与工程实践中理解并遵守工程职业道德和规范，履行责任 №8 Professional Norms - Graduates should understand and abide by engineering professional ethics and norms in photoelectric engineering practice and fulfill their responsibilities， with humanities and Social Sciences literacy， sense of social responsibility	8.1 有正确的价值观，理解个人与社会的关系，了解中国国情 8.1 Understand the relationship between individuals and society， and comprehend China's national conditions with correct values，	电子信息类新生研讨课 思想道德修养与法律基础 中国近现代史纲要 马克思主义基本原理概论 毛泽东思想与中国特色社会主义理论体系概论 形式与政策 Electronic Information Renaissance Seminar Ideological and moral cultivation and legal basis Outline of Modern and Contemporary Chinese History Introduction to the basic principles of Marxism An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics Forms and Policies
	8.2 理解诚实公正、诚信守则的光电信息科学与工程职业道德和规范，并能在工程实践中自觉遵守 8.2 Understand the professional ethics and norms of the code of honesty， impartiality and abide by them in the practice of photoelectric engineering.	入学教育 大学生心理健康教育 军事理论 军事技能训练 思想政治理论课实践教学 思想道德修养与法律基础 运动基础 体育俱乐部 实验室安全规范 Entrance Education College students' mental health education

毕业要求 Graduation Requirements	指标点（知识与能力要求） Index Points （Knowledge and Capability Requirements）	支撑课程或培养环节 Supporting courses or training processes
		Military theory Military skill training Practical teaching of ideological and political theory courses Ideological and moral cultivation and legal basis Sports foundation Sports club Laboratory safety specification
	8.3 理解光电工程师对公众的安全、健康和福祉，以及环境保护的社会责任，能够在工程实践中自觉履行责任 8.3 Understand and undertake the social responsibility of photoelectric engineers for public safety， health and well-being， as well as environmental protection.	大学生心理健康教育 运动基础 电子信息类新生研讨课 电子信息类专业认识实习 光电图像与处理（课程设计） 光电显示与照明技术 实验室安全规范 College students' mental health education Sports foundation Electronic Information Renaissance Seminar Electronic information majors understand the internship Photoelectric Image and Processing （Course Design） Photoelectric display and lighting technology Laboratory safety specification
9. 个人和团队——能够在光学工程、机械、电子信息、计算机技术等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 People and Team - Graduates should be able to play the roles of individuals， team members and leaders in the team under the background of multiple disciplines， including physics，optical engineering， computer technology， and machinery.	9.1 能够理解团队中每个角色的定位与责任，能够胜任个人承担的角色任务 9.1 Undertake own tasks and understand role definition and responsibility of everyone in a team.	体育俱乐部 毕业实习 光电图像与处理（课程设计） 光电检测技术 光通信原理与技术（实验） 思想政治理论课实践教学 大学物理 B1、B2 计算机原理与应用 Sports club Graduation internship Photoelectric Image and Processing （Course Design） Photoelectric detection technology Optical communication principle and technology（experimental） Practical teaching of ideological and political theory courses University Physics B1， B2 Computer principle and application
	9.2 能够与团队其他成员有效沟通，听取并综合团队其他成员的意见与建议，做出合理决策 9.2 Communicate effectively with other team members. Listen to and synthesize the opinions and suggestions of other team members， to make reasonable decisions.	电子信息类专业认识实习 军事技能训练 光学机械设计原理 工程训练 D 光通信原理与技术（实验） Electronic information majors understand the internship Military skill training Principle of optomechanical design Engineering training D Optical communication principle and technology（experimental） Analog integrated circuit design

毕业要求 Graduation Requirements	指标点（知识与能力要求） Index Points （Knowledge and Capability Requirements）	支撑课程或培养环节 Supporting courses or training processes
10. 沟通——能够就光电信息科学与工程复杂工程问题与光电行业界同行及社会公众进行有效沟通和交流，包括撰写相关报告和设计文稿、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 Communicate - Graduates should be able to effectively communicate with colleagues and the public on complex engineering issues of photoelectric engineering，including writing relevant reports， designing manuscripts，presenting statements， and clearly expressing or responding to instructions. They also need to communicate and communicate in cross-cultural context with international vision.	10.1 能就光电信息科学与工程专业问题，以口头、文稿、图表等方式，准确表达自己的观点，回应质疑，理解与光电业界同行和社会公众交流的差异性 10.1 Accurately express opinions， respond to queries and understand the differences of communication between photoelectric industry peers and the public on the professional issues of photoelectric information science and engineering by means of oral， manuscript， chart.	信息光学（实验） 电磁场与电磁波 光电图像处理课程设计 综合英语 1、2、3、4 半导体器件 科技论文写作 Information optics （experimental） Electromagnetic field and electromagnetic wave Photoelectric image processing course design Comprehensive English 1， 2， 3， 4 Semiconductor device Scientific Writing
	10.2 了解光电信息科学与工程专业领域的国际发展趋势、研究热点，理解和尊重世界不同文化的差异性和多样性 10.2 Apprehend the international development trends and research hotpots in the field of photoelectric Information Science and engineering. Understand and respect the differences and diversity of different cultures in the world	光通信原理与技术（实验） 光电传感器应用技术（实验） 光电显示与照明技术 电子信息类新生研讨课 文献检索与利用 毕业设计 综合英语 1、2、3、4 Optical communication principle and technology （experimental） Photoelectric sensor application technology （experimental） Photoelectric display and lighting technology Electronic Information Renaissance Seminar Literature search and utilization Graduation Project Comprehensive English 1， 2， 3， 4
	10.3 具备跨文化交流的语言和书面表达能力，能就光电信息科学与工程专业问题，在跨文化背景下进行基本沟通和交流 10.3 Communicate on professional issues of photoelectric Information Science and engineering in cross-cultural context， with written and oral abilities for cross-culture communication.	综合英语 1、2、3、4 光电子技术及器件（课程设计） 毕业设计 中国近现代史纲要 全人教育微学会 人工智能与传感技术 光电传感器应用技术（实验） Comprehensive English 1， 2， 3， 4 Optoelectronic Technology and Devices （ Course Design） Graduation Project Outline of Modern and Contemporary Chinese History Innovation and Entrepreneurship Artificial intelligence and infrared technology Photoelectric sensor application technology （experimental）
11.项目管理——理解并掌握光电信息科学与工程管理原理与经济决策方法，并能在光学工程等学科环境中应用	11.1 掌握光电信息科学与工程项目中涉及的管理与经济决策方法 11.1 Master the management and economic decision-making methods involved in photoelectric engineering projects	电子信息类专业认识实习 光通信原理与技术（实验） 光电图像与处理课程设计 光机电系统设计 全人教育微学会 人工智能与传感技术 模型可视化与光电工程管理

毕业要求 Graduation Requirements	指标点（知识与能力要求） Index Points （Knowledge and Capability Requirements）	支撑课程或培养环节 Supporting courses or training processes
№11 Project Management -Graduates should understand and master the principles of photoelectric engineering management and economic decision-making methods ， applying them in physics，optical engineering and other disciplines.		Electronic information majors understand the internship Optical communication principle and technology （experimental） Photoelectric image and processing course design Opto-mechanical system design Innovation and Entrepreneurship Artificial intelligence and infrared technology Model Visualization and Photoelectric Engineering Management
	11.2 了解光电信息科学与工程及产品全周期、全流程的成本构成，理解其中涉及的光电工程管理与经济决策问题 11.2 Understand the cost composition of photoelectric engineering and product cycle and whole process， and understand the photoelectric engineering management and economic decision-making issues involved.	光学系统 CAD 光电传感器应用技术（实验） 光电显示与照明技术 全人教育微学会 科技论文写作 模型可视化与光电工程管理 Optical system CAD Photoelectric sensor application technology （experimental） Photoelectric display and lighting technology Innovation and Entrepreneurship Scientific Writing Model Visualization and Photoelectric Engineering Management
	11.3 能在多学科环境下（ 包括模拟环境），在设计开发解决方案的过程中，运用工程管理与经济决策方法 11.3 Apply engineering management and economic decision-making methods to design and develop solutions in multidisciplinary environments （including simulation environments）	光电图像与处理（课程设计） 光电显示与照明技术 全人教育微学会 实验室安全规范 科技论文写作 集成电路版图设计 机器学习与图像识别 模型可视化与光电工程管理 Photoelectric Image and Processing （Course Design） Photoelectric display and lighting technology Innovation and Entrepreneurship Laboratory safety specification Scientific Writing Analog integrated circuit layout design Machine learning and image recognition Model Visualization and Photoelectric Engineering Management
12.终身学习——了解光电信息科学与工程专业前沿发展现状和趋势，具有终身学习的意识和适应光电信息科学与工程技术发展的能力 №12 Lifelong Learning - Graduates should comprehend the current situation and trend of the professional frontier，and possess the awareness of lifelong learning and the ability to adapt to the development of photoelectric Information Science and	12.1 能在社会发展的大背景下，认识到自主和终身学习的必要性 12.1 Recognize the necessity of self-determination and lifelong learning in the context of Social development	入学教育 马克思主义基本原理概论 电子信息类专业认识实习 激光加工 半导体器件 科技论文写作 量子力学 Entrance Education laser processing Semiconductor device Scientific Writing Introduction to the basic principles of Marxism Electronic information majors understand the internship

毕业要求 Graduation Requirements	指标点（知识与能力要求） Index Points （Knowledge and Capability Requirements）	支撑课程或培养环节 Supporting courses or training processes
engineering technology. （Supporting training object	12.2 具有自主学习的能力，包括对技术问题的理解能力，归纳总结的能力和提出问题的能力 12.2 Possess ability to learn independently，including the ability to understand technical problems， to summarize and to ask questions	入学教育 思想道德修养与法律基础 光机电系统设计 半导体器件 科技论文写作 集成电路版图设计 大数据与光电行业分析 Entrance Education Opto-mechanical system design Semiconductor device Scientific Writing Ideological and moral cultivation and legal basis Analog integrated circuit layout design Big data and optoelectronic industry analysis

□专业培养阶段教学进程计划表

□ Courses Schedule of Educational Stages for the Major

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Credit	理论学时 Theory	实践学时 Experiment		
通识教育平台（必修） Basic Courses in General Education （Required）								
1	WY160203	综合英语 3 Comprehesive English3	2	32	32	0	3	
2	MY160080	马克思主义基本原理概论 Introduction to the basic principles of Marxism	3	48	48	0	3	
3	MY160110	毛泽东思想与中国特色社会主义理论体系概论 An Introduction to MaoZedong Thought and theTheoretical System ofSocialism with ChineseCharacteristics	4	64	64	0	4	
4	MY160280	思想政治理论课实践教学 The Practice Teaching ofIdeological and PoliticalTheory	2	32	0	32	3	
5	WY160104	综合英语 4 Comprehesive English4	2	32	32	0	4	
6		创新创业基础 Fundamentals of Innovation and Entrepreneurship	2	32	32	0	4	
小计			15	240	208	32		
学科（大类）教育平台（必修） Basic Courses in Discipline （Majors） Education （Elective）								
1	LX190030	复变函数与积分变换 Complex Variable Function and Integral Transformation	3	48	48	0	3	
2	LX190020	概率论与数理统计 Probability and MathematicalStatistics B	3	48	48	0	3	
3	LX190091	大学物理实验 A1 College Physics ExperimentA1	1.5	24	0	24	3	
4	XX160032	电路分析基础 A2 Circuit AnalysisFundamentals A2	2	32	32	0	3	★
5	XX160042	电路分析基础实验 A2 Experiments of CircuitAnalysis Fundamentals A2	0.5	8	0	8	3	
6	XX160880	数字电子技术 Digital Electronic Technology	3.5	56	56	0	3	
7	XX161740	数字电子技术实验 A Experiments of DigitalElectronic Technology A	1	16	0	16	3	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Credit	理论学时 Theory	实践学时 Experiment		
8	LX160042	大学物理实验 A2 College Physics ExperimentA2	1.5	24	0	24	4	
9	LX160860	信号与系统 C Signal & Systematic	3	48	48	0	5	
10	XX160700	模拟电子技术 Analog Electronics	3.5	56	56	0	4	
11	XX160710	模拟电子技术实验 Experiments of AnalogElectronic Technology	1	16	0	16	4	
12	XX 160610	计算机原理及应用 Computer Principles andApplications	3	48	48	0	4	
13	XX 160620	计算机原理及应用实验 Experiments of ComputerPrinciples and Applications	0.5	8	0	8	4	
小计			27	432	288	96		
个性化培养平台（选修课） Charateristic Education Course （Elective）								
1		美育素质选修课 Aesthetic Education	5	80	80	0	1-8	
2		全人教育微学会 Micro credit of Holistic Education	3	48	0	48	1-8	
小计			8	128	80	48		
专业教育平台（必修） Professional Education （Elective）								
1	LX190310	工程光学 Engineering Optics	3	48	48	0	3	★
2	LX190320	工程光学实验 Experiment Engineering Optics	1	16	0	16	3	
3	LX160450	光学机械设计原理 Design Principle of Optical Machinery	3	48	48	0	4	
4	LX190480	光学系统 CAD Optical Computer Aided Design	3	48	48	0	4	★
5	LX190450	光机电系统设计 Design of Photoelectric system	3	48	48	0	5	★
6	LX190420	光电子技术及器件 Optoelectronic technology and devices	3	48	48	0	5	★
7	LX190430	光电子技术及器件课程设计 Courses Design Optoelectronic technology and devices	1	16	0	16	5	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Credit	理论学时 Theory	实践学时 Experiment		
8	LX190510	激光工程原理 Principle of Laser Engineering	3	48	48	0	5	★
9	LX190520	激光工程原理实验 Experiment Principle of Laser Engineering	1	16	0	16	5	
10	LX160430	光通信原理与技术 Principle and Technology of Optical Communication	3	48	48	0	5	
11	LX190460	光通信原理与技术实验 Principle & Technology Experiments of Optical Communication	1	16	0	16	5	
12	LX190330	光电传感器应用技术 Application Technology of Photoelectric Sensor	3	48	48	0	6	★
13	LX190340	光电传感器应用技术实验 Experiment Application Technology of Photoelectric Sensor	1	16	0	16	6	
14	LX190410	光电显示与照明技术 Photoelectric display and lighting technology	2.5	40	40	0	6	★
15	LX160350	光电图像与处理 Photoelectric Imaging & Image Processing	2.5	40	40	0	6	
16	LX190400	光电图像与处理课程设计 Courses Design Optoelectronic Imaging and Image Processing	1	16	0	16	6	
17	LX160370	光电信息科学与工程专业毕业实习 Professional Practice	2	32	0	4 周	7	
18	LX190350	光电创新创业教育 Photoelectric Innovation and Entrepreneurship Education	2	32	0	32	7	
19	LX160360	光电信息科学与工程专业毕业设计（论文） Graduation Project	10	160	0	16 周	8	
小计			49	784	464	320		
个性化培养平台（选修课） Charateristic Education Course （Elective）								
1	LX190740	实验室安全规范 Laboratory Safety Code	0.5	8	0	8	3	
2	LX161020	固体物理学 Solid State Physics	3	48	48	0	3	
3	LX190620	量子力学 Fundamentals of Quantum	3	48	48	0	3	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course
				总学时 Credit	理论学时 Theory	实践学时 Experiment		
4	LX190160	半导体物理学 Semiconductor Physics	3	48	48	0	4	
5	LX190380	光电检测技术 Optoelectronic Detection Technology	3	48	32	16	4	
6	LX190800	数学物理方程 Mathematical Physics Method	3	48	48	0	4	
7	LX190230	电磁场与电磁波 Electromagnetic Field and Electromagnetic Wave	3	48	40	8	5	
8	LX190170	薄膜原理与技术 Physics and Technology of Thin Films	3	48	32	16	5	
9	LX190930	专业文献检索与利用 Indexing of Scientific Literature	1	16	0	16	5	
10	LX190610	科技论文写作 Academic Writing	1	16	0	16	5	
11	LX190150	半导体器件 Semiconductor Devices	3	48	48	0	5	
12	LX160490	集成电路版图设计 Analog IC Layout Design	3	48	48	0	6	
13	LX160870	信息光学 Information optics	3	48	48	0	6	
14	LX190840	信息光学实验 Information optics experiment	1	16	0	16	6	
15	LX190530	激光加工 Laser Processing	2	32	16	16	6	
16	LX190500	机器学习与图像识别 Machine learning and image recognition	3	48	40	8	7	
17	LX190220	大数据与光电行业分析 Big data and optoelectronic industry analysis	3	48	40	8	7	
18	LX190700	人工智能与传感技术 Artificial intelligence and infrared technology	3	48	40	8	7	
19	LX190640	模型可视化与光电工程管理 Model Visualization and Photoelectric Engineering Management	3	48	40	8	8	
小计			22	320	120	200		

□集中实践环节

□Intensive Practical Training Courses

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	实践学时 PracticeHours	开课学期 Semester	学位课 Degree Course
1	XG160010	入学教育 Entrance education	0.5	8	1	
2	FX160020	大学生心理健康教育 mental health education of college students	1	6	1	
3	BW160010	军事技能训练 Military Skill Training	0.5	14 天	1	
4	XX190350	电子信息类专业认识实习 Electronic information majors understand the internship	1	1 周	1	
5	XX190340	电子信息类新生研讨课 Electronic Information Renaissance Seminar	1	14	1	
6		全人教育微学会 Innovation and Entrepreneurship	3	48	1-8	
7		体育俱乐部 Sports Club	2	64	1-7	
8		体育选项 Sports Options	1	28	2-8	任选 2 学分
9		游泳 Swimming	1	28	2 或 4 或 6	
10		团体操 Group Callisthenics	1	28	3 或 5 或 7	
11	GC160040	工程训练 D Engineering Training D	2	32	2	
12	XX160041	电路分析基础实验 A1 Experiments of Circuit Analysis Fundamentals 1	0.5	8	2	
13	MY160280	思想政治理论课实践教学 Practice of Ideological and Political Theory Course Teaching	2	32	3 或 4	
14	LX190091	大学物理实验 A1 University Physics Experiment B1	1.5	24	3	
15	XX160042	电路分析基础实验 A2 Experiments of Circuit Analysis Fundamentals 2	0.5	8	3	
16	LX190320	工程光学实验 Experiment Engineering Optics	1	16	3	
17	LX190740	实验室安全规范 Laboratory Safety Code	0.5	8	3	
18	XX161740	数字电子技术实验 A Experiments of Digital Electronic Technology A	1	16	3	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	实践学时 PracticeHours	开课学期 Semester	学位课 Degree Course
19	LX190092	大学物理实验 A2 University Physics Experiment B2	1.5	24	4	
20	XX160710	模拟电子技术实验 Experiments of Analog ElectronicTechnology	1	16	4	
21	LX190380	光电检测技术 Optoelectronic Detection Technology	2.5	16	4	
22	XX160620	计算机原理及应用实验 Experiments of Computer Principles and Applications	0.5	8	4	
23	LX190230	电磁场与电磁波 Electromagnetic Field and Electromagnetic Wave	0.5	8	5	
24	LX190430	光电子技术及器件课程设计 Courses Design Optoelectronic technology and devices	1	16	5	
25	LX190520	激光工程原理实验 Experiment Principle of Laser Engineering	1	16	5	
26	LX190460	光通信原理与技术实验 Principle & Technology Experiments of Optical Communication	1	16	5	
27	LX190170	薄膜原理与技术 Physics and Technology of Thin Films	1	16	5	
28	LX190930	专业文献检索与利用 Indexing of Scientific Literature	1	16	5	
29	LX190610	科技论文写作 Academic Writing	1	16	5	
30	LX190540	集成电路版图设计 Analog IC Layout Design	2	32	5	
31	LX190340	光电传感器应用技术实验 Experiment Application Technology of Photoelectric Sensor	1	16	6	
32	LX190400	光电图像与处理课程设计 Courses Design Optoelectronic Imaging and Image Processing	1	16	6	
33	LX190840	信息光学实验 Information optics experiment	1	16	6	
34	LX190530	激光加工 Laser Processing	1	16	6	
35	LX160370	光电信息科学与工程专业毕业实习 Education Internship	2	4 周	7	
36	LX190350	光电创新创业教育 Photoelectric Innovation and Entrepreneurship Education	2	32	7	
37	LX190500	机器学习与图像识别 Machine learning and image recognition	0.5	8	7	
38	LX190220	大数据与光电行业分析 Big data and optoelectronic industry analysis	0.5	8	7	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	实践学时 PracticeHours	开课学期 Semester	学位课 Degree Course
39	LX190700	人工智能与传感技术 Artificial intelligence and infrared technology	0.5	8	7	
40	LX190640	模型可视化与光电工程管理 Model Visualization and Photoelectric Engineering Management	0.5	8	8	
41	LX160360	光电信息科学与工程专业毕业设计（论文） Graduation Project	10	16 周	8	
		小计	54	1016		

□核心课程和学位课程

□ Core Courses and Diploma Courses

核心课程：工程光学（实验）、光学机械设计原理、电路分析基础 A1 和 A2、模拟电子技术（实验）、数字电子技术（实验）、程序设计基础 B（C 语言）、信号与系统 B、光学系统 CAD、光机电系统设计、激光工程原理（实验）、光通信原理与技术（实验）、光电子技术及器件（实验）、光电显示与照明技术、光电传感器应用技术（实验）、信息光学（实验）、光电图像与处理（课程设计）、激光加工、光电创新创业教育、毕业实习、毕业设计。

特色课程：光电子技术及器件（“国家双万课程”省级精品在线开放课程），光电创新创业教育（省级创新创业教育示范课程）。

学位课程：综合英语 1、高等数学 A2、电路分析基础 A2、工程光学、光学系统 CAD、光机电系统设计、光电子技术及器件、激光工程原理、光电传感器应用技术、光电显示与照明技术。

交叉课程：机器学习与图像识别、大数据与光电行业分析、人工智能与传感技术、模型可视化与光电工程管理

Core Courses： Engineering Optics（Experiment）， Optical Machinery Design Principles ， Circuit Analysis Foundation A1 and A2， Analog Electronics Technology （Experiments， Digital Electronics Technology， Programming Foundation C， Signal and System， Optical System CAD， Optical Mechanical and Electrical System Design， Laser Engineering Principles （Experiments）， Optical Communication Principles and Technology （Experiment）， Photoelectric Technology and Devices （Experiments）， Photoelectric Display and Illumination Technology ， Photoelectric Sensor application technology （experiment），information optics（experiment），photoelectric image and processing（curriculum design），laser processing （experiment）， photoelectric innovation and entrepreneurship education， graduation practice， graduation design.

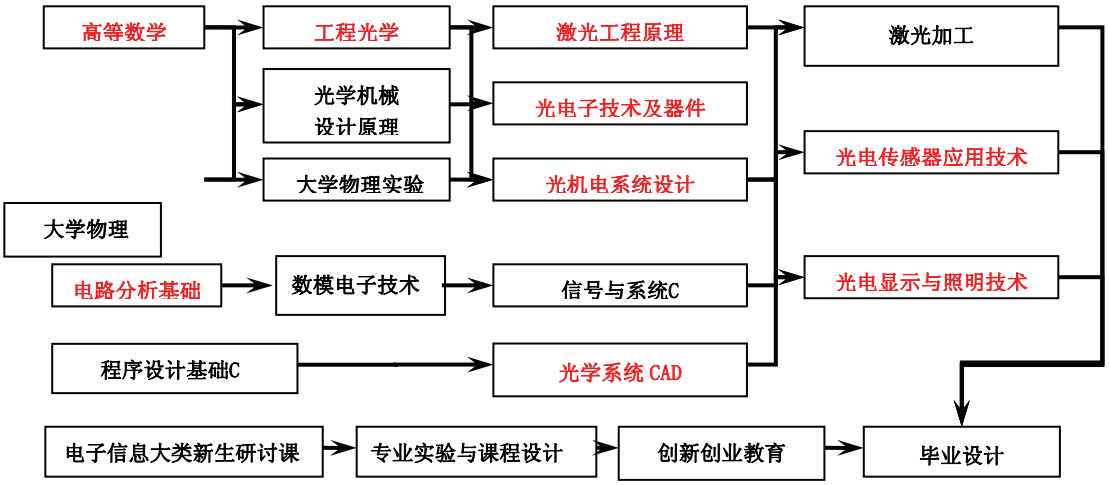
Characteristic Courses： Photoelectric Technology and Devices （"National 20，000 Courses" Sichuan Excellent Online Open Course）， Photoelectric Innovation and Entrepreneurship Education （Sichuan Innovation and Entrepreneurship Education Demonstration Course）.

Degree Courses： Comprehensive English 4， Advanced Mathematics A2， Circuit Analysis Foundation 2， Applied Optics， Optical System CAD， Optical Mechanical and Electrical System Design， Photoelectric Technology and Devices， Laser Engineering Principles， Photoelectric Sensor Application Technology， Photoelectric Display and Lighting Technology.

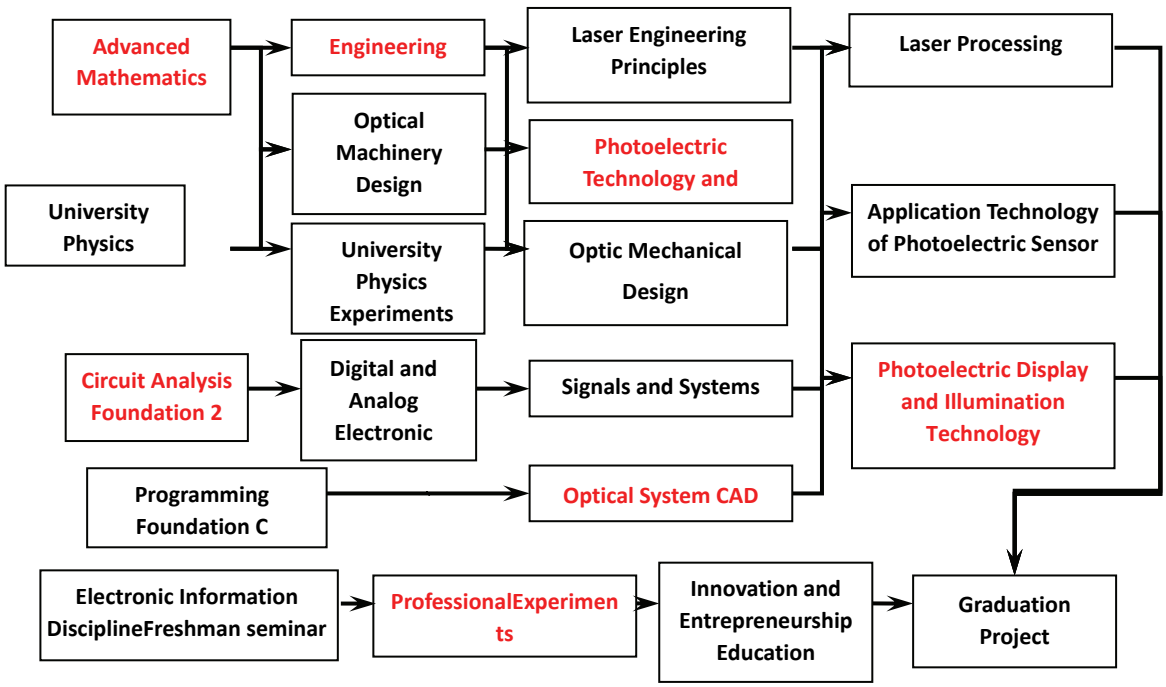
Interdisciplinary Courses： Machine Learning and Image Recognition， Big Data and Photoelec tric Industry Analysis， Artificial Intelligence and Infrared Technology， Model Visualization and Ph otoelectric Engineering Management.

□课程体系结构图

□The Curriculum Chart



Ⅷ.Logical Structure Diagram of Professional Course System



□学制及学分要求

□ Duration of Schooling and Credit Requirements

1.学制：4 年

1. Length of Schooling： 4 Years

2.学分要求：学生在校期间必须修满本方案规定的 170 学分方能毕业，其中，各环节的具体学分要求如下表。

2.Students are required to gain at least 170 credits to graduate. The specific credit requirements for each link are as follows.

课程类别 Course Classification / 课程性质 Course Nature	通识教育平台 Public Basic Course	学科（大类）教育平台 Discipline （major） education platform	专业教育平台 Specialized Courses	个性化培养平台 Personalized Course	总学分 Total Credits
RequiredCourses	35.5	57.5	49	/	170
ElectiveCourses	/	/	/	28	

□授予学位

□Degree Conferred

毕业时符合学位授予条件的，授予工学学士学位。

Student who meet the graduate requirements is conferred Bachelor of Engineering.

□说明

□Notes

1.各学期应修学分建议如下表。（在 1-7 或 2-8 学期选课的，建议在第 5-8 学期选）

1. Credit proposals for each semester are listed below. （For elections in 1-7 or 2-8 semesters， it is recommended to elect in 5-8 semesters）

学期 Semester	一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th	学分合计 Total credits
建议应修学分 Suggested credits	22.5	24.5	24.5	25.5	24	20	16	13	170

2.各学期教学计划总体安排如下表。

2.The overall arrangement of each semester's teaching plan is as follows.

学年	学期	教学进度安排（周）																				理论教学	考试	入学教育	军训	课程设计	工程训练	电子实习	综合实验	生产实习	毕业实习	毕业设计	就业安排	机动	小计
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	A	B	C	D	E	F	G	H	I	J	K	L	M	
一	1		C	D	D	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	14	1	1	3										19
	2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	M	B	B	17	2											1	20
二	3	A	A	A	A	A	A	A	A	A	A	A	A	A	A	F	F	M	M	B	B	14	2				2							2	20
	4	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G	G	M	M	B	B	14	2					2						2	20
三	5	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E	E	E	B	B	15	2			3									20
	6	A	A	A	A	A	A	A	A	H	H	A	A	A	A	A	A	B	B	I	I	14	2						2	2					20
四	7	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	J	J	J	J	14	2								4				20

自动化专业本科人才培养方案

Undergraduate Program for the Major of Automation

专业负责人：吴　斌　　主管院长：姚远程　　院学术委员会主任：邹传云

Director of Specialty：　Bin Wu　Executive Dean：Yuancheng Yao

Academic Committee Director：　Chuanyun Zou

一、专业简介（Brief Introduction to the Major）

西南科技大学自动化专业 1978 年开始本科招生，是学校最早设立的两个本科专业之一。本专业是学校首批建设的校级品牌专业、四川省首批特色专业、国家级特色专业、卓越工程师教育培养计划专业。1998 年获“控制理论与控制工程”硕士学位授予权，2013 年成为“控制科学与工程”一级学科博士学位授权点，2016 年“检测技术与自动化装置”获批国防特色学科，同年“信息与控制学科群”入选四川省“双一流”建设学科。

本专业高度重视学生培养质量，强化实践能力的培养。形成了以综合设计项目为关键节点、以专业实验室为基地、以学科竞赛为展示、以创新实践班促教改、“共建与区域产学研联合办学”的特色培养途径。

The specialty of automation control started undergraduate enrollment in 1978, becoming one of the first two undergraduate majors in Southwest University of Science and Technology （SWUST）. The specialty has the following characteristics： it is one of the first batch of university-level brand majors, the first batch of featured majors in Sichuan province, national featured majors, and has the education and training program for outstanding engineers. In 1998, this specialty was authorized to grant the master's degree of "control theory and control engineering", and became the doctorate degree authorization center in the first-level discipline of "control science and engineering" in 2013. In 2016, “detection technology and automation device” was approved as a characteristic discipline of national defense, and “information and control science group” was selected as a “double first-class” construction discipline in Sichuan province.

This specialty attaches great importance to the quality of student training and strengthens the training of practical ability. It has formed a training approach with the following features： taking the comprehensive design project as the key node, taking professional laboratory as the base, exhibiting by discipline competitions, promoting teaching reform with innovative practice class, and "co-construction and reginal industry-university-research joint education".

二、培养目标（Education Objectives）

本专业立足西部，服务全国，面向智能自动化装备、电子信息、智能制造等产业，培养品德优良、身心健康、基础宽厚、专业扎实、能力突出、视野开阔，具有责任意识、科学精神、人文素养、终身学

习意识和能力，德智体美劳全面发展，在运动控制、过程控制、工业自动化、机器人等相关领域从事科学研究、系统开发与集成、设备运行维护与工程项目管理并能适应新发展的复合型人才，毕业五年后达到以下目标：

（1）职业素养：具有较高的思想素质和法律伦理水平，能够在工程实践中遵守职业规范，履行社会责任；

（2）专业能力：能够综合运用数理基本知识、工程基础知识、自动化专业知识和现代工具，分析、研究和解决自动化领域的复杂工程问题，并体现创新；

（3）交流合作：能与同行、客户和社会公众有效沟通，能够独立或团队协作实施复杂工程项目，有全球化意识和国际视野；

（4）终身学习：具有终身学习能力，通过不断学习适应新技术发展，实现工作能力的自我提升。

The specialty bases in the west and serves the whole country, facing the industries of the intelligent automation equipment, electronic information, intelligent manufacturing and other industries. The specialty aims at bringing up inter-disciplinary talents, with the following characteristics： good moral character, physically and mentally healthy, deepening foundation, solid professional knowledge, outstanding ability and broad vision. They should have been equipped with the sense of responsibility, scientific spirit, humanistic quality, lifelong learning awareness and comprehensive development of morality, intelligence, body, beauty and labor, to pursue their careers of scientific research, system development and integration, equipment operation and maintenance and project management in automation related domain such as motion control, process control, industrial automation and robotics. After 5 years of graduation, they should reach the following targets：

1） Professional quality： possess high ideological quality and legal ethics, enable tocomply with professional norms and fulfill social responsibilities in engineering practice.

2） Professional competence： capable of comprehensively applying basic mathematical knowledge, basic engineering knowledge, automation professional knowledge and modern tools to analyze, study and solve complicated problem in the domain of automatic control, and reflect innovation.

3） Communication and cooperation： have the ability to communicate effectively with peers, clients and publics, and able to work independently or in a team to implement complex engineering projects, with global awareness and international perspective.

4） Lifelong learning： possess the ability of lifelong learning, adapt to the development of new technology and achieve self-improvement of working ability through continuous study.

三、毕业要求（GraduationRequirements）

毕业要求 1——**工程知识：**能够用数学、自然科学等语言描述工程问题，并用于自动化系统的设计、制作和优化。

毕业要求 2——**问题分析**：能够识别和正确表达自动化系统中涉及的电路、信号检测、执行机构等环节，并能根据自动化系统的要求，通过文献调研，得到解决问题的总体思路和方案。

毕业要求 3——**设计/开发解决方案**：能够遵循工程设计流程，合理选择方案，设计出满足特定要求的单元电路和自动化系统，并能够在设计环节中体现创新意识，同时考虑社会、健康、安全、法律、文化以及环境等因素。

毕业要求 4——**研究**：能够基于科学原理并采用科学方法对复杂工程问题进行研究，能够理解或提出实验目标和实验方案，基于科学原理设计实施实验，并对实验结果进行分析，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**：能够合理选择恰当的技术、信息资源、编程语言、仿真工具，解决自动化领域的工程问题或者对其进行辅助设计、预测模拟，并能理解其局限性。

毕业要求 6——**工程与社会**：能够基于工程相关背景知识进行合理分析，评价自动化专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律及文化等的影响，并理解应承担的责任。

毕业要求 7——**环境和可持续发展**：能够理解和评价自动化专业领域的工程实践对环境、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，能够在自动化专业领域的工程实践中理解并遵守工程职业道德和规范，履行责任。

毕业要求 9——**个人和团队**：能够在多学科背景的团体中承担个体、团队成员以及负责人的角色。

毕业要求 10——**沟通**：能够就自动化专业领域的复杂工程问题与同行及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。有一定的国际视野，能够在跨文化背景下进行沟通和交流。

毕业要求 11——**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。

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。

Graduation requirement 1： Engineering knowledge： be able to describe engineering problems using languages of mathematics, natural science etc., and have the ability to design, manufacture and optimize automation systems.

Graduation requirement 2： Problem analysis： be able to identify and correctly express the circuit, signal detection, actuator and other links involved in the automation system, and be able to get the overall ideas and schemes to solve the problems in line with the requirements of the automation system and through literature research.

Graduation requirement 3： Design/development solution： be able to follow the engineering design process and reasonably choose the solution to design unit circuit and automation system that meet specific requirements, and reflect the sense of innovation in the design process, as well as to consider social, health, safety, legal, cultural and environmental factors.

Graduation requirement 4： Research： be able to study complex engineering problems based on scientific principles and methods, have the ability to understand or propose experimental objectives and schems, design and implement experiments based on scientific principles, analyze experimental results, and obtain reasonable and effective conclusions through information synthesis.

Graduation requirement 5： Usage of modern tools： be able to select appropriate technologies, information resources, programming languages and simulation tools to solve engineering problems in the field of automation or to assist in design, prediction and simulation, and capable of understanding their limitation.

Graduation requirement 6： Engineering and society： be able to make rational analysis based on engineering-related background knowledge, evaluate the impact of automation engineering practice and complex engineering problem solution on society, health, safety, law and culture, and understand the responsibilities.

Graduation requirement 7： Environment and sustainable development： be able to understand and evaluate the impact of engineering practices in the field of automation on environmental and social sustainable development.

Graduation requirement 8： Professional norms： Possessing humanistic, social science literacy, and social responsibility, be able to understand and comply with engineering professional ethics and standards and fulfill responsibilities in the engineering practice of automation field.

Graduation requirement 9： Individuals and teams： be able to assume the roles of individual, team member, and leader in a multi-disciplinary group.

Graduation requirement 10： Communication： be able to effectively communicate and exchange with peers and the public on complex engineering issues in the professional field of automation, including writing reports and design drafts, making presentations, and clearly expressing or responding to instructions. Have a certain international prospective and be able to communicate and exchange in a cross-cultural context.

Graduation requirement 11： Project management： understanding and mastering the engineering management principles and economic decision-making methods, capable of applying these principles and methods in a multi-disciplinary environment.

Graduation requirement 12： Lifelong study： having the consciousness of self-learning and life-long learning, possessing the ability of continuous learning and adaptive development.

四、培养目标实现矩阵（毕业要求与课程的对应矩阵）Realization Matrix of Educational Objectives（Graduation Requirements by Courses）

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
1.工程知识：能够用数学、自然科学等语言描述工程问题，并将基础知识、专业知识用于自动化系统的设计、实现和优化。 Engineering knowledge： be able to describe engineering problems using languages of mathematics, natural science etc., and have the ability to design, manufacture and optimize automation systems.	1.1 能够用数学、自然科学的语言对工程问题进行初步描述。 Be able to describe engineering problems preliminarily using languages of mathematics and natural science.	高等数学 1、 高等数学 2、 大学物理、 概率论与数理统计、 线性代数
	1.2 能够将工程基础知识应用于信号、电路与电子系统的计算与分析。 Be able to apply basic engineering knowledge to signal, circuit and electronic system calculation and analysis.	电路分析基础 1、 电路分析基础 2、 模拟电子技术、 数字电子技术、 信号与系统
	1.3 能够将专业基础知识应用于自动控制系统的建模、计算与分析。 Be able to apply basic professional knowledge to modeling, calculation and analysis of automatic control system.	自动控制理论、 电机与拖动、 过程控制与仪表、 计算机控制系统
	1.4 能够将检测、驱动、控制、网络通信等专业知识用于自动化系统的设计、制作和优化。 Be able to apply professional knowledge of detection, drive, control and network communication to the design, manufacture and optimization of automation system.	检测技术、 电力电子技术、 工业数据通信与控制网络、 电气控制与 PLC
2.问题分析：能够识别和正确表达自动化系统中涉及的电路、信号检测、控制器、执行机构等环节，并能根据自动化系统的要求，通过文献调研，得到解决复杂工程问题的总体思路和方案。 Problem analysis： be able to identify and correctly express the circuit, signal detection, actuator and other links involved in the automation system, and be able to get the overall ideas and schemes to solve the problems in line with the requirements of the automation system and through literature research.	2.1 能够应用数学、自然科学的基本原理，识别电路及电子系统、自动化系统中涉及的电路原理、信号分析等问题。 Be able to apply the basic principles of mathematics and natural science to identify the circuit theory, signal analysis and other issues evolved in circuit and electronic system and automation system.	复变函数与积分变换、 电路分析基础 1、 电路分析基础 2、 模拟电子技术、 数字电子技术、信号与系统
	2.2 能够识别自动控制系统的组成部分并分析各环节的作用，会分析系统性能及其影响因素。 Be able to identify the components of the automatic control system and analyze the role of each link, as well as to analyze the system performance and factors influencing the system.	自动控制理论、 电机与拖动、 检测技术、 电力电子技术、 计算机原理及应用、 检测技术课程设计
	2.3 能够根据自动化系统的要求，在文献调研的基础上进行分析，得到解决复杂工程问题的总体思路和方案。 Be able to get the overall idea and solution to solve complex engineering problems according to requirements of the automation system and based on the literature research analysis.	创新创业基础、 自动化专业综合设计、 自动化专业毕业设计、 自动化专业生产实习
3.设计/开发解决方案：能够遵循工程设计流程，合理选择方案，设计出满足特定要求的单元电路和自动化系统，并能够在设计环节中体现创新意识，同时考虑社会、健康、安全、法律、文化以及环境等因素。	3.1 能够根据特定要求，完成单元电路或电子电气系统的设计。 Be able to design unit circuit or electrical system according to specific requirements.	单片机基础与实践、 电气控制与 PLC（嵌入式设计技术）、 电子技术课程设计、 检测技术课程设计
	3.2 能够根据自动化系统的技术要求，选择合理化解决方案，包括系统方案、器件选型、控制算法选择等。	计算机控制系统课程设计、 PLC项目实践(嵌入式项目实践)、 过程控制与仪表（运动控制）

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
Design/development solution：be able to follow the engineering design process and reasonably choose the solution to design unit circuit and automation system that meet specific requirements, and reflect the sense of innovation in the design process, as well as to consider social, health, safety, legal, cultural and environmental factors.	Have the ability to select reasonable solutions, including system solution, device selection, control algorithm selection, etc, according to the technical requirements of automation system,	
	3.3 能够对系统设计方案的合理性进行论证，根据要求设计出满足性能指标的自动化系统，并在此过程中体现创新意识。 Be able to demonstrate the rationality of the system design scheme, have the ability to design an automation system meeting performance indicators according to the requirements, and reflect innovative consciousness in the process.	项目综合训练、 自动化专业方向设计、 自动化专业毕业设计
	3.4 能够在设计环节考虑社会、健康、安全、法律、文化和环境等因素。 Be able to consider social, health, safety, legal, cultural and environmental factors in the design process.	思想道德修养与法律基础、 形势与政策、 工程伦理、 工程管理与经济决策
4.研究：能够基于科学原理并采用科学方法对复杂工程问题进行理论和实验研究，能够理解或提出实验目标和实验方案，设计实施实验，并对实验结果进行分析，通过信息综合得到合理有效的结论。 Research： be able to study complex engineering problems based on scientific principles and methods, have the ability to understand or propose experimental objectives and schems, design and implement experiments based on scientific principles, analyze experimental results, and obtain reasonable and effective conclusions through information synthesis.	4.1 能够理解或提出实验目标，设计并实施实验，对自然科学、电路、电子元器件等相关的物理现象、电气特性进行理论研究和实验分析。 Be able to understand or propose experimental objectives, design and implement experiments, conduct theoretical study and experiemntal analysis of physical phenomena and electrical characteristics related to natural sciences, circuits, electronic components, etc.	电子技术课程设计、 大学物理实验、 电路分析基础实验、 模拟电子技术实验、 数字电子技术实验
	4.2 基于科学原理并采用科学方法对元部件、自动控制系统、计算机输入输出接口等制订实验方案并实施，以获取实验数据并进行分析。 Using scientific methods to develop and implement experimental programs for element components, automatic control system, computer input and output interface etc. based on scientific principles, to obtain and analyze experimental data.	自动控制理论实验、 电机与拖动实验、 检测技术实验、 计算机原理及应用实验、 电力电子技术实验
	4.3 能够基于科学原理、采用科学方法对复杂工程问题进行理论和实验研究，能够分析和解释实验数据，并通过信息综合得到系统优化等合理有效的结论。 Be able to conduct analysis and experimental research on complex engineering problems based on scientific principles and methods, analyze and interpret experimental data, and obtain reasonable and effective conclusions such as system optimization through information synthesis.	概率论与数理统计、 过程控制与仪表（运动控制）、 检测技术课程设计、 计算机控制系统课程设计、 自动化专业毕业设计
5.使用现代工具：能够合理选择恰当的技术、信息资源、编程语言、仿真工具，解决自动化领域的复杂工程问题或者对其进行辅助设计、预测模拟，并能理解其局限性。	5.1 能够理解相关技术、信息资源、编程工具等的作用、功能，认知其适用场合。 Be able to understand the functions of related technologies, information resources and programming tools, and understand their application occasions	自动化专业导论 1、 工业数据通信与控制网络、 单片机基础与实践、 程序设计基础（C 语言）
	5.2 掌握一门程序设计语言，并能加以利用，以解决自动化领域的实际问题。 Master a programming language and be able to use it to solve practical problems in the field of automation	电气控制与 PLC、 计算机原理及应用实验、 单片机基础与实践、 程序设计基础（C 语言）

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
Usage of modern tools：be able to select appropriate technologies, information resources, programming languages and simulation tools to solve engineering problems in the field of automation or to assist in design, prediction and simulation, and capable of understanding their limitation.	5.3 能够使用恰当的仿真、计算、电子设计或其他工程工具对自动化领域中的复杂工程问题进行辅助设计、预测和模拟，并能理解其局限性。 Be able to assist in design, predict, and simulate complex engineering problems in the field of automation using appropriate simulation, calculation, electrical design or other engineering tools and understand their limitations.	模拟电子技术实验、 数字电子技术实验、 PLC 项目实践（嵌入式项目实践）、 过程控制与仪表（运动控制）
6.工程与社会：能够基于工程相关背景知识进行合理分析，评价自动化专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律及文化等的影响，并理解应承担的责任。 Engineering and society： be able to make rational analysis based on engineering-related background knowledge, evaluate the impact of automation engineering practice and complex engineering problem solution on society, health, safety, law and culture, and understand the responsibilities.	6.1 能够认知和解释自动化专业相关的知识产权、产业政策和法律法规，理解不同社会文化的差异。 Be able to understand and interpret intellectual property, industrial policies, laws and regulations related to automation specialty, and comprehend differences between different social cultures.	入学教育、 自动化专业导论 1、 思想道德修养与法律基础、 形势与政策
	6.2 能够理解工程技术人员在专业工程实践和自动化系统中应承担的社会责任；能够评价专业工程实践和自动化系统对社会、健康、安全、法律以及文化的影响。 Be able to understand the social responsibilities of engineering technicians in professional engineering practice and automation system； have the ability to evaluate the impact of professional engineering practices and automation systems on society, health, safety, law, and culture.	创新创业基础、 创新创业实践课程、 自动化专业生产实习、 自动化专业毕业实习、 工程伦理
7.环境和可持续发展：能够理解和评价自动化专业领域的工程实践对环境、社会可持续发展的影响。 Environment and sustainable development： be able to understand and evaluate the impact of engineering practices in the field of automation on environmental and social sustainable development.	7.1 能够认知环境保护和社会可持续发展的内涵和意义，并在实习、社会实践等项目中践行。 Be able to understand the connotation and significance of environmental protection and social sustainable development, and implement in internship, social practice and other projects.	入学教育、 自动化专业导论 1、 就业创业基础、 自动化专业认识实习、 自动化专业生产实习
	7.2 能够评价自动化领域的工程应用对环境、社会可持续发展的影响。 Be able to evaluate the impact of engineering applications in the field of automation on environmental and social sustainable development	自动化专业毕业实习、 自动化专业生产实习、 项目综合训练、 工程伦理
8.职业规范：具有人文社会科学素养、社会责任感，能够在自动化专业领域的工程实践中理解并遵守工程职业道德和规范，履行责任。 Professional norms ： Possessing humanistic, social science literacy, and social responsibility, be able to understand and comply with engineering professional ethics and standards and fulfill responsibilities in the engineering practice of automation field.	8.1 具有人文社会科学素养，能够形成正确的世界观、人生观和价值观。 Possess humanistic, social science literacy, and be able to form correct outlooks on world, life and value.	中国近现代史纲要、 毛泽东思想与中国特色社会主义理论体系概论、 马克思主义基本原理概论
	8.2 具有健康的身体和心理，具备履行社会责任的基础。 Have a healthy body and mind, possess the foundation to fulfill the social responsibilities.	体育俱乐部、 运动基础、 军事理论、 大学生心理健康教育
	8.3 能够在自动控制系统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。 Be able to understand and follow engineering ethics and codes as well as to fullfil responsibilities in engineering practice of automatic control system.	思想道德修养与法律基础、 思想政治理论课实践教学、 创新创业实践系列项目、 工程伦理、 自动化专业认识实习

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
9.个人和团体：能够在多学科背景的团体中承担个体、团队成员以及负责人的角色。 Individuals and teams： be able to assume the roles of individual, team member, and leader in a multi-disciplinary group.	9.1 具备良好的团队协作意识，能够与其他学科成员协作互补。 Posseess with good teamwork spirit, be able to cooperate with other discipline members.	军事理论、 军事技能训练、 工程训练、 思想政治理论课实践教学
	9.2 能够独立完成团队分配的工作，胜任团队成员的角色，组织团队成员开展工作。 Be able to complete the assigned work independently, be competent to play the role of team members, and organize team members to carry out work.	工程训练、 PLC 项目实践（嵌入式项目实践）、 项目综合训练、 自动化专业方向设计、 自动化专业毕业实习
10.沟通：能够就自动化专业领域的复杂工程问题与同行及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。有一定的国际视野，能够在跨文化背景下进行沟通和交流。 Communication： be able to effectively communicate and exchange with peers and the public on complex engineering issues in the professional field of automation, including writing reports and design drafts, making presentations, and clearly expressing or responding to instructions. Have a certain international prospective and be able to communicate and exchange in a cross-cultural context.	10.1 能够就自动化领域的复杂工程问题，通过文稿、图表、口头表达等方式进行表达，回应质疑，与业界同行及社会公众进行有效沟通和交流。 Be able to express complex engineering problems in the field of automation through manuscripts, charts, oral expression, etc., have the ability to respond to questions, and communicate effectively with industry peers and the public.	PLC 项目实践（嵌入式项目实践）、 项目综合训练、 检测技术课程设计、 自动化专业毕业设计、 电子技术课程设计
	10.2 能够阅读外文文献资料，在跨文化背景下进行沟通和交流，理解不同文化的差异性、多样性；了解本专业国际发展趋势、研究热点，有一定的国际视野。 Be able to read foreign literature, communicate and exchange in cross-cultural context, understand the differences and diversities of different cultures. Understand the international development trend and research hotspot of this major, and possess a certain international perspective.	综合外语 1、 综合外语 2、 综合外语 3、 综合外语 4、 信号与系统、 自动化专业导论 2、 人工智能三选一
11.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。 Project management：understanding and mastering the engineering management principles and economic decision-making methods, capable of applying these principles and methods in a multi-disciplinary environment.	11.1 理解自动化领域工程活动涉及的重要经济与管理因素。 Understand the important economic and management factors involved in engineering activities in the field of automation.	马克思主义基本原理概论、 工程训练、 工程管理与经济决策、 自动化专业生产实习、 项目综合训练
	11.2 具备在多学科环境中对工程问题进行经济分析、决策和管理的能力。 Be able to conduct economic analysis, decision-making and management of engineering problems in a multidisciplinary environment.	工程管理与经济决策、 自动化专业方向设计、 自动化专业毕业设计
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。 Lifelong study ： having the consciousness of self-learning and life-long learning, possessing the ability of continuous learning and adaptive development.	12.1 能认识不断探索和学习的必要性，具备自主学习和终身学习的意识。 Understand the necessity of continuous exploration and learning, have the awareness of independent learning and lifelong learning.	马克思主义基本原理概论、 毛泽东思想与中国特色社会主义理论体系概论、 自动化专业认识实习
	12.2 能够通过学习不断提高，适应工程技术的发展，适应社会竞争与合作。 Have the ability to improve through learning, adapt to the development of engineering technology, adapt to social competition and cooperation.	电子技术课程设计、 自动化专业毕业实习、 自动化专业毕业设计

毕业要求与培养目标的支撑关系

培养目标 毕业要求	培养目标 1	培养目标 2	培养目标 3	培养目标 4
毕业要求 1		√		√
毕业要求 2		√		√
毕业要求 3		√		
毕业要求 4		√		
毕业要求 5		√		√
毕业要求 6	√			
毕业要求 7	√			
毕业要求 8	√			
毕业要求 9			√	
毕业要求 10			√	
毕业要求 11			√	
毕业要求 12				√

五、教学进程计划表（Courses Schedule for the Major）

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
通识教育平台（必修） General Education Courses（Required）								
1	XG160010	入学教育 Entrance education	0.5	8		8	1	
2	FX160020	大学生心理健康教育 Psychological health education of college students	1	16	8	8	1	
3	GF190010	军事理论 Military Theory	0.5	36	20（授课）+ 16（网络）		1	

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
					总学时 Total	理论学时 Class	实践学时 Practice		
4	BW190010	军事技能训练 Military Skill Training		0.5	112		14 天	1	
5	自选项目	体育俱乐部 Sports Club		2	60	0	60	1-7	
6	TY190010	运动基础 Sports Fundamental		1	28	0	28	1	
7	自选项目	体育选项 Sports Options	限选 2 学分	1	28	0	28	2-7	
8	TY190020	游泳 Swimming		1	28	0	28	2、4、6	
9	TY190030	团体操 Group Callisthenics		1	28	0	28	3、5、7	
10	MY160210	思想道德修养与法律基础 Thought Morals Tutelage and L egal foundation		3	48	48	0	2	
11	XX190360	工程伦理 Engineering Ethics		1	16	16		2	
12	MY160360	中国近现代史纲要 Conspectus of Chinese Modern History		2	32	32	0	1	
13	MY160080	马克思主义基本原理概论 Introduction to the basic principles of Marxism		3	48	48	0	3	
14	JG192130	工程管理与经济决策 Engineering Management and Economic Decision		1	16	16		3	
15	MY160110	毛泽东思想与中国特色社会主义理论体系概论 An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics		4	64	64	0	4	
16	MY190011	形势与政策 1 Situation and Policy 1		0.25	8	8	0	1	
	MY190012	形势与政策 2 Situation and Policy 2		0.25	8	8	0	2	
	MY190013	形势与政策 3 Situation and Policy 3		0.25	8	8	0	3	
	MY190014	形势与政策 4 Situation and Policy 4		0.25	8	8	0	4	
	MY190015	形势与政策 5 Situation and Policy 5		0.25	8	8	0	5	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
	MY190016	形势与政策 6 Situation and Policy 6	0.25	8	8	0	6	
	MY190017	形势与政策 7 Situation and Policy 7	0.25	8	8	0	7	
	MY190018	形势与政策 8 Situation and Policy 8	0.25	8	8	0	8	
17	MY160280	思想政治理论课实践教学 The Practical Teaching of Ideological and Political Theory	2	32	0	32	3	
18	WY160371	综合英语 1 Comprehesive English 1	3	48	48	0	1	
19	WY160372	综合英语 2 Comprehesive English 2	3	48	48	0	2	
20	WY160203	综合英语 3 Comprehesive English 3	2	32	32	0	3	
21	WY160104	综合英语 4 Comprehesive English 4	2	32	32	0	4	★
22	JW190010	创新创业基础 Fundamentals of Innovation and Entrepreneurship	2	32	32		4	
小计 Subtotal			37.5	796	494			
学科（大类）教育平台（必修） Discipline Coureses （Required）								
1	LX160071	高等数学 A1 Advanced Mathematics A1	6	96	96	0	1	
2	LX160072	高等数学 A2 Advanced Mathematics A2	6	96	96	0	2	★
3	LX190020	概率论与数理统计 Probability and Mathematical Statistics	3	48	48	0	5	
4	LX190010	线性代数 Linear Algebra	3	48	48	0	2	
5	LX190030	复变函数与积分变换 Complex Variable Functions and Integral Transformation	3	48	48	0	3	
6	LX190071	大学物理 C1 College Physics C1	3	48	48	0	2	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
7	LX190072	大学物理 C2 College Physics C2	3	48	48	0	3	
8	LX190101	大学物理实验 B1 College Physics Experiment B1	1	16	0	16	3	
9	LX190102	大学物理实验 B2 College Physics Experiment B2	1	16	0	16	4	
10	JK160210	程序设计基础 B（C 语言） C Language Programming Foundation B	2	32	32	0	1	★
11	JK160170	程序设计基础 B（C 语言）实验 Experiment of C Language Programming Foundation B	1	16	0	16	1	
12	GC160040	工程训练 D Engineering Training D	2	32	0	2 周	3	
小计 Subtotal			34	544	464			
专业教育平台（必修） Major Courses （Required）								
1	XX191091	自动化专业导论 1（新生研讨） Introduction to Automation1	0.5	8	8	0	1	
2	XX191092	自动化专业导论 2（学科新进展） Introduction to Automation2	0.5	8	8	0	4	
3	XX190180	单片机基础与实践 SCM Basis and Practice	1.5	24	24	0	1	
4	XX190190	单片机基础与实践课程实验 Experiments of SCM Basis and Practice	1	16	0	16	1	
5	XX160031	电路分析基础 A1 Circuit Analysis Fundamentals A1	2	32	32	0	2	★
6	XX160032	电路分析基础 A2 Circuit Analysis Fundamentals A2	2	32	32	0	3	★
7	XX160041	电路分析基础实验 A1 Experiments of Circuit Analysis FundamentalsA1	0.5	8	0	8	2	
8	XX160042	电路分析基础实验 A2 Experiments of Circuit Analysis FundamentalsA2	0.5	8	0	8	3	
9	XX160700	模拟电子技术 Analog Electronic Technology	3.5	56	56	0	3	
10	XX160880	数字电子技术 Digital Electronic Technology	3.5	56	56	0	4	★

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
11	XX160710	模拟电子技术实验 Experiments of Analog Electronic Technology	1	16	0	16	3	
12	XX161740	数字电子技术实验 A Digital Electronic Technological Experiment A	1	16	0	16	4	
13	XX160610	计算机原理及应用 Computer Principles and Applications	3	48	48	0	5	
14	XX160620	计算机原理及应用实验 Experiments of Computer Principles and Applications	0.5	8	0	8	5	
15	XX161180	信号与系统 D（双语） Signalsand Systems D	2	32	32	0	4	
16	XX161930	自动控制理论 C Automatic Control Theory C	4	64	56	8	5	★
17	XX161600	工业数据通信与控制网络 Industrial Data Communication and Control Network	2.5	40	32	8	4	
18	XX160200	电机与拖动 Electrical Machinery and Towage	2.5	40	40	0	4	★
19	XX160210	电机与拖动实验 Experiments of Electrical Machinery and Towage	1	16	0	16	4	
20	XX161560	电力电子技术 A Power Electronic Technology A	3	48	40	8	5	★
21	XX161650	检测技术 C Detection Technology C	2.5	40	32	8	5	★
22	XX190390	计算机控制系统 Computer Control System	2.5	40	32	8	6	
23	XX190400	计算机控制系统课程设计 Course Design of Computer Control System	1	16		1 周	6	
24	XX160400	电子技术课程设计 Course Design of Electronic Technology	2	32	0	2 周	4	
25	XX161660	检测技术课程设计 Course Design of Detection Technology	1	16	0	1 周	5	
26	XX161890	项目综合训练 Project Comprehensive Training	2	32	0	2 周	7	
27	XX161300	自动化专业认识实习 Cognition Practice of Automation	1	16	0	1 周	2	
28	XX161310	自动化专业生产实习 Production Practice of Automation	2	32	0	2 周	6	

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
					总学时 Total	理论学时 Class	实践学时 Practice		
29	XX161320	自动化专业综合设计 Comprehensive Design of Automation		3	48	0	3 周	7	★
30	XX161290	自动化专业毕业实习 GraduationPracticeofAutomation		3	48	0	3 周	8	
31	XX161280	自动化专业毕业设计 GraduationDesignofAutomation		12	192	0	12 周	8	
小计 Subtotal				68	1088	528			
个性化培养平台（选修课） Customized Education Courses（Selective）									
1			创新创业微学分选修 Entrepreneurship and InnovationElective Course	3	学术报告/科研项目/创新创业项目/科技竞赛等，1-8 学期开设				
2			素质选修课 Quality Elective Course	5	学生需至少选择 5 学分，1-8 学期开设				
3	XX160510	限选其一	工程电磁场 Engineering Electromagnetics	2.5	40	40		4	
4	ZZ160450		工程制图 Engineering drafting	2	32	32		4	
5	XX190890		系统建模与仿真 System Modeling and Simulation	2	32	16	16	5	
6	XX190300	至少选其中一个模块	PLC 模块 电气控制与 PLC Electrical Control and PLC	2.0	32	32		6	
7	XX190310		PLC 模块 电气控制与 PLC 实验 Experiments of Electrical Control and PLC	1	16		16	6	
8	XX161500		PLC 项目实践 Project practice of PLC	1	16		16	6	
9	XX190470		嵌入式模块 嵌入式系统设计 A Embedded Sytem Design A	1.5	24	24		6	
10	XX190480		嵌入式模块 嵌入式系统设计 A 实验 Experiments of Embedded Sytem Design A	1.5	24		24	6	
11	XX190510		嵌入式模块 嵌入式系统项目实践 Project practice of Embedded system	1	16		16	6	

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
					总学时 Total	理论学时 Class	实践学时 Practice		
12	XX161620	限选其一	过程控制及仪表 Process Control and Instrument	2.5	40	32	8	6	
13	XX191050		运动控制 Motion Control	2.5	40	32	8	6	
14	XX161110	现代控制理论 Modern control theory		2	32	32	0	6	
15	XX161610	供配电系统 Power Supply and Distribution System		3	48	40	8	5	
16	XX160720	限选其一	模式识别导论 Introduction toPattern Recognition	2	32	32	0	5	
17	XX190520		人工智能基础 Fundamentals of Artifical Intelligence	2	32	32	0	5	
18	XX190620		数据挖掘 E Data Mining E	2	32	32	0	5	
19	XX160540	机器人技术及应用 Robot Techniques and Application		2	32	24	8	7	
20	JK160480	计算机网络 DX Computer Network DX		2	32	24	8	4	
21	XX161760	数字信号处理 Digital Signal Processing		3	48	40	8	6	
22	XX160460	旋翼飞行器入门 Introduction to Multi-Rotor Aircraft		2	32	24	8	6	
23	XX161270	智能控制 Intellegent control		2	32	32	0	6	
24	XX161150	新能源技术与电源管理 New Energy Technology and Power Management		2	32	32	0	7	
25	XX190220	电磁兼容导论 Introduction toelectromagnetic compatibility		2	32	32	0	6	
26	XX190010	C++语言程序设计及应用 C++ Programming and Application		1.5	24	24		7	
27	XX190020	C++语言程序设计及应用实践 Practice of C++ Programming and Application		1.5	24		24	7	
28	XX160750	软件技术基础 Basis of Software Technique		2	32	32	0	7	
29	ZZ161080	机械设计基础 B Fundamentals of Mechanical Design		3	48	48	0	7	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
小计 Subtotal			30.5/62.5					

六、集中实践环节（ Intensive Practical Training Courses）

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	实践学时 PracticeHours	开课学期 Semester	学位课 Diploma Course
1	JK160170	程序设计基础 B（C 语言）实验 Experiment of B Language Programming Foundation C		1	16	1	
2	XX190190	单片机基础与实践实验 Experiments of SCM Basis and Practice		1	16	1	
3	XX160041	电路分析基础实验 A1 Experiments of Circuit Analysis FundamentalsA1		0.5	8	2	
4	XX160042	电路分析基础实验 A2 Experiments of Circuit Analysis FundamentalsA1		0.5	8	3	
5	XX160710	模拟电子技术实验 Experiments of Analog Electronic Technology		1	16	3	
6	XX161740	数字电子技术实验 A Digital Electronic Technological Experiment A		1	16	4	
7	XX160620	计算机原理及应用实验 Experiments of Computer Principles and Applications		0.5	8	5	
8	XX160210	电机与拖动实验 Experiments of Electrical Machinery and Towage		1	16	5	
9	XX190310	限选其一	电气控制与 PLC 实验 Experiments of Electrical Control and PLC	1	16	6	
10	XX190480		嵌入式系统设计 A 实验 Experiments of Embedded Sytem Design A	1	16	6	
11	XX190400	计算机控制系统课程设计 Course Design of Computer Control System		1	1 周	6	
12	GC160040	工程训练 D Engineering Training D		2	2 周	3	
13	XX160400	电子技术课程设计 Course Design of Electronic Technology		2	2 周	4	
14	XX161660	检测技术课程设计 Course Design of Detection Technology		1	1 周	5	

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	实践学时 PracticeHours	开课学期 Semester	学位课 Diploma Course
15	XX161500	限选其一	PLC 项目实践 Project practice of PLC	1	1 周	6	
16	XX190510		嵌入式系统项目实践 Project practice of Embedded system	1	1 周	6	
17	XX161890	项目综合训练 Project Comprehensive Training		2	2 周	7	
18	XX161300	自动化专业认识实习 Cognition Practice of Automation		1	1 周	2	
19	XX161310	自动化专业生产实习 Production Practice of Automation		2	2 周	6	
20	XX161320	自动化专业综合设计 Comprehensive Design of Automation		3	3 周	7	★
21	XX161290	自动化专业毕业实习 Graduation Practice of Automation		3	3 周	8	
22	XX161280	自动化专业毕业设计 Graduation Design of Automation		12	12 周	8	
小计 Subtotal				37.5			

七、核心课程和学位课程（Core Courses and Diploma Courses）

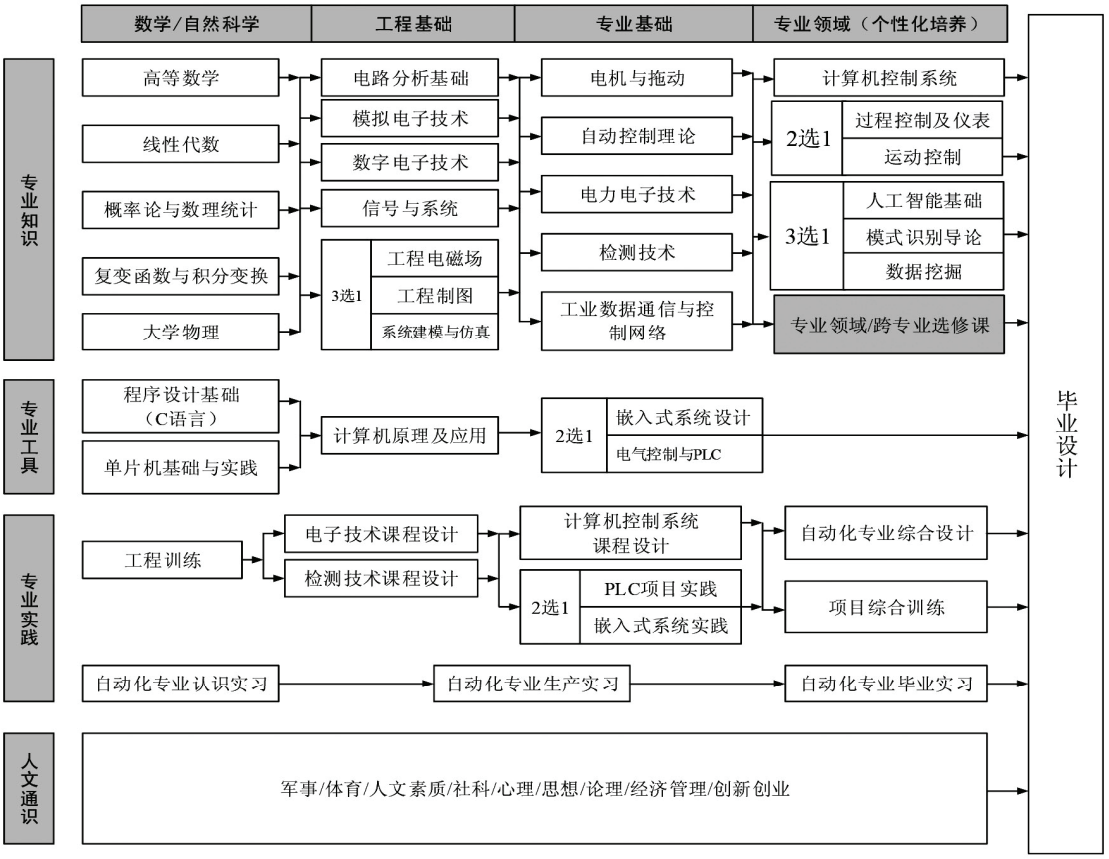
核心课程：单片机基础与实践、程序设计基础 C（C 语言）、电路分析基础 A1、电路分析基础 A2、模拟电子技术、数字电子技术、自动控制理论、计算机原理及应用、信号与系统 D、工业数据通信与控制网络、电机与拖动、电力电子技术、检测技术、过程控制及仪表（运动控制）、计算机控制系统等。

Core Courses： SCM Basis and Practice , Programming Foundation C（C Language）,Circuit Analysis Fundamentals A1, Circuit Analysis Fundamentals A2, Analog Electronic Technology, Digital Electronic Technology, Automatic Control Theory, Signalsand Systems D，Industrial Data Communication and Control Network, Electrical Machinery and Towage, Power Electronic Technology, Detection Technology, Process Control and Instrument（Motion Control）, Computer Control System, etc.

学位课程：高等数学 A2、程序设计基础 C（C 语言）、电路分析基础 A1、电路分析基础 A2、数字电子技术、自动控制理论、电机与拖动、电力电子技术、检测技术、自动化专业综合设计等。

Degree Courses：Advanced Mathematics A2, Programming Foundation C（C Language）, Circuit Analysis Fundamentals A1, Circuit Analysis Fundamentals A2, Digital Electronic Technology, Automatic Control Theory, Electrical Machinery and Towage, Power Electronic Technology, Detection Technology, Project Comprehensive Training, etc.

八、课程体系结构图（The Curriculum Chart）



九、学制及学分要求（(Duration of Schooling and Credit Requirements)）

1. 学制（Length of Schooling）：4 年（Four years）
2. 学分要求（Required credits）：学生在校期间必须修满本方案规定的 170 学分方能毕业，其中，各环节的具体学分要求如下表。

The students must complete 170 credits stipulated in this program before they can graduate from this major. Among them, the specific credit requirements for each link are as follows.

	通识教育平台 General Education Courses	学科（大类）教育平台 Discipline Coureses	专业教育平台 Major Courses	个性化培养平台 Customized Education Courses	总学分 Total Credits
必修课 Required Courses	37.5	34	68	3/	170
选修课 SelectiveCourses	7/	2/6	21.5/38	30.5	

十、授予学位（Degree Conferred）

毕业时符合学位授予条件的，授予工学学士学位。

A bachelor's degree in engineering shall be awarded to those students who meet the conditions fo r conferring degrees upon graduation.

十一、说明（Notes）

1.各学期应修学分建议（Credit Allotment for Each Semester）

学期 Semester	一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th	学分合计 Total
建议应修学分 Credits	21	26	26	27	22	19	14	15	170

2.个性化培养平台中 PLC 模块和嵌入式模块至少应全部选择其中一个模块的所有课程，在此基础上可以再选择另一个模块的课程，但实验不能脱离理论单独选，项目训练必须在课程和实验的基础上选择。

2. The PLC module and the embedded module in the personalized training platform should select at least all the courses of one of the modules. On this basis, another module can be selected, but th e experiment can not be separated from the theory. The project training must be in the course. And c hoose based on experiments.

生物医学工程专业本科人才培养方案

Undergraduate Program for the Major of Biomedical Engineering

专业负责人：周颖玥　主管院长：姚远程　院学术委员会主任：邹传云

Director of Specialty： Yingyue Zhou　Executive Dean： Yuancheng Yao

Academic Committee Director： Chuanyun Zou

一、专业简介（Brief Introduction to the Major）

生物医学工程是将工程学原理和方法用于生物医学领域，研制用于预防、诊断、治疗疾病及促进健康的医疗设备、智能诊断系统、生物材料等，涉及生物、物理、数学、化学、计算机、电子信息工程等学科的知识，是一门多学科融合的专业。生物医学工程在国家发展和经济建设中具有重要战略地位，高端医学仪器是国家科技水平和核心竞争力的重要标志。我校生物医学工程专业依托信息工程学院充足的师资配备和实践资源，形成了医学电子仪器、智能医学信息处理两个专业培养方向。医学电子仪器方向以医学传感技术和电子信息技术为核心，针对医学临床中的实际问题设计开发生理信号检测设备、诊疗设备等，由电路分析基础、数字/模拟电子技术、计算机原理及应用、医学传感与检测、医学仪器等课程组成方向主干课。智能医学信息处理方向以医学信号和医学影像的智能分析为目标，掌握经典和现代的医学信息处理技术以及模式识别方法，为“人工智能+医疗”课题和项目的开展打下坚实基础，由信号与系统、医学信号处理、医学成像技术、医学图像处理、模式识别与人工智能基础等课程组成方向主干课。本专业自 2001 年夏季开始招生，至今已为社会培养 1000 多名行业优秀人才。

Biomedical engineering （BME） is the application of engineering principles and methods in the field of biomedicine, and the development of medical equipment, intelligent diagnostic system and biomaterials for the prevention, diagnosis, treatment of diseases and health promotion. It involves the knowledge of biology, physics, mathematics, chemistry, computer, electronic information engineering, etc. It is a specialty with the characteristic of multidisciplinary integration. BME plays an important strategic role in the national development and economic construction. High-level medical instruments are an important symbol of national scientific and technological level and core competitiveness. The specialty of BME in Southwest University of Science and Technology （SWUST） relies on the abundant teaching staff and practical resources in the School of Information Engineering, forming two main directions： medical electronic instrument and intelligent medical information processing. The direction of medical electronic instrument focuses on the medical sensing technology and electronic information technology. It designs and develops the physiological signal detection equipment, the diagnostic and therapeutic equipments, etc., aiming at some practical problems in the field of medical clinic. It includes some core courses, such as Circuit Analysis Fundamentals, Digital/Analog Electronic Technology, Computer Principles and Applications, Sensor and Measure of Biomedicine, Medical Instrumentation. The direction of intelligent medical information processing aims at the intelligent analysis of

medical signals and medical images. It requires the students to master the classical and modern methods of medical information processing and pattern recognition for laying a solid foundation to develop the projects about 'Artificial Intelligence + Medical Treatment'. It consists of the core courses like Signals and Systems, Medical Signal Processing, Medical Imaging Technology, Medical Image Processing and Foundation of Pattern Recognition and Artifical Intelligence. Since the summer of 2001, our university has enrolled the students of BME. To this day, BME specialty of our university has trained more than 1000 personnels of the related professions for the society.

二、培养目标（Education Objectives）

本专业培养能够综合运用自然科学、工程科学的基础理论与专业知识，分析和解决生物医学工程专业领域的复杂工程问题，具备在生物医学工程或相关工程领域进行技术开发与服务、系统集成、设备运行维护、工程项目的实施管理等方面的工作能力，能在团队中进行有效交流与合作，具有较高的思想政治素质、社会责任感、职业道德、创新意识和善于学习的"研究与应用型"复合人才。学生毕业 5 年左右的预期目标具体为：

1. 道德修养：具有较高的思想政治素质、职业道德、社会责任感，能够在工程实践中遵守职业规范，履行责任；

2. 问题解决：能够综合运用自然科学、工程科学的基础理论与专业知识，分析和解决生物医学工程领域的复杂工程问题，尤其在医学电子仪器、智能医学信息处理这两个方向上具有创新意识和较强的工程实践能力；

3. 协作能力：具有良好的团队协作能力和一定的领导能力，能够有效地进行交流合作，具备一定的国际视野；

4. 学习能力：具有自主学习和终身学习的意识，能够不断学习，实现工作能力的自我提升；

5. 社会服务：适应社会竞争与合作，愿意且能够为地方经济、国家建设服务，能够从事生物医学工程或相关工程领域的技术开发、系统集成、设备运行维护、工程项目的实施管理等工作。

This specialty trains the 'Research and Application-oriented' compound talents with the abilities of comprehensively appling the basic theories and professional knowledge of natural science and engineering science to analyze and solve complex engineering problems in the field of biomedical engineering. The students should have the ability of technology development and service, system integration, equipment operation and maintenance, project implementation and management in the field of biomedical engineering or some related engineering fileds. They can communicate and cooperate with other people effectively in the team. They should have the high ideological and political quality, social responsibility, professional ethics, innovative consciousness and the ability to learn. Expected targets after 5 years of graduation are as follows：

1. Moral accomplishment. Students should have high ideological and political quality, professional ethics and social responsibility, and can abide by professional norms and fulfill their responsibilities in the

engineering practices.

2. Problem solving. Students should have the ability to analyze and solve the complex engineering problems in the field of biomedical engineering by using the basic theory and professional knowledge of natural science and engineering science, and have the innovative consciousness and the strong engineering practice ability, especially in the directions of medical electronic instrument and intelligent medical information processing.

3. Collaboration ability. Students should have the good teamwork spirit and a certain leadership ability, be able to effectively communicate and cooperate, and own a certain international perspective.

4. Learning ability. Students should have the consciousness of self-learning and lifelong learning, and be able to continuously learn for self-improvement of working ability.

5. Social Services. Students need to adapt for social competition and cooperation, be willing and able to serve the local economy and national construction, and be able to engage in the work, such as technology development, system integration, equipment operation and maintenance, project implementation and management in the field of biomedical engineering or other related engineering fields.

三、毕业要求（Graduation Requirements）

毕业生应获得以下几方面的知识和能力：

1. 工程知识：能够将数学、自然科学、工程学等领域的理论、方法等知识与生物医学工程领域中的特定问题相结合，并将这些知识有效运用于医学电子仪器或软件系统的设计与应用等复杂工程问题中。

2. 问题分析：能够根据生物医学工程领域特定问题的属性，通过文献研究、数学建模、工程推理等手段，识别和表达待解决的医学信号传感、检测、识别或处理等复杂工程问题，并分析和判断问题中的难疑点，以获得正确的原理模型等有效结论。

3. 设计/开发解决方案：针对生物医学工程领域中所出现的复杂工程问题，设计满足需求的系统方案、硬件电路、关键算法等，并能够在设计环节中融入创新点，同时全面考虑对社会、健康、安全、法律、文化以及环境等方面所可能产生的影响，从而优化系统或算法的整体性能。

4. 研究：针对生物医学工程领域中特定问题的一般性和特殊性，采用数学建模、软硬件仿真、数据结果分析、实验设计等科学方法，研究目标问题的科学原理、关键参数的影响以及系统的稳定性及可靠性等，并能综合对目标问题各方面的研究获得合理的研究思路或结论。

5. 使用现代工具：针对生物医学工程领域中的复杂工程问题，选择与使用恰当的软硬件设计开发工具实现目标问题，并通过分析软硬件系统的输出结果理解所用技术或工具的局限性。

6. 工程与社会：能够基于工程相关背景知识进行合理分析，评价生物医学工程实践活动以及所设计的医学电子仪器或软件系统等对人体健康、社会伦理、安全、法律以及区域文化可能产生的影响，并理解应承担的责任，配合相关部门制定权益规范。

7. 环境和可持续发展：能够基于环境保护、人文社会等领域的相关背景知识，理解和评价在医学电

子仪器或软件系统等研发或应用过程中，专业实践活动对环境、社会可持续发展的影响。

8. 职业规范：具有人文社会科学素养、社会责任感，能够在解决生物医学工程领域的复杂工程问题中理解并遵守工程职业道德和规范，履行法定或社会约定的责任。

9. 个人和团队：生物医学工程是多学科融合的专业，在生物医学、工程学、社会学等多学科背景下的团队中，要能够承担个体、团队成员以及负责人的角色。

10. 沟通：能够在医学电子仪器或软件系统等的设计、开发、调测、应用过程中，与业界同行及社会公众进行有效沟通和交流，同时具备一定的国际视野，能够在跨文化背景下针对产品研发、应用或推广进行有效沟通和交流。

11. 项目管理：理解并掌握工程管理原理与经济决策方法，并在医学电子仪器或软件系统研发或应用过程中加以运用，具有良好的项目组织、协调和管理能力。

12. 终身学习：具有自主学习的意识，能够利用互联网、图书馆等资源，实践自主学习。同时，具备终身学习的意识，不断更新和学习与生物医学工程专业相关的知识，适应时代发展，勇于开拓生物医学工程专业美好的未来，造福人类。

The graduates should acquire the following knowledge and abilities：

1. Engineering knowledge. The students should be able to combine the theories and methods of mathematics, natural science, engineering and other fields with the specific problems in biomedical engineering, and effectively apply the knowledge into the complex engineering problems such as design or application of medical electronic instruments or software systems.

2. Problem analysis. According to the properties of specific issues in the field of biomedical engineering, the students should be able to discriminate and express the complex engineering problems to be solved, such as medical signal sensing, detecting, identifying, or processing, and analyze the difficult technical points to obtain the correct principle model or other effective conclusions by means of literature studying, mathematical modeling, engineering reasoning and so on.

3. Design/development of solutions. For the complex engineering problems appearing in the field of biomedical engineering, the students should be able to design the system scheme, hardware circuit, key algorithm to meet the requirements, and be able to integrate the innovation in the design stage, at the same time to fully consider the possible impact on the social, health, safety, law, cultural and environment etc. For optimizing the overall performance of the system or equipment.

4. Research. For the generality and particularity of specific problems in biomedical engineering, the students should be able to use mathematical modeling, software and hardware simulation, data analysis, experimental design or other scientific methods to study the scientific principle of target problem, the influence of key parameters, the system stability and reliability and so on. Besides, they should combine the various aspects of research for the target problem to obtain the reasonable and effective research route or conclusion.

5. Modern tool utilization. For the complex engineering problems in biomedical engineering, the students should be able to select and use the appropriate software and hardware design and development tools to achieve the target problems, and be able to understand the limitations of the used technologies or tools by analyzing the output of hardware and software systems.

6. Engineering and society. Based on the reasonable analysis of engineering related background knowledge, the students should be able to evaluate the possible influence of biomedical engineering practice and the designed medical electronic instruments or software systems on human health, social ethics, security, law and regional culture. Besides, they should be able to understand the responsibilities and cooperate with the relevant departments to formulate the rights and interests norms.

7. Environment and sustainable development. Based on the related background knowledge about environmental protection and human society, the students should be able to understand and evaluate the impact of professional practice activities on environment and social sustainable development in the process of research and application of medical electronic instruments or software systems.

8. Professional ethics. The students should be able to possess humanistic and social science literacy and social responsibility, understand and abide the engineering ethics and norms when solving the complex engineering problems of biomedical engineering and fulfill responsibilities.

9. Individuals and groups. Biomedical engineering is a major of multidisciplinary Integration. Therefore, the students should be able to undertake the roles of individual, team member and responsible person in the team with multidisciplinary background such as biomedicine, engineering, sociology and so on.

10. Communication. In the processes of designing, development, testing and application of the medical electronic instruments or software systems, the students should be able to have the effective communication with the industry peers and the public. Besides, they should have a certain international vision and be able to communicate effectively for the product development, application or promotion in the cross-cultural background.

11. Project management： The students should be able to understand and master the principles of engineering management and the methods of economic decision and apply them into the development or application of medical electronic instruments or software systems, with good capabilities of project organization, coordination and management.

12. Lifelong learning. The students should possess the consciousness of independent learning, and be able to use the Internet, library and other resources to practice self-study. At the same time, they should have lifelong learning consciousness, constantly update and learn the knowledge related to biomedical engineering, adapt to the development of the times, open up the future of biomedical engineering, and benefit mankind.

四、培养目标实现矩阵（毕业要求与课程的对应矩阵）Realization Matrix of Educational Objectives （Graduation Requirements by Courses）

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Index Point（Requirements for Competence and Knowledge）	支撑课程或培养环节 Supporting Courses or Training Parts
1. 工程知识 Engineering knowledge	1.1 针对生物医学工程领域中的特定问题，能够将数学、自然科学知识与医学电子仪器或软件系统的研发或应用等复杂工程问题进行关联，并具备对问题进行初步描述的能力。 1.1 For the specific problems in the field of biomedical engineering, the students can correlate mathematical and natural science knowledge with the complex engineering problems such as the development or application of medical electronic instruments or software systems, and have the ability to provide a preliminary description of the problem.	高等数学A1,A2 线性代数 概率论与数理统计 复变函数与积分变换 大学物理B1,B2 普通化学B 普通生物学 人体解剖生理学
	1.2 能够将工程基础知识应用于医学电子仪器或软件系统设计等问题的建模中。 1.2 The students should have the ability to apply engineering basics to the modeling of medical electronic instruments or software system design issues.	电路分析基础A1,A2 模拟电子技术 数字电子技术 信号与系统 程序设计基础B（C语言）
	1.3 能够运用工程专业知识解决医学电子仪器或软件系统设计等复杂工程问题。 1.3 The students should have the ability to apply engineering expertise to solve some complex engineering problems such as medical electronic instruments or software system design.	医学传感与检测技术 医学信号处理 医学仪器 医学成像技术 医学图像处理
2. 问题分析 Problem analysis	2.1 通过对生物医学工程领域特定问题的分析，应用数理知识和工程科学基础知识对待解决的复杂工程问题进行识别、表达和有效分解。 2.1 Through the analysis of specific problems in the field of biomedical engineering, the students can apply mathematics, physics and the basic knowledge of engineering science to identify, express and effectively decompose the complex engineering problems.	高等数学A1,A2 线性代数 概率论与数理统计 复变函数与积分变换 大学物理B1,B2 电路分析基础A1,A2 人体解剖生理学
	2.2 能够针对医学电子仪器或软件系统，识别和表达其复杂工程问题的关键环节和参数，并对有效分解后的问题进行分析。 2.2 The students can identify and express the key links and parameters in the complex engineering problems of medical electronic instruments or software systems, and analyze the problems after effective decomposition.	模拟电子技术 数字电子技术 信号与系统 医学信号处理 医学仪器
	2.3 通过图书馆资料现刊、数据库、网上检索等文献查阅方式开展研究，具备分析生物医学工程领域中复杂工程问题的能力，以获得有效结论。 2.3 The students should be able to develop research through literature reviewing, database, online searching and other literature accessing methods, and have the ability to analyze the complex engineering problems in the field of biomedical engineering for obtaining the effective conclusions.	生物医学工程专业生产实习 生物医学工程专业综合设计 生物医学工程专业毕业设计
3. 设计/开发解决方案 Design/development solution	3.1 掌握设计/开发生物医学工程领域复杂工程问题解决方案所需要的设计概念、原理和方法。 3.1 The students should master the design concepts, principles, and methods to design or develop schemes for the complex engineering problems in the field of biomedical engineering.	计算机网络DX 医学传感与检测技术 医学信号处理 医学仪器 医学成像技术 医学图像处理

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Index Point（Requirements for Competence and Knowledge）	支撑课程或培养环节 Supporting Courses or Training Parts
	3.2 综合利用信息领域的专业知识，针对特定需求完成医学电子仪器、软件系统或其功能模块的设计。 3.2 The students should comprehensively use of expertise in the field of information to complete the design of medical electronic instruments, software systems or the functional modules for some specific needs.	电路分析基础实验A1、A2 模拟电子技术实验 数字电子技术实验 医学传感与检测技术实验 医学信号处理实验 医学仪器实验 医学成像技术实验 医学图像处理实验
	3.3 能够在系统方案设计环节中体现创新意识，并考虑多方面、多层次因素的影响，如社会、健康、安全、法律、文化以及环境等因素。 3.3 The students should be able to show the sense of innovation in the process of system designing, and consider the influence from the view of many aspects and multiple levels, such as social, health, safety, legal, cultural, environmental factors, etc.	电子技术课程设计 生物医学信号采集与处理课程设计 生物医学工程专业综合设计 生物医学工程专业毕业设计 思想道德修养与法律基础 形势与政策 1-8 工程伦理
4. 研究 Research	4.1 能够对医学电子仪器或软件系统的核心功能模块进行理论分析。 4.1 The students should be able to conduct the theoretical analysis of the core functional modules of medical electronic instruments or software systems.	计算机原理及应用 医学传感与检测技术 医学信号处理 医学仪器 医学成像技术 医学图像处理
	4.2 能够针对生物医学工程领域的复杂工程问题设计实验方案，基于已构建的实验平台获取实验数据，并能够对实验结果进行合理分析、解释，得到有效结论。 4.2 The students should be able to design experimental schemes for complex engineering problems in the field of biomedical engineering, obtain experimental data based on the constructed experimental platform, and analyze and explain the experimental results reasonably to obtain the effective conclusions.	医学传感与检测技术实验 医学信号处理实验 医学仪器实验 医学成像技术实验 医学图像处理实验 人体解剖生理学实验
	4.3 综合对目标问题各方面的研究获得合理有效的研究思路或结论。 4.3 The students should be able to combine the various aspects of research of the target problem to obtain the reasonable and effective ideas or conclusions.	电子技术课程设计 生物医学信号采集与处理课程设计 生物医学工程专业综合设计 生物医学工程专业毕业设计
5. 使用现代工具 Using modern tools	5.1 掌握基本的计算机操作和应用（至少掌握一种软件开发语言），并能够进行较复杂的程序设计。 5.1 The students should master the basic computer operations and applications（at least one software development language） and be able to perform the complex programming design.	计算机原理及应用 计算机网络DX 程序设计基础B（C语言）
	5.2 通过掌握医学电子仪器或软件系统的设计开发平台的基本原理与操作方法，运用现代信息工具，能够针对复杂的综合型工程设计问题进行有效的预测与模拟，并据此理解所使用工具的使用要求和局限性。 5.2 The students should master the basic principles and operation methods about the design and development platform of medical electronic instruments or software systems, and use the modern information tools to effectively predict and simulate the complex engineering design problems. Based on this, they should understand the	工程训练 模拟电子技术实验 数字电子技术实验 计算机原理及应用实验 电子技术课程设计 生物医学信号采集与处理课程设计

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Index Point（Requirements for Competence and Knowledge）	支撑课程或培养环节 Supporting Courses or Training Parts
	requirements and limitations of the used tools.	生物医学工程专业综合设计 生物医学工程专业毕业设计
6. 工程与社会 Engineering and society	6.1 通过经历工程实践和多种实习过程，了解生物医学工程专业领域的复杂工程问题的解决方案对社会、健康、安全、法律以及文化的影响。 6.1 Through engineering practice and various internship processes, the students should understand the impact of solutions of the complex engineering problems in the field of biomedical engineering on the society, health, safety, law and culture.	工程训练D 生物医学工程专业认识实习 生物医学工程专业生产实习 生物医学工程专业毕业实习
	6.2 能够结合相关的工程知识，通过思政、人文、社科类课程学习的知识，综合分析和评价专业工程实践和复杂工程问题的解决方案对社会、健康、安全、法律、伦理以及文化的影响，并理解应承担的责任。 6.2 Through combining the relevant engineering knowledge, the students should have the ability to comprehensively analyze and evaluate the impacts of professional engineering practices and solutions of the complex engineering problems on the society, health, safety, law, ethics, and culture based on the knowledge of ideological, human, and social science courses. They need to understand the responsibilities that should be assumed.	入学教育 思想道德修养与法律基础 形势与政策 1-8 工程伦理 人体解剖生理学实验 生物医学工程导论 生物医学工程专业毕业实习
7. 环境和可持续发展 Environment and sustainable development	7.1 了解环境保护和社会可持续发展的基本方针、政策及法律法规，能够正确认识针对生物医学工程领域复杂工程问题的专业工程实践对环境和社会的影响。 7.1 The students should understand the basic principles, policies, laws and regulations of environmental protection and social sustainable development, and be able to correctly understand the impact of professional engineering practice on the environment and society in the complex engineering problems of the biomedical engineering field.	入学教育 形势与政策 1-8 生物医学工程专业认识实习 生物医学工程导论
	7.2 能够评价医学电子仪器或软件系统产品的开发和应用对环境及社会可持续发展的影响。 7.2 The students should be able to evaluate the impact of the development and application of medical electronic devices or software systems on the environmental and social sustainability.	生物医学工程专业生产实习 生物医学工程专业毕业实习 创新创业基础
8. 职业规范 Professional norms	8.1 具有人文社会科学素养，了解国情，理解社会主义核心价值观，树立正确的世界观、人生观和价值观。 8.1 The students should have the humanities and social science literacy, understand the national conditions, understand the core values of socialism, and establish a correct outlook of world, life and value.	入学教育 中国近现代史纲要 马克思主义基本原理概论 毛泽东思想和中国特色社会主义理论体系概论
	8.2 具有健康的身体和心理，具备履行社会责任的基础。 8.2 The students should own a healthy body and mind, and have the basis to fulfil the social responsibility.	大学生心理健康教育 体育类课程 军事理论 军事技能训练
	8.3 能够在生物医学工程领域所涉及的实践中理解并遵守工程职业道德和规范，履行责任。 8.3 The students should have the ability to understand and comply with the engineering professional ethics and norms in the practice of the biomedical engineering field.	思想道德修养与法律基础 思想政治理论课实践教学 生物医学工程专业认识实习 生物医学工程专业生产实习 生物医学工程专业毕业实习

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Index Point（Requirements for Competence and Knowledge）	支撑课程或培养环节 Supporting Courses or Training Parts
9. 个人和团队 Individuals and teams	9.1 具备良好的团队协作意识，能主动与其他学科的成员共享信息，合作共事，独立完成团队分配的工作。 9.1 The students should own a good sense of teamwork, be able to share information proactively with the members of other disciplines, work together, and independently complete the work assigned by the team.	军事理论 军事技能训练 思想政治理论课实践教学 创新创业基础 工程训练D
	9.2 能够在生物学、医学、工程学、社会学等多学科背景下的团队中担当团队成员或团队负责人的角色，能在团队协作中听取其他团队成员的意见和建议，充分发挥团队协作的优势。 9.2 The students should be able to play the role of team member or team leader in a team with the multidisciplinary background, such as biology, medicine, engineering, sociology, etc., listen to the opinions and suggestions from other members and maximize the advantages of teamwork.	生物医学信号采集与处理课程设计 生物医学工程专业综合设计 生物医学工程专业毕业设计
10. 沟通 Communication	10.1 具有良好的口头表达能力，能够清晰、有条理地表达自己的观点，掌握基本的专业报告、设计文稿的撰写技能。 10.1 The students should have the good oral expression ability to clearly and systematically express their views and master the basic writing skills about the professional reports and design manuscripts.	电子技术课程设计 生物医学信号采集与处理课程设计
	10.2 至少掌握一门外语，具备一定的国际视野，并了解基本的国际文化礼仪。 10.2 The students should master at least one foreign language, have a certain international vision, and understand the basic international cultural etiquette.	综合英语 1 综合英语 2 综合英语 3 综合英语 4
	10.3 能够就复杂工程问题，综合运用口头、书面、报告、图表等多种形式与国内外业界同行及社会公众进行有效沟通和交流。 10.3 The students should be able to communicate effectively with the domestic and foreign counterparts and the public for the complex engineering problems through oral, written, report, chart forms, etc.	生物医学工程专业综合设计 生物医学工程专业毕业设计
11. 项目管理 Project management	11.1 理解工程管理与经济决策的重要性，掌握工程管理的基本原理和常用的经济决策方法。 11.1 The students should understand the importance of engineering management and economic decision-making and master the basic principles of engineering management and common economic decision-making methods.	创新创业基础 工程管理与经济决策
	11.2 能够在多学科、跨职能环境中合理运用工程管理原理与经济决策方法。 11.2 The students should have the ability to apply engineering management principles and economic decision-making methods in the multidisciplinary and cross-functional circumstances.	生物医学工程专业综合设计 生物医学工程专业毕业设计
12. 终身学习 Lifelong learning	12.1 理解自主学习的必要性，具有自主学习和终身学习的意识。 12.1 The students should understand the necessity of independent learning and own the awareness of independent learning and lifelong learning.	马克思主义基本原理概论 毛泽东思想与中国特色社会主义理论体系概论 生物医学工程导论
	12.2 掌握跟踪本专业学科前沿、发展趋势的基本方法和途径，能够通过文献查询、网络培训等多种渠道进行终身学习，以适应职业发展的需求。 12.2 The students should master the basic methods and approaches to track the frontier and development trend of this major, and be able to conduct lifelong learning through literature search, network training and other channels to meet the needs of career development.	生物医学工程专业毕业实习 生物医学工程专业毕业设计

五、教学进程计划表（Courses Schedule for the Major）

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时Hours			开课学期 Semester	学位课 Diploma Course
					总学时 Total	理论学时 Class	实践学时 Practice		
通识教育平台（必修） General Education Courses（Required）									
1	XG160010	入学教育 Entrance Education		0.5	8	0	8	1	
2	FX160020	大学生心理健康教育 Psychological health education of college students		1	16	8	8	1	
3	GF190010	军事理论 Military Theory		0.5	36	20（授课）+ 16（网络学时）	0	2	
4	BW190010	军事技能训练 Military Skill Training		0.5	112	0	14 天	1	
5	自选项目	体育俱乐部 Sports Club		2	60	0	60	1-7	
6	TY190010	运动基础 Sports Fundamental		1	28	0	28	1	
7	自选项目	体育选项 Sports Options	限选 2 学分	1	28	0	28	2 或 3 或 8	
8		游泳 Swimming		1	28	0	28	2 或 4 或 6	
9		团体操 Group Callisthenics		1	28	0	28	3 或 5 或 7	
10	MY160210	思想道德修养与法律基础 Cultivation of Ethics and Fundamentals of Law		3	48	48	0	2	
11	XX190360	工程伦理 Engineering ethics		1	16	16	0	2	
12	MY160360	中国近现代史纲要 Conspectus of Chinese Modern History		2	32	32	0	1	
13	MY160080	马克思主义基本原理概论 Introduction to The Basic Principles of Marxism		3	48	48	0	3	
14	JG192130	工程管理与经济决策 Engineering Management and Economic Decision-making		1	16	16	0	3	
15	MY160110	毛泽东思想与中国特色社会主义理论体系概论 An Introduction to Mao Zedong Thought and The Theoretical System of Socialism With Chinese Characteristics		4	64	64	0	4	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
16	MY160280	思想政治理论课实践教学 The Practice Teaching of Ideological and Political Theory	2	32	0	32	3	
17	WY160371	综合英语 1 Comprehesive English 1	3	48	48	0	1	
18	WY160372	综合英语 2 Comprehesive English 2	3	48	48	0	2	★
19	WY160203	综合英语 3 Comprehesive English 3	2	32	32	0	3	
20	WY160104	综合英语 4 Comprehesive English 4	2	32	32	0	4	
21	JW190010	创新创业基础 Foundation of Innovation and Entrepreneurship	2	32	32	0	4	
22	MY190011	形势与政策 1 Situation and Policy 1	0.25	8	8	0	1	
23	MY190012	形势与政策 2 Situation and Policy 2	0.25	8	8	0	2	
24	MY190013	形势与政策 3 Situation and Policy 3	0.25	8	8	0	3	
25	MY190014	形势与政策 4 Situation and Policy 4	0.25	8	8	0	4	
26	MY190015	形势与政策 5 Situation and Policy 5	0.25	8	8	0	5	
27	MY190016	形势与政策 6 Situation and Policy 6	0.25	8	8	0	6	
28	MY190017	形势与政策 7 Situation and Policy 7	0.25	8	8	0	7	
29	MY190018	形势与政策 8 Situation and Policy 8	0.25	8	8	0	8	
小计Subtotal			37.5	828	526	302		
学科（大类）教育平台（必修） Discipline Coureses （Required）								
1	JK160210	程序设计基础B（C语言） Programming Foundation B（C Language）	2	32	32	0	1	★
2	JK160170	程序设计基础B（C语言）实验 Experiments of Programming Foundation B（C Language）	1	16	0	16	1	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
3	LX160071	高等数学A1 Advanced Mathematics A1	6	96	96	0	1	★
4	LX190010	线性代数 Linear Algebra	3	48	48	0	2	
5	LX160072	高等数学A2 Advanced Mathematics A2	6	96	96	0	2	
6	LX190030	复变函数与积分变换 Functions of Complex Variable and Integral Transforms	3	48	48	0	3	
7	LX190061	大学物理B1 College Physics B1	3	48	48	0	2	
8	LX190062	大学物理B2 College Physics B2	3	48	48	0	3	
9	LX190101	大学物理实验B1 College Physics Experiment B1	1	16	0	16	3	
10	LX190102	大学物理实验B2 College Physics Experiment B2	1	16	0	16	4	
11	LX190020	概率论与数理统计 Probability and Mathematical Statistics	3	48	48	0	3	
12	CL161430	普通化学B General Chemistry B	2	32	32	0	2	
13	CL161450	普通化学实验B General Chemistry Experiments B	0.5	8	0	8	2	
14	SM191080	普通生物学 General Biology	2	32	32	0	1	
15	GC160040	工程训练D Engineering Training D	2	32	0	32	4	
小计 Subtotal			38.5	616	528	88		
专业教育平台（必修） Major Courses （Required）								
1	XX190570	生物医学工程导论 Introduction to Biomedical Engineering	1	16	16	0	1	
2	XX160031	电路分析基础A1 Circuit Analysis Fundamentals A1	2	32	32	0	2	★

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
3	XX160041	电路分析基础实验A1 Experiments of Circuit Analysis Fundamentals A1	0.5	8	0	8	2	
4	XX160032	电路分析基础A2 Circuit Analysis Fundamentals A2	2	32	32	0	3	
5	XX160042	电路分析基础实验A2 Experiments of Circuit Analysis Fundamentals A2	0.5	8	0	8	3	
6	XX160700	模拟电子技术 Analog Electronic Technology	3.5	56	56	0	3	★
7	XX160710	模拟电子技术实验 Experiments of Analog Electronic Technology	1	16	0	16	3	
8	JK160480	计算机网络DX Computer Networks DX	2	32	24	8	3	
9	XX160880	数字电子技术 Digital Electronic Technology	3.5	56	56	0	4	★
10	XX161740	数字电子技术实验A Experiments of Digital Electronic Technology A	1	16	0	16	4	
11	XX161170	信号与系统B Signals and Systems B	4	64	64	0	4	★
12	XX160610	计算机原理及应用 Computer Principles and Applications	3	48	48	0	5	
13	XX160620	计算机原理及应用实验 Experiments of Computer Principles and applications	0.5	8	0	8	5	
14	SM161000	人体解剖生理学B Human Anatomy and Physiology B	2.5	40	40	0	4	
15	SM191100	人体解剖生理学实验 Experiments of Human Anatomical and Physiological	0.5	8	0	8	4	
16	XX190960	医学传感与检测技术 Sensor and Measure of Biomedicine	2.5	40	40	0	5	
17	XX190970	医学传感与检测技术实验 Experiments of ensor and Measure of Biomedicine	0.5	8	0	8	5	
18	XX191000	医学信号处理 Medical Signal Processing	2.5	40	40	0	5	★
19	XX191010	医学信号处理实验 Experiments of Medical Signal Processing	1	16	0	16	5	
20	XX191020	医学仪器 Medical Instrumentation	2.5	40	40	0	6	★

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
21	XX191030	医学仪器实验 Experiments of Medical Instrumentation	0.5	8	0	8	6	
22	XX190940	医学成像技术 Medical Imaging Technology	2	32	32	0	6	
23	XX190950	医学成像技术实验 Experiments of Medical Imaging Technology	0.5	8	0	8	6	
24	XX190980	医学图像处理 Medical Image Processing	2	32	32	0	6	
25	XX190990	医学图像处理实验 Experiments of Medical Image Processing	1	16	0	16	6	
26	XX160810	生物医学工程专业认识实习 Cognitive Practice of Biomedical Engineering	1	16	0	16	2	
27	XX160400	电子技术课程设计 Course Design of Electronic Technology	2	32	0	32	4	
28	XX160820	生物医学工程专业生产实习 Production Practice of Biomedical Engineering	2	32	0	32	4	
29	XX160840	生物医学信号采集与处理课程设计 Course Design of Biomedical Signal Acquisition and Processing	2	32	0	32	5	
30	XX160830	生物医学工程专业综合设计 Comprehensive Design of Biomedical Engineering	3	48	0	48	7	★
31	XX160800	生物医学工程专业毕业实习 Graduation Practice of Biomedical Engineering	3	48	0	48	8	
32	XX160790	生物医学工程专业毕业设计 Graduation Design of Biomedical Engineering	12	192	0	192	8	
小计 Subtotal			67.5	1080	552	528		
个性化培养平台（选修课） Customized Education Courses（Selective）								
1	自选项目	素质选修课 Quality Elective Course	5	学生至少选择 5 学分，1-8 学期开设				
2	自选项目	全人教育微学分 Micro credit of Holistic Education	3	学术报告/科研项目/创新创业项目/科技竞赛等，1-8 学期开设				

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时Hours			开课学期 Semester	学位课 Diploma Course
					总学时 Total	理论学时 Class	实践学时 Practice		
3	XX190320	医学电子仪器方向必选	电子工程技术基础 Fundamentals of Electronic Engineering Technology	1.5	24	24	0	2	
4	XX190330		电子工程技术基础实验 Experiments of Fundamentals of Electronic Engineering Technology	1.5	24	0	24	2	
5	XX161540		单片机应用技术 Application Technology of Microcomputer	3	48	32	16	4	
6	XX190050		FPGA技术 FPGA Technology	1.5	24	24	0	6	
7	XX190060		FPGA技术实验 Experiments of FPGA Technology	1.5	24	0	24	6	
小计				9	144	80	64		
8	XX160750	智能医学信息处理方向必选	软件技术基础 Software Technology Foundation	2	32	32	0	2	
9	XX160760		软件技术基础实验 Experiments of Software Technology Foundation	0.5	8	0	8	2	
10	XX190110		Python程序设计 Python Program Design	1.5	24	24	0	6	
11	XX190120		Python程序设计实践 Python Programming Practice	1.5	24	0	24	6	
12	XX190450		模式识别与人工智能基础 Foundation of Pattern Recognition and Artifiical Intelligence	1.5	24	24	0	7	
13	XX190460		模式识别与人工智能基础实验 Experiments of Pattern Recognition and Artificial Intelligence Foundation	1.5	24	0	24	7	
小计				8.5	136	80	56		
14	XX190580	生物医学光子学 Biomedical Photonics		2.5	40	32	8	5	
15	XX190070	JAVA程序设计及应用 JAVA Programming and Application		1.5	24	24	0	4	
16	XX190080	JAVA程序设计及应用实践 JAVA Programming and Application Practice		1.5	24	0	24	4	

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时Hours			开课学期 Semester	学位课 Diploma Course
					总学时 Total	理论学时 Class	实践学时 Practice		
17	XX190590	数据库技术 Database Technology		1	16	16	0	5	
18	XX190600	数据库技术实践 Database Technology Practice		1	16	0	16	5	
19	XX161470	DSP技术A Digital Signal Processor Technology A	DSP技术和嵌入式系统设计仅需 2 选 1	2	32	16	16	7	
20	XX190490	嵌入式系统设计B Embedded System Design B		1.5	24	24	0	7	
21	XX190500	嵌入式系统设计B实验 Experiments of Embedded System Design B		1.5	24	0	24	7	
备注： 1. 素质选修课、创新创业微学分系列项目学分共计 8 学分 2. 需从 3-21 对应课程中选够学分>=18.5，“医学电子仪器方向”课程组和“智能医学信息处理方向”课程组二选一，剩余的学分可在另一个方向课程组里选或 14-21 对应课程中选。 3. 若所选择的课程有对应的实验课程，二者都需选择，例如如果选择了数据库技术，则必须选数据库技术实践。									
小计 Subtotal				26.5	424	约 244	约 180		

六、集中实践环节（ Intensive Practical Training Courses）

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	实践学时 Practice Hours	开课学期 Semester	学位课 Diploma Course
1	JK160170	程序设计基础B（C语言）实验 Experiments of Programming Foundation B（C Language）	1	16	1	
2	CL161450	普通化学实验B General Chemistry Experiments B	0.5	8	2	
3	XX160041	电路分析基础实验A1 Experiments of Circuit Analysis Fundamentals A1	0.5	8	2	
4	GC160040	工程训练D Engineering Training D	2	32	4	
5	LX190101	大学物理实验B1 Experimentsof University Physics B1	1	16	3	
6	XX160042	电路分析基础实验A2 Experiments of Circuit Analysis Fundamentals A2	0.5	8	3	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	实践学时 Practice Hours	开课学期 Semester	学位课 Diploma Course
7	XX160710	模拟电子技术实验 Experiments of Analog Electronic Technology	1	16	3	
8	LX190102	大学物理实验B2 Experimentsof University Physics B2	1	16	4	
9	SM191100	人体解剖生理学实验 Human Anatomical and Physiological Experiments	0.5	8	4	
10	XX161740	数字电子技术实验A Experiments of Digital Electronic Technology A	1	16	4	
11	XX160620	计算机原理及应用实验 Experiments of Computer Principles and applications	0.5	8	5	
12	XX190970	医学传感与检测技术实验 Experiments of Sensor and Measure of Biomedicine	0.5	8	5	
13	XX191010	医学信号处理实验 Experiments of Medical Signal Processing	1	16	5	
14	XX191030	医学仪器实验 Experiments of Medical Instrumentation	0.5	8	6	
15	XX190990	医学图像处理实验 Experiments of Medical Image Processing	1	16	6	
16	XX190950	医学成像技术实验 Experiments of Medical Imaging Technology	0.5	8	6	
17	XX160810	生物医学工程专业认识实习 Cognitive Practice of Biomedical Engineering	1	16	2	
18	XX160400	电子技术课程设计 Course Design of Electronic Technology	2	32	4	
19	XX160820	生物医学工程专业生产实习 Production Practice of Biomedical Engineering	2	32	4	
20	XX160840	生物医学信号采集与处理课程设计 Course Design of Biomedical Signal Acquisition and Processing	2	32	5	
21	XX160830	生物医学工程专业综合设计 Comprehensive Design of Biomedical Engineering	3	48	7	
22	XX160800	生物医学工程专业毕业实习 Graduation Practice of Biomedical Engineering	3	48	8	
23	XX160790	生物医学工程专业毕业设计 Graduation Design of Biomedical Engineering	12	160	8	
24		专业选修课实践 Practice of Elective Specialized Courses	约 8	128		
小计 Subtotal			约 46	736		

七、核心课程和学位课程（Core Courses and Diploma Courses）

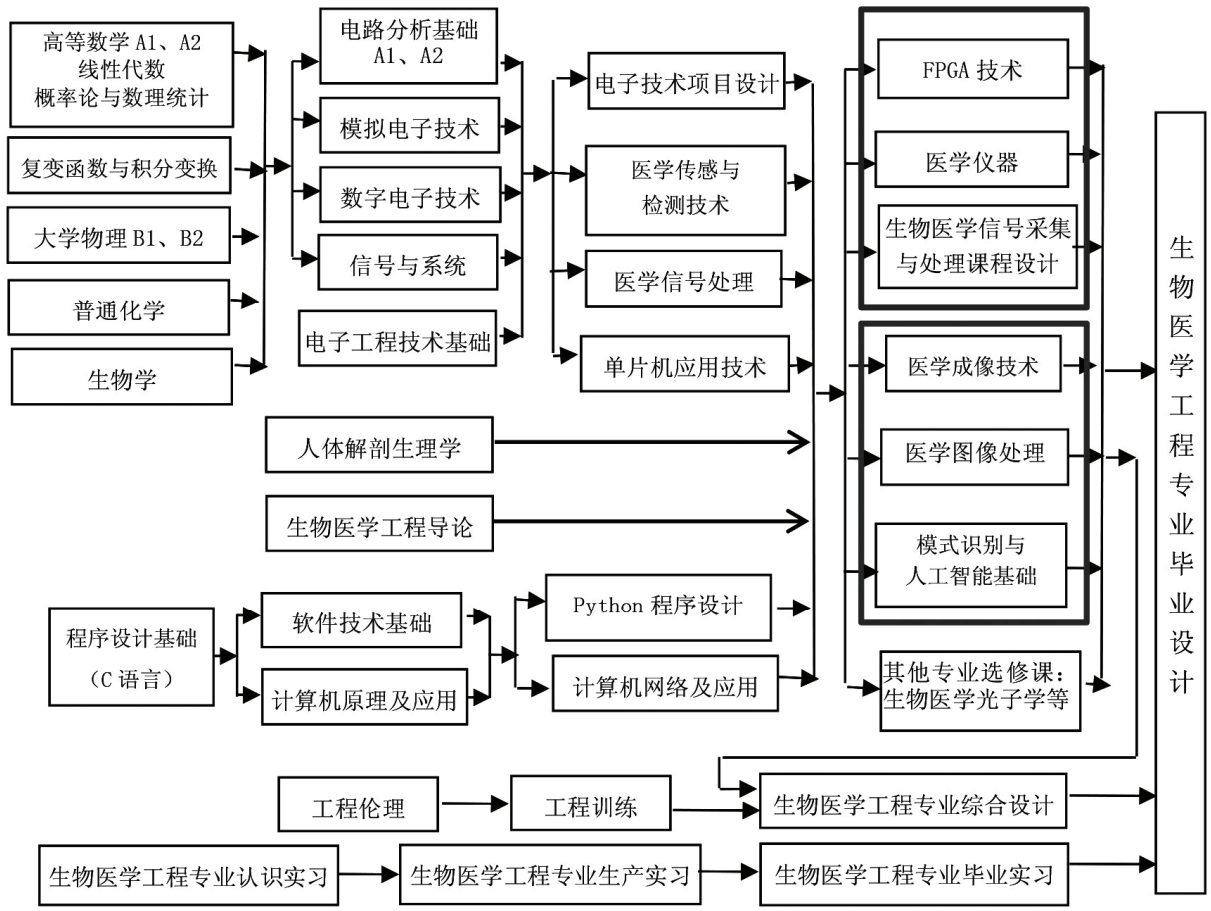
核心课程：模拟电子技术、数字电子技术、计算机网络、信号与系统、计算机原理及应用、医学传感与检测技术、医学信号处理、医学仪器、医学成像技术、医学图像处理。

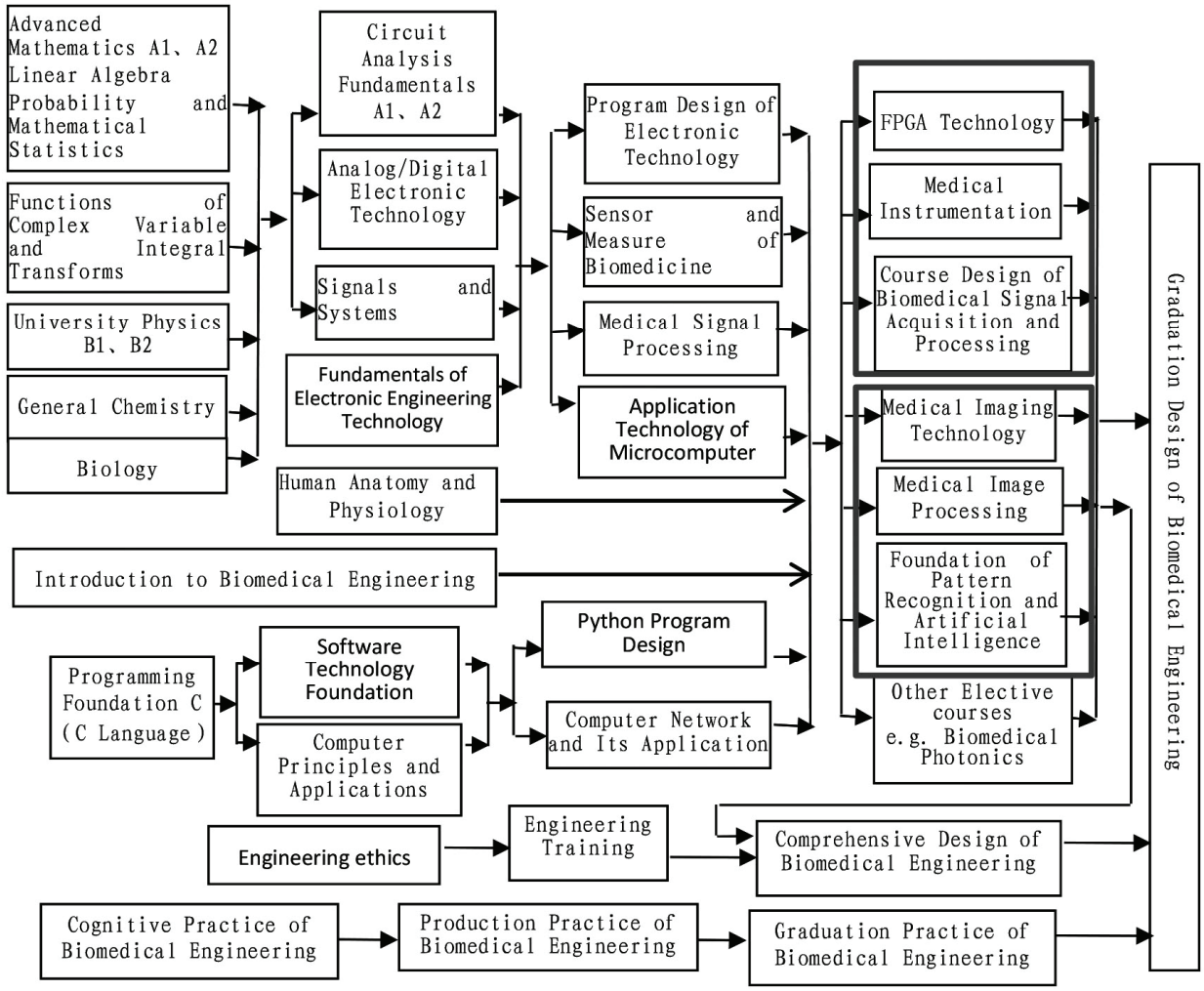
Core Courses：Analog Electronic Technology, Digital Electronic Technology, Computer Network, Signals and Systems, Computer Principles and Applications, Sensor and Measure of Biomedicine, Medical Signal Processing, Medical Instrumentation, Medical Imaging Technology, Medical Image Processing.

学位课程：综合英语 2、高等数学A1、程序设计基础B（C语言）、电路分析基础A1、模拟电子技术、数字电子技术、信号与系统B、医学信号处理、医学仪器、生物医学工程综合设计等。

Degree Courses： Integrated English 2, Advanced Mathematics A1, Programming Foundation B（C Language）, Circuit Analysis Fundamentals A1, Analog Electronic Technology, Digital Electronic Technology, Signals and Systems B, Medical Signal Processing, Medical Instrumentation, Comprehensive Design of Biomedical Engineering.

八、课程体系结构图（The Curriculum Chart）





九、学制及学分要求（（Duration of Schooling and Credit Requirements））

1. 学制（Length of Schooling）：4 年（Four years），
2. 学分要求（Required credits）：学生在校期间必须修满本方案规定的 170 学分方能毕业，其中，各环节的具体学分要求如下表。

The students must complete 170 credits stipulated in this program before they can graduate from this major. Among them, the specific credit requirements for each link are as follows.

	通识教育平台 General Education Courses	**学科（大类）教育平台Discipline Coureses**	**专业教育平台 Major Courses**	**个性化培养平台 Customized Education Courses**	**总学分 Total Credits**
必修课 Required Courses	37.5	38.5	67.5	/	170
选修课 Selective Courses	/	/	/	26.5	

十、授予学位（Degree Conferred）

毕业时符合学位授予条件的，授予工学学士学位。

A bachelor's degree in engineering shall be awarded to those students who meet the conditions for conferring degrees upon graduation.

十一、说明（Notes）

各学期应修学分建议（Credit Allotment for Each Semester）

学期 Semester	一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th	学分合计 Total
建议应修学分 Credits	26	28	27	29	20	15	10	15	170

电气工程及其自动化专业本科人才培养方案

Undergraduate Program for Specialty in Electrical Engineering and Automation

专业负责人：张晓琴　　主管院长：姚远程　　院学术委员会主任：邹传云

Director of Specialty： Xiaoqin Zhang　　Executive Dean： Yuancheng Yao

Chairman of Academic Committee： Chuanyun Zou

一、专业简介（Brief Introduction to the Major）

西南科技大学电气工程及其自动化专业源自自动化专业中的电气工程方向，2009 年开始招生。本专业强调强电和弱电并重，软件和硬件兼备，元件和系统结合，充分利用产学研联合办学的体制优势和地域优势，与董事单位在实习基地建设、设备共享、学术交流和科学研究等方面，形成了长期的合作关系，依托科技竞赛平台和实验室资源，着力培养学生的工程应用能力。

Originated from the electrical engineering direction of the automation specialty, the electrical engineering and automation specialty of Southwest University of Science and Technology began to recruit students in 2009. This specialty put equal emphasis on heavy current and weak current, embodies hardware and software capabilities, and combines components and systems. By making full use of the institutional and regional advantages of industry-university-research cooperation, this specialty have formed a long-term cooperative relationship with directors' unit in the aspects of practice base construction, equipment sharing, academic exchange and scientific research, etc. Relying on the science and technology competition platform and laboratory resources, the specialty have focused on training students' engineering application ability.

二、培养目标（Education Objectives）

本专业培养能够综合运用自然科学、工程科学的基础理论与专业知识，分析和解决电气工程及其自动化专业领域的复杂工程问题，具备在电气工程及其相关领域进行科学研究、技术开发、系统运行、工程设计、项目管理等方面的工作能力，能在团队中进行有效交流与合作，具有较高的思想政治素质、社会责任感、职业道德、创新意识和善于学习的复合型高层次人才。毕业五年后达到以下目标：

1. 职业素养：具有较高的思想素质和法律伦理水平，能够在工程实践中遵守职业规范，履行社会责任；

2. 专业能力：能够综合运用系统的科学技术知识，分析和解决电气工程及其自动化领域的复杂工程问题；

3. 交流合作：具有一定的领导能力，能与同行、客户和公众有效沟通，适应团队工作环境，有全球化意识和一定的国际视野；

4. 终身学习：具有终身学习能力，通过不断学习，实现工作能力的自我提升。

The specialty aims at bringing up high-level inter-disciplinary talents, who are able to comprehensively utilize the basic theory and professional knowledge of natural science and engineering science, analyze and solve complex engineering problems in electrical engineering and its automation fields, and have the ability to carry out scientific research, technology development, system operation, engineering design, project management and other aspects in electrical engineering and related fields. They should also possess the following qualities： tbe able to communicate and cooperate effectively in the team, have high ideological and political quality, social responsibility, professional ethics, innovative consciousness and be good at learning. After 5 years of graduation, they should reach the following targets：

1. Professional quality： possess high ideological quality and legal ethics, enable to comply with professional norms and fulfill social responsibilities in engineering practice.

2. Professional competence： capable of comprehensively applying systematic scientific techniques and knowledges to analyze and solve complicated problem in the domain of electrical engineering and related automatic area.

3. Communication and cooperation： embody certain leadership ability, have the ability to communicate effectively with peers, clients and publics, and able to adapt to the work environment of the team, have globalization consciousness and certain international vision.

5. Lifelong learning： possess the ability of lifelong learning, and achieve self-improvement of working ability through continuous study

三、毕业要求（Graduation Requirements）

毕业生应获得以下几方面的知识和能力：

1. 工程知识：能够用科学的语言描述工程问题，并用于电力系统和建筑电气的设计、分析和优化

2. 问题分析：能够识别和表达电气工程问题中涉及的原理结构、控制保护、设备选择等环节，并能根据电气工程问题的要求，通过文献调研，得到解决问题的总体思路和方案。

3. 设计/开发解决方案：能够遵循工程设计流程，合理选择方案，设计出满足指标要求、符合国家相关技术标准和规范的电力系统和建筑电气系统，并能够在设计环节中体现创新意识，同时考虑社会、健康、安全、法律、文化以及环境等因素。

4. 研究：能够理解或提出电力系统、建筑电气系统的实验目标，基于科学原理设计、实施实验，并对实验结果进行分析，通过信息综合得到合理有效的结论。

5. 使用现代工具：能够合理选择相关技术、资源、编程语言、仿真工具，解决电气工程及其自动化领域的工程问题或者对其进行辅助设计、预测模拟，并能够理解其局限性。

6. 工程与社会：能够基于工程相关背景知识进行合理分析，评价电气工程及其自动化专业领域的工

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。

7. 环境和可持续发展：能够理解和评价电气工程及其自动化专业领域的工程实践对环境、社会可持续发展的影响。

8. 职业规范：具有人文社会科学素养、社会责任感，能够在电气工程及其自动化专业领域的工程实践中理解并遵守工程职业道德和规范，履行责任。

9. 个人和团体：能够在多学科背景下的团体中承担个体、团队成员以及负责人的角色。

10. 沟通：能够就电气工程及其自动化专业领域的复杂工程问题与同行及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。能够在跨文化背景下进行沟通和交流。

11. 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。

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。

The graduates should acquire the following knowledge and abilities：

1. Engineering knowledge： be able to describe engineering problems in scientific language, and be used for the design, analysis and optimization of electrical system and building electricity.

2. Problem analysis： be able to identify and express the principle structure, control protection, equipment selection and other links involved in electrical engineering problems, and get the overall idea and solution to the electrical engineering problem through literature research, according to the requirements,

3. Design/development solution： be able to follow the engineering design process and choose the solution reasonably, design the power system and building electrical system to meet the specific requirements of indicators and conform to the relevant national technical standards and norms；be able to reflect the sense of innovation in the design process, as well as to consider the social, health, safety, legal, cultural and environmental factors.

4. Research： be able to understand or propose experimental objectives of the power system and building electrical system, design and implement experiments based on scientific principles, analyze experimental results, and obtain reasonable and effective conclusions through information synthesis

5. Usage of modern tools： be able to select appropriate technologies, resources, programming languages and simulation tools to solve engineering problems in the field of electrical engineering and its automation area or to assist in design, prediction and simulation, and capable of understanding their limitations

6. Engineering and society： able to make rational analysis based on engineering-related background knowledge, evaluate the impact of engineering practice and complex engineering problem solution in electrical engineering and its automation area on society, health, safety, law and culture, and understand the responsibilities

7. Environment and sustainable development： able to understand and evaluate the impact of engineering practices in the field of electrical engineering and its automation area on environmental and social

sustainable development

8. Professional norms： possessing humanistic and social science literacy and social responsibility, able to understand and comply with engineering professional ethics and standards and fulfill responsibilities in the engineering practice in the field of electrical engineering and its automation area

9. Individuals and teams： able to assume the roles of individual, team member, and leader in a multi-disciplinary group.

10. Communication： able to effectively communicate and exchange with peers and the public on complex engineering issues in the professional field of electrical engineering and its automation area, including writing reports and design drafts, making presentations, and clearly expressing or responding to instructions. Able to communicate and exchange in a cross-cultural context.

11. Project management： understanding and mastering the engineering management principles and economic decision-making methods so as to apply them in a multi-disciplinary environment

12. Lifelong study： having the consciousness of self-learning and lifelong learning, as well as the ability of continuous learning and adaptive development。

四、培养目标实现矩阵（毕业要求与课程的对应矩阵）

Ⅴ.Matrix of Realization of Educational Objectives （The Corresponding Matrix of Requirements for Graduation and Courses）

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
1.工程知识 Engineering knowledge	1.1 能够用数学、自然科学的语言对工程问题进行初步描述。 1.1 Be able to preliminarily describe engineering problems in the language of mathematics and natural science	高等数学 1、高等数学 2、概率论与数理统计、线性代数、大学物理 1、大学物理 2
	1.2 能够将工程基础知识应用于工程问题的建模、计算与分析。 1.2 Be able to apply basic engineering knowledge to model, calculation and analysis of engineering problem	电路分析基础 1、电路分析基础 2、模拟电子技术、数字电子技术、信号与系统、工程电磁场
	1.3 能够将专业基础知识应用于电力系统和建筑电气的设计、分析和优化。 1.3 Be able to apply basic professional knowledge to design,analysis and optimization of electrical system and building electricity	自动控制理论、电力电子技术、电机学、电力系统分析、供配电系统
2. 问题分析 Problem analysis	2.1 能够应用数学、自然科学的基本原理，制订解决电气工程问题的思路和方法，得到系统的原理结构图。 2.1 Be able to apply the basic principles of mathematics and natural science to formulate ideas and methods for solving electrical engineering problems, as well as to get the system principle structure diagram	复变函数与积分变换、电路分析基础 1、电路分析基础 2、模拟电子技术、数字电子技术
	2.2 能够识别系统的组成部分并分析各环节的作用，会分析系统性能及其	电力电子技术、电机学、自动控制

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
	影响因素。 2.2 Be able to identify the components of the system and analyze the role of each link, as well as to analyze the system performance and its influencing factors.	理论、信号与系统、计算机原理及应用
	2.3 能够根据系统的要求，综合考虑可行性和经济性，得到解决问题的总体思路和方案。 2.3 Be able to get the overall idea and solution according to the requirements of the system, comprehensively combining feasibility and economical efficiency	创新创业基础、电气工程及其自动化专业综合设计、电气工程及其自动化专业毕业设计、电气工程及其自动化专业生产实习
3.设计/开发解决方案 Design/development solution	3.1 能够根据指标要求，完成系统总体方案和单元电路的设计。 3.1 Be able to design the overall scheme of the system and the design of the unit circuit according to index requirements	电气控制与 PLC、电子技术课程设计、电力电子课程设计
	3.2 能够根据国家相关技术标准和规范，选择合理化解决方案。 3.2 Be able to choose reasonable solution according to relevant national technical standards and specifications.	电力系统分析、供配电系统、电力系统继电保护（建筑智能化系统）、电力系统的计算机辅助分析（建筑电气工程设计基础）
	3.3 能够对系统设计方案的合理性进行论证，并在此过程中体现创新意识。 3.3 be able to demonstrate the rationality of the system design scheme, and reflect the innovative consciousness in the process.	电力系统课程设计（供配电系统课程设计）、电气工程及其自动化专业综合设计、电气工程及其自动化专业毕业设计
	3.4 能够在设计环节考虑社会、健康、安全、法律、文化和环境等因素。 3.4 Be able to consider social, health, safety, legal, cultural and environmental factors in the design process.	思想道德修养与法律基础、形势与政策、工程伦理、工程管理与经济决策
4.研究 Research	4.1 能够理解或提出实验目标，设计并实施实验，对自然科学、电路、电子元器件等相关的物理现象、电气特性进行研究和实验分析。 4.1 have the ability to understand or propose experimental objectives, design and implement experiments, study and analyze physical phenomena and electrical characteristics related to natural sciences, circuits, electronic components, etc.	电子技术课程设计、大学物理实验、电路分析基础实验、模拟电子技术实验、数字电子技术实验
	4.2 能够基于科学原理并采用科学方法对控制系统、电力系统及建筑电气系统制定实验方案并实施，以获取实验数据。 4.2 Be able to develop and implement experimental plans for control system, power system and building electrical system based on scientific principles and methods to obtain experimental data.	计算机原理及应用实验、电气控制与 PLC 实验、程序设计基础 C 实验、专业方向实验 1（专业方向实验 2）
	4.3 能够分析和解释实验数据，并通过信息综合得到系统优化等合理有效的结论。 4.3 Be able to analyze and interpret experimental data and get reasonable and effective conclusions of system optimization through information synthesis.	概率论与数理统计、电力电子课程设计、电力系统课程设计（供配电系统课程设计）、电气工程及其自动化专业毕业设计

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
5.使用现代工具 Usage of modern tools	5.1 能够理解相关技术、资源、编程工具等的作用、功能，认知其适用场合。 5.1 understand the functions and functions of related technologies, resources, programming tools, etc, and where they apply	电力系统继电保护（建筑智能化系统）、电力系统的计算机辅助分析（建筑电气工程设计基础）
	5.2 掌握一门程序设计语言，并能加以利用，以解决电气工程领域的实际问题。 5.2 Master a programming language and be able to use it to solve practical problems in the field of electrical engineering.	电气控制与 PLC、计算机原理及应用、程序设计基础（C 语言）
	5.3 能够使用恰当的仿真工具或工程工具对电气工程及其自动化领域中的复杂工程问题进行辅助设计、预测和模拟，并能理解其局限性。 5.3 be able to design, predict and simulate complex engineering problems in electrical engineering and its automation field using appropriate simulation tools or engineering tools, and understand their limitations.	模拟电子技术实验、数字电子技术实验、专业方向实验 1（专业方向实验 2）
6.工程与社会 Engineering and society	6.1 能够认知和解释电气工程及其自动化专业相关的知识产权、产业政策和法律法规，理解不同社会文化的差异。 6.1 Be able to understand and explain intellectual property, industrial policy, laws and regulations related to electrical engineering and automation, and understand the differences of different social cultures.	电气工程及其自动化专业导论、入学教育、思想道德修养与法律基础、形势与政策
	6.2 能够理解工程技术人员在专业工程实践中应承担的社会责任；能够评价专业工程实践对社会、健康、安全、法律以及文化的影响。 6.2 Be able to understand the social responsibility of engineering technicians in professional engineering practice and automation system； have the ability to evaluate the impact of professional engineering practices and automated systems on society, health, safety, law, and culture.	创新创业基础、电气工程及其自动化专业生产实习、电气工程及其自动化专业毕业实习、工程伦理
7.环境和可持续发展 Environment and sustainable development	7.1 能够认知环境保护和社会可持续发展的内涵和意义，并在实习、社会实践等项目中践行。 7.1 Be able to understand the connotation and significance of environmental protection and social sustainable development, and practice in internship, social practice and other projects.	电气工程及其自动化专业导论、入学教育、创新创业基础、电气工程及其自动化专业认识实习、电气工程及其自动化专业生产实习
	7.2 能够评价电气工程及其自动化专业领域的工程应用对环境、社会可持续发展的影响。 7.2 Be able to evaluate the impact of electrical engineering and automation applications on environmental and social sustainability	电气工程及其自动化专业毕业实习、电气工程及其自动化专业生产实习、工程伦理
8.职业规范 Professional norms	8.1 具有人文社会科学素养，能够形成正确的世界观、人生观和价值观。 8.1 Possess humanistic, social science literacy, and be able to form correct overlooks on the world, life and values	中国近现代史纲要、毛泽东思想与中国特色社会主义理论体系概论、马克思主义基本原理概论
	8.2 具有健康的身体和心理，具备履行社会责任的基础。 8.2 Have a healthy body and mind, have the foundation to fulfill the social responsibility	体育俱乐部、体育项目、运动基础、军事理论、大学生心理健康教育

毕业要求 Requirements for Graduation	指标点（知识与能力要求） Key Index （Knowledge and Capability Requirements）	支撑课程或培养环节 Realization
	8.3 能够在电气领域的工程实践中理解并遵守工程职业道德和规范，履行责任。 8.3 Be able to understand and follow engineering ethics and codes as well as to fullfil responsibilities in electrical engineering practice.	思想道德修养与法律基础 思想政治理论课实践教学 电气工程及其自动化专业认识实习
9.个人和团体 Individuals and teams	9.1 具备良好的团队协作意识，能够与其他学科成员协作互补。 9.1 posseess with good teamwork spirit, be able to cooperate with other discipline members.	军事理论、军事技能训练、工程训练、思想政治理论课实践教学
	9.2 能够独立完成团队分配的工作，胜任团队成员的角色，组织团队成员开展工作。 9.2 Be able to complete the assigned work independently, be competent to play the role of team members, and organize team members to carry out work.	工程训练、电力电子技术课程设计、电气工程及其自动化专业综合设计、电气工程及其自动化专业毕业实习
10.沟通 Communication	10.1 能够就就电气工程及其自动化专业领域的复杂工程问题，通过文稿、图表、口头表达等方式进行表达，回应质疑，与业界同行及社会公众进行有效沟通和交流。 10.1 Be able to express complex engineering problems in the field of electrical engineering and its related automation area through manuscripts, charts, oral expression, etc., have the ability to respond to questions, and communicate effectively with industry peers and the public.	电力电子技术课程设计、电力系统课程设计（供配电系统课程设计）、电气工程及其自动化专业毕业设计、电子技术课程设计
	10.2 能够阅读外文文献资料，在跨文化背景下进行沟通和交流，具备一定的国际视野。 10.2 Be able to read foreign literature, communicate and exchange in cross-cultural context, possess a certain international perspective.	综合外语 1、综合外语 2、综合外语 3、综合外语 4
11.项目管理 Project management	11.1 理解电气领域工程活动涉及的重要经济与管理因素。 11.1 Understand the important economic and management factors involved in engineering activities in the electric field	马克思主义基本原理概论、工程训练、工程管理与经济决策、电气工程及其自动化专业生产实习
	11.2 具备在多学科环境中对工程问题进行经济分析、决策和管理的能力。 11.2 Be able to conduct economic analysis, decision-making and management of engineering problems in a multidisciplinary environment.	工程管理与经济决策、电气工程及其自动化专业综合设计、电气工程及其自动化专业毕业设计
12.终身学习 Lifelong study	12.1 能认识不断探索和学习的必要性，具备自主学习和终身学习的意识。 12.1 understand the necessity of continuous exploration and learning, have the awareness of independent learning and lifelong learning.	马克思主义基本原理概论、毛泽东思想与中国特色社会主义理论体系概论、电气工程及其自动化专业认识实习
	12.2 能够通过学习不断提高，适应工程技术的发展，适应社会竞争与合作。 12.2 have the ability to improve through learning, adapt to the development of engineering technology, adapt to social competition and cooperation.	电子技术课程设计、电气工程及其自动化专业毕业实习、电气工程及其自动化专业毕业设计

五、教学进程计划表（Courses Schedule for the Major）

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
通识教育平台（必修） General Education Courses（Required）								
1	XG160010	入学教育 Entrance education	0.5	8	0	8	1	
2	FX160020	大学生心理健康教育 Psychological health education of college students	1	16	8	8	1	
3	GF190010	军事理论 Military Theory	0.5	36	20（授课）+ 16（网络）	0	1	
4	BW190010	军事技能训练 Military Skill Training	0.5	112	0	14 天	1	
5	自选项目	体育俱乐部 Sports Club	2	60	0	60	1-7	
6	TY190010	运动基础 Sports Fundamental	1	28	0	28	1	
7	自选项目	体育选项 Sports Options	1	28	0	28	2-7	
8	TY190020	限选 2 学分 游泳 Swimming	1	28	0	28	2、4、6	
9	TY190030	团体操 Group Callisthenics	1	28	0	28	3、5、7	
10	MY160210	思想道德修养与法律基础 Thought Morals Tutelage and Legal foundation	3	48	48	0	2	
11	MY160360	中国近现代史纲要 Conspectus of Chinese Modern History	2	32	32	0	1	
12	MY160080	马克思主义基本原理概论 Introduction to the basic principles of Marxism	3	48	48	0	3	
13	MY160110	毛泽东思想与中国特色社会 主义理论体系概论 An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics	4	64	64	0	4	
14	MY190011	形势与政策 1 Situation and Policy 1	0.25	8	8	0	1	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
15	MY190012	形势与政策 2 Situation and Policy 2	0.25	8	8	0	2	
16	MY190013	形势与政策 3 Situation and Policy 3	0.25	8	8	0	3	
17	MY190014	形势与政策 4 Situation and Policy 4	0.25	8	8	0	4	
18	MY190015	形势与政策 5 Situation and Policy 5	0.25	8	8	0	5	
19	MY190016	形势与政策 6 Situation and Policy 6	0.25	8	8	0	6	
20	MY190017	形势与政策 7 Situation and Policy 7	0.25	8	8	0	7	
21	MY190018	形势与政策 8 Situation and Policy 8	0.25	8	8	0	8	
22	MY160280	思想政治理论课实践教学 The Practical Teaching of Ideological and Political Theory	2	32	0	32	3	
23	WY160371	综合英语 1 Comprehesive English 1	3	48	48	0	1	
24	WY160372	综合英语 2 Comprehesive English 2	3	48	48	0	2	
25	WY160203	综合英语 3 Comprehesive English 3	2	32	32	0	3	
26	WY160104	综合英语 4 Comprehesive English 4	2	32	32	0	4	★
27	JW190010	创新创业基础 Fundamentals of Innovation and Entrepreneurship	2	32	32	0	4	
28	XX190360	工程伦理 Engineering ethics	1	16	16	0	2	
29	JG192130	工程管理与经济决策 Engineering Management and Economic Decision	1	16	16	0	3	
小计 Subtotal			37.5	796	494	302		

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
学科（大类）教育平台（必修） Discipline Coureses （Required）								
1	LX160071	高等数学 A1 Advanced Mathematics A1	6	96	96	0	1	
2	LX160072	高等数学 A2 Advanced Mathematics A2	6	96	96	0	2	★
3	LX190020	概率论与数理统计 Probability and Mathematical Statistics	3	48	48	0	5	
4	LX190010	线性代数 Linear Algebra	3	48	48	0	2	
5	LX160210	复变函数与积分变换 Complex Variable Functions and Integral Transformation	3	48	48	0	3	
6	LX190971	大学物理B1(电子信息类) University Physics B1	2	32	32	0	1	
7	LX190972	大学物理B2(电子信息类) University Physics B2	4	64	64	0	2	
8	LX190101	大学物理实验 B1 College Physics Experiment B1	1	16	0	16	3	
9	LX190102	大学物理实验 B2 College Physics Experiment B2	1	16	0	16	4	
10	JK160210	程序设计基础 B（C 语言） Programming Foundation B（C Language）	2	32	32	0	1	★
11	JK160170	程序设计基础 B（C 语言）实验 Experiments of Programming Foundation B（C Language）	1	16	0	16	1	
12	GC160040	工程训练 D Engineering Training D	2	32	0	2 周	3	
小计 Subtotal			34	544	464	80		
专业教育平台（必修） Major Courses （Required）								
1	XX190291	电气工程及其自动化专业导论 1 Introduction to Electrical Engineering and automation 1	0.5	8	8	0	1	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
2	XX190292	电气工程及其自动化专业导论 2 Introduction to Electrical Engineering and automation 2	0.5	8	8	0	4	
3	XX160031	电路分析基础 A1 Circuit Analysis Fundamentals A1	2	32	32	0	2	★
4	XX160032	电路分析基础 A2 Circuit Analysis Fundamentals A2	2	32	32	0	3	★
5	XX160041	电路分析基础实验 A1 Experiments of Circuit Analysis Fundamentals A1	0.5	8	0	8	2	
6	XX160042	电路分析基础实验 A2 Experiments of Circuit Analysis Fundamentals A1	0.5	8	0	8	3	
7	XX160700	模拟电子技术 Analog Electronic Technology	3.5	56	56	0	3	
8	XX160880	数字电子技术 Digital Electronic Technology	3.5	56	56	0	4	★
9	XX160710	模拟电子技术实验 Experiments of Analog Electronic Technology	1	16	0	16	3	
10	XX161740	数字电子技术实验 A Digital Electronic Technological Experiment A	1	16	0	16	4	
11	XX161180	信号与系统 D Signals and Systems D	2	32	32	0	4	
12	XX160610	计算机原理及应用 Computer Principles and Applications	3	48	48	0	5	
13	XX160620	计算机原理及应用实验 Experiments of Computer Principles and Applications	0.5	8	0	8	5	
14	XX191100	自动控制理论 Automatic Control Theory	3	48	40	8	5	
15	XX160510	工程电磁场 Engineering Electromagnetics	2.5	40	40	0	4	
16	XX161560	电力电子技术 A Power Electronic Technology A	3	48	40	8	5	★
17	XX190240	电力电子技术课程设计 Course Design of Power Electronic Technology	2	32	0	32	5	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
18	XX161610	供配电系统 Power Supply and Distribution System	3	48	40	8	5	
19	XX160250	电力系统分析 Power System Analysis	3.5	56	56	0	6	★
20	XX161970	电机学 Electrical Machinery	4.5	72	64	8	4	★
21	XX190300	电气控制与 PLC Electrical Control and PLC	2	32	32	0	6	
22	XX190310	电气控制与 PLC 实验 Experiments of Electrical Control and PLC	1	16	0	16	6	
23	XX160400	电子技术课程设计 Course Design of Electronic Technology	2	2 周	0	2 周	4	
24	XX160340	电气工程及其自动化专业认识实习 Cognition Practice of Electrical Engineering and Automation	1	1 周	0	1 周	2	
25	XX160350	电气工程及其自动化专业生产实习 Production Practice of Electrical Engineering and Automation	2	2 周	0	2 周	6	
26	XX160330	电气工程及其自动化专业毕业实习 Graduation Practice of Electrical Engineering and Automation	3	3 周	0	3 周	8	
27	XX160320	电气工程及其自动化专业毕业设计 Graduation Design of Electrical Engineering and Automation	12	12 周	0	12 周	8	
28	XX160360	电气工程及其自动化专业综合设计 Comprehensive Design of Electrical Engineer and Automation	3	3 周	0	3 周	7	★
小计 Subtotal			68	1088	584	504		
个性化培养平台（选修课） Customized Education Courses（Selective）								

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
					总学时 Total	理论学时 Class	实践学时 Practice		
1		必选	全人教育微学会 Micro credit of Holistic Education	3	学术报告/科研项目/创新创业项目/科技竞赛等，1-8 学期开设				
2			素质选修课 Quality Elective Course	5	学生至少选择 5 学分，1-8 学期开设				
3	XX190250	程电力系统方向	电力系统保护 power system protection	2	32	32	0	6	
4	XX190260		电力系统的计算机辅助分析 computer-aided analysis of power system	2	32	32	0	6	
5	XX191070		专业方向实验 1（电力系统继电保护、电力系统的计算机辅助分析） professional experiment 1	2	32	0	32	6	
6	XX161960		电力系统课程设计 Course Design of Power System	2	32	0	32	7	
7	XX190410	运建筑电气与智能化方向	建筑智能化系统 Building Intelligentized System	2	32	32	0	6	
8	XX160650		建筑电气工程设计基础 Foundation of Building Electrical Design	2	32	32	0	6	
9	XX191080		专业方向实验 2（建筑智能化系统、建筑电气工程设计基础） professional experiment 2	2	32	0	32	6	
10	XX190370		供配电系统课程设计 Course Design of Power Supply and Distribution System	2	32	0	32	7	
11	XX161540	单片机应用技术 Application technology of microcomputer		3	48	32	16	2	
12	JK160480	计算机网络 DX Computer Networks DX		2	32	24	8	4	
13	XX161650	检测技术 C Detection Technology C		2.5	40	32	8	5	
14	XX160300	电气工程 CAD CAD of Electrical Engineering		2	32	8	24	5	
15	XX160470	高电压工程 High Voltage Engineering		2	32	32	0	5	
16	XX190520	人工智能基础 Foundation of Artifiical Intelligence		2	32	24	8	5	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
17	XX190470	嵌入式系统设计 A Embedded Sytem Design A	1.5	24	24	0	6	
18	XX190480	嵌入式系统设计 A 实验 Experiments of Embedded Sytem Design A	1.5	24	0	24	6	
19	XX191050	运动控制 Motion Control	2.5	40	32	8	6	
20	XX190220	电磁兼容导论 Introduction to Electromagnetic Compatibility	2	32	32	0	6	
21	XX160460	多旋翼飞行器入门 Introduction to Multi-Rotor Aircraft	2	32	24	8	6	
22	XX191060	照明技术 Illuminating Technology	2	32	32	0	7	
23	XX160280	电力系统自动化技术 Power System Automation	2	32	32	0	7	
24	XX161150	新能源技术与电源管理 New Energy Technology and Power Management	2	32	32	0	7	
25	XX160540	机器人技术及应用 Robot Techniques and Application	2	32	24	8	7	
小计 Subtotal			30.5/55					
小计 Subtotal								

六、集中实践环节（ Intensive Practical Training Courses）

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	实践学时 PracticeHours	开课学期 Semester	学位课 Diploma Course
1	JK160210	程序设计基础 B 实验（C 语言） Experiment of C Language Programming Foundation B	1	16	1	
2	XX160041	电路分析基础实验 A1 Experiments of Circuit Analysis Fundamentals A1	0.5	8	2	
3	XX160042	电路分析基础实验 A2 Experiments of Circuit Analysis Fundamentals A1	0.5	8	3	

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	实践学时 PracticeHours	开课学期 Semester	学位课 Diploma Course
4	XX160710	模拟电子技术实验 Experiments of Analog Electronic Technology		1	16	3	
5	XX161740	数字电子技术实验 A Digital Electronic Technological Experiment A		1	16	4	
6	XX160620	计算机原理及应用实验 Experiments of Computer Principles and Applications		0.5	8	5	
7	XX190240	电力电子技术课程设计 Course Design of Power Electronic Technology		2	32	5	
8	XX190310	电气控制与 PLC 实验 Experiments of Electrical Control and PLC		1	16	6	
9	GC160040	工程训练 D Engineering Training D		2	2 周	3	
10	XX160400	电子技术课程设计 Course Design of Electronic Technology		2	2 周	4	
11	XX191070	专业方向实验 1 professional experiment 2	必选 1	2	32	6	
12	XX191080	专业方向实验 2 professional experiment 2		2	32	6	
13	XX161960	电力系统课程设计 Course Design of Power System	必选 1	2	16	6	
14	XX190370	供配电系统课程设计 Course Design of Power Supply and Distribution System		2	16	6	
15	XX160340	电气工程及其自动化专业认识实习 Cognition Practice of Electrical Engineering and Automation		1	1 周	2	
16	XX160350	电气工程及其自动化专业生产实习 Production Practice of Electrical Engineering and Automation		2	2 周	6	
17	XX160330	电气工程及其自动化专业毕业实习 Graduation Practice of Electrical Engineering and Automation		3	3 周	8	
18	XX160320	电气工程及其自动化专业毕业设计 Graduation Design of Electrical Engineering and Automation		12	12 周	8	
19	XX160360	电气工程及其自动化专业综合设计 Comprehensive Design of Electrical Engineer and Automation		3	3 周	7	
小计 Subtotal				36.5	648		

七、核心课程和学位课程（Core Courses and Diploma Courses）

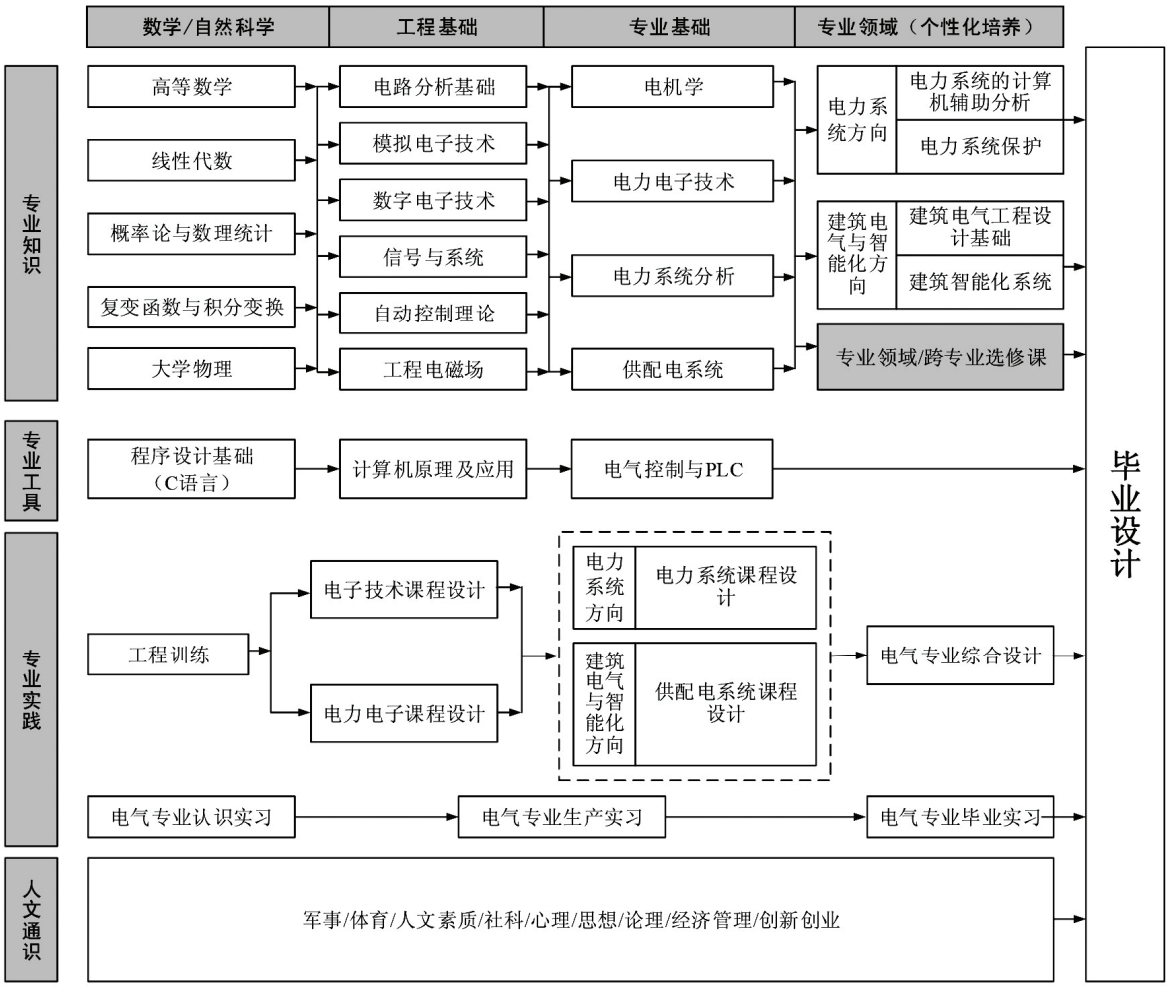
核心课程：程序设计基础 B（C 语言）、电路分析基础 A1、电路分析基础 A2、模拟电子技术、数字电子技术、自动控制理论、计算机原理及应用、工程电磁场、电力电子技术、供配电系统、电气控制与 PLC、电机学、电力系统分析。

Core Courses： Programming Foundation B（C Language）, Circuit Analysis Fundamentals A1, Circuit Analysis Fundamentals A2, Analog Electronic Technology, Digital Electronic Technology, Automatic Control Theory, Computer Principles and Applications, Engineering Electromagnetics, Power Electronic Technology, Power Supply and Distribution System, Electrical Control and PLC, Electrical Machinery, Power System Analysis.

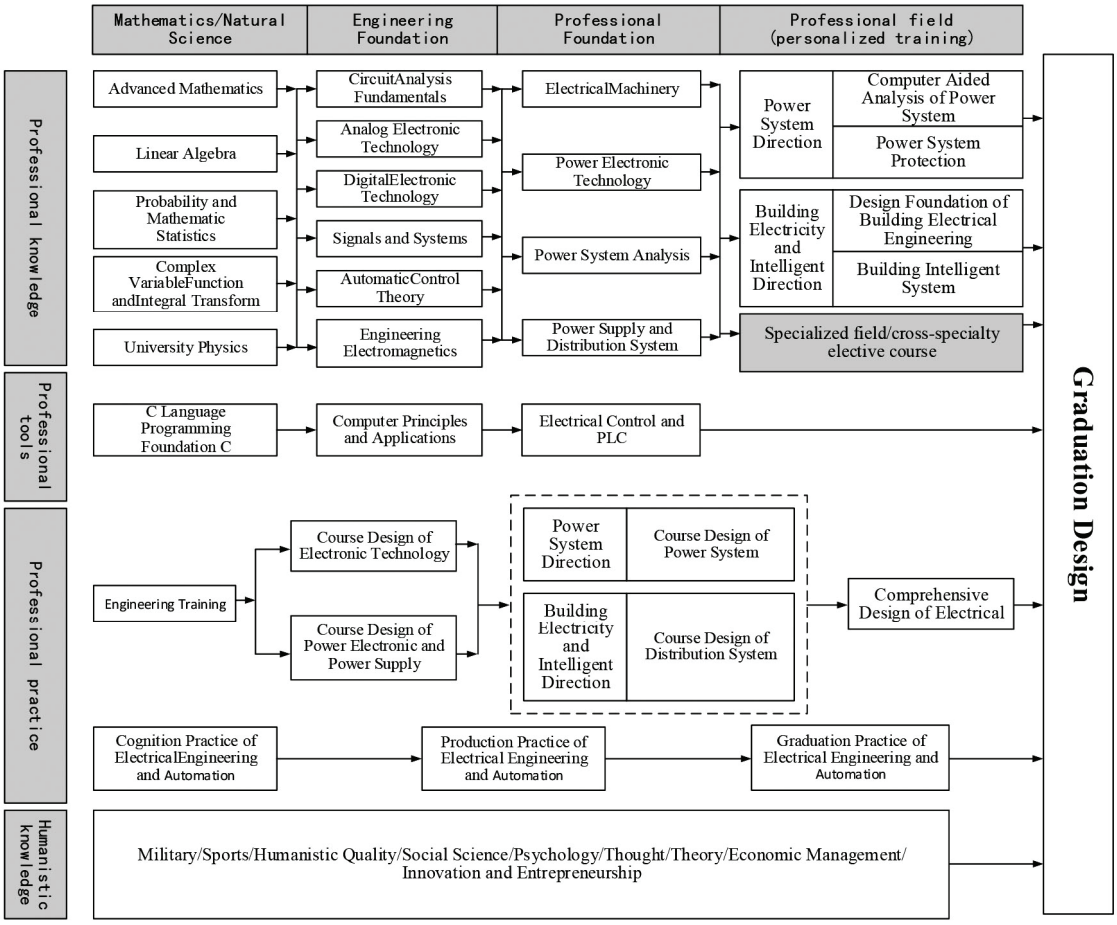
学位课程：综合英语 4、高等数学 A2、程序设计基础 B（C 语言）、电路分析基础 A1、电路分析基础 A2、数字电子技术、电机学、电力电子技术、电力系统分析、电气工程及其自动化专业综合设计。

Degree Courses： Comprehesive English 4, Advanced Mathematics A2, Programming Foundation B（C Language）, Circuit Analysis Fundamentals A1, Circuit Analysis Fundamentals A2, Digital Electronic Technology, Electrical Machinery, Power Electronic Technology, Power System Analysis, Comprehensive Design of Electrical Engineer and Automation.

八、课程体系结构图（The Curriculum Chart）



Ⅷ.Guidance for Selecting Courses



九、学制及学分要求（(Duration of Schooling and Credit Requirements)）

1. 学制（Length of Schooling）：4 年（Four years）

2. 学分要求（Required credits）：学生在校期间必须修满本方案规定的 170 学分方能毕业，其中，各环节的具体学分要求如下表。

The students must complete 170 credits stipulated in this program before they can graduate from this major. Among them, the specific credit requirements for each link are as follows.

	通识教育平台 General Education Courses	学科（大类）教育平台 Discipline Coureses	专业教育平台 Major Courses	个性化培养平台 Customized Education Courses	总学分 Total Credits
必修课 Required Courses	37.5	34	68	/	170
选修课 SelectiveCourses	5/	2/6	/	30.5/55	

十、授予学位（Degree Conferred）

毕业时符合学位授予条件的，授予工学学士学位。

A bachelor's degree in engineering shall be awarded to those students who meet the conditions for conferring degrees upon graduation.

十一、说明（Notes）

1.各学期应修学分建议（**Credit Allotment for Each Semester**）

学期 Semester	**一 1st**	**二 2nd**	**三 3rd**	**四 4th**	**五 5th**	**六 6th**	**七 7th**	**八 8th**	**学分合计 Total**
建议应修学分 Credits	21	24	25	26	22	21	16	15	170

2.个性化培养平台中电力系统方向和建筑电气与智能化方向方向两个模块必选其中一个。

In the personalized training platform, one of the two modules, the direction of power system and the direction of building electricity and intellectualization, must be selected.

计算机类本科人才培养方案

Undergraduate Program for the Discipline of Computer Science

一、大类专业简介（Brief Introduction to the Discipline）

计算机大类专业涵盖计算机科学与技术（代码：080901）、软件工程（代码：080902）、信息安全（080904K）、物联网工程（080905）等四个专业。本大类采用“1+3”培养模式，一年级进行通识课程和大类平台课程的学习，二年级按照政策进行专业分流。本大类人才培养坚持“育人为本、德育为先、科学理性、开放包容、彰显卓越”的办学理念，积极推进以“因材施教、个性化培养”为核心的人才培养体系改革，紧密结合国家、区域经济社会发展和中国科技城建设需求，立足四川，面向西部和国家软件产业基地，培养“基础扎实、能力突出”的计算机类专业技术人才。本专业类有一级硕士学位授权点 2 个、国防特色学科专业方向 1 个、“国家卓越工程师教育培养计划”专业 1 个、“四川省卓越工程师教育培养计划”专业 1 个、四川省特色专业 2 个、学校“8111 品牌”专业 1 个。

The discipline of Computer Science includes four majors: Computer Science and Technology (code: 080901), Software Engineering (080902), Information Security (080904K) and Internet of Things (080905). The discipline adopts "1+3" culture mode. During the first year, all students learn the basic courses in general education, discipline courses, and some elective quality courses. After that, the students will choose one majors to learn the remainder basic course in general and discipline education, professional education courses, charateristic education course, and some intensice practical training. The discipline presists in that student is first, moral is primary, scientific and reasonable, patulous and compatible, prominent and excellence, and promotes the education reformation based on the core principle of teaching follows student, and training follows individual. The discipline cultivates professional technical talent of computer science with solidified science knowledge and skilled technology ability according to the requirements of the economic and social development and the construction of the Chinese Science and Technology City. The discipline has two first level master degree majors, one special national defense major direction, one national excellence engineer plan major, one provincial excellence engineer plan major, two special majors of Sichuan province, and one 8111 Brand major.

二、大类培养阶段教学进程计划表（Courses Schedule of Educational Stages for the Discipline）

序号 No.	课程编号 Course Code	课程名称 Course Name		学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course	辅修 Minor
					总学时 Total	理论学时 Theory	实践学时 Practice			
通识教育平台（必修） Basic Courses in General Education (Required)										
1	FX160020	大学生心理健康教育 Mental health education of college students		1	16	8	8	1		
2	XG160010	入学教育 Entrance education		0.5	8		8	1		
3	MY160210	思想道德修养与法律基础 Thought Morals Tutelage and Legal foundation		3	48	48		2		
4	MY190011	形势与政策 1 Situation and Policy 1		0.25	8	8		1		
5	MY190012	形势与政策 2 Situation and Policy 2		0.25	8	8		2		
6	MY160360	中国近现代史纲要 Conspectus of Chinese Modern History		2	32	32		1		
7	BW190010	军事技能训练 Military Skill Training		0.5	112		14 天	1		
8	GF190010	军事理论 Military Theory		0.5	36	20	16	1		
9	自选项目	体育俱乐部 Sports Club		2	60		60	1-7		
10	TY190010	运动基础 Sports Fundamental		1	28		28	1		
11	自选项目	体育选项 Sports Options	限选2学分	1	28		28	2\3\8		
12	TY190020	游泳 Swimming		1	28		28	2\4\6		
13	TY190030	团体操 Group Callisthenics		1	28		28	3\5\7		
14	WY160371	综合英语 1 Comprehesive English 1		3	48	48		1		
15	WY160372	综合英语 2 Comprehesive English 2		3	48	48		2	★	
小计 Subtotal				20	536	220	316			
学科（大类）教育平台（必修） Discipline Coureses (Required)										
1	LX160081	高等数学 B1 Advanced Mathematics B1		5	80	80		1		
2	LX160082	高等数学 B2 Advanced Mathematics B2		5	80	80		2	★	
3	LX190010	线性代数 Linear Algebra		3	48	48		2		

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Degree Course	辅修 Minor
				总学时 Total	理论学时 Theory	实践学时 Practice			
4	LX190080	大学物理 D College Physics D	4.5	72	72		2		
5	JK190370	集合论与图论 Set theory and graph theory	2.5	40	40		2		
6	JK191050	数理逻辑 Mathematical logic	2	32	32		1		
7	JK190520	计算机学科导论 Introduction to Computer Science	1	16	16		1		
8	JK190270	程序设计基础 Programing Foundation	2	32	32		1	★	◆
9	JK190280	程序设计基础实验 Programing Experiment	1	16		16	1		◆
10	JK190970	数据结构 Data Structure	3	48	36	12	2	★	◆
小计 Subtotal			29	464	436	28			
个性化培养平台（选修课） Customized Education Courses(Selective)									
1		素质选修 Quality Elective	5						
2		全人教育微学分 Micro credit of Holistic Education	3						
小计 Subtotal			8						

三、专业培养阶段方案（分专业培养方案）（Undergraduate Program for Majors under the Discipline）

物联网工程专业培养方案

Undergraduate Program for the Major of Internet of Things Engineering

专业负责人：路锦正　　主管院长：姚远程　　院学术委员会主任：　邹传云

Director of Major: Jinzheng Lu　Executive Dean: Yuancheng Yao　Academic Committee Director: Chuanyun Zou

□培养目标(Educational Objectives)

本专业面向国家战略性新兴产业发展需求，培养具有良好的人文素养和扎实的自然科学基础，掌握物联网工程相关专业知识，具有社会责任感和团队协作能力，在物联网系统设计和产品应用领域，从事产品开发、系统集成、运行维护、项目管理等工作的复合型高级工程技术人才。

本专业学生在毕业后五年左右，达到以下目标：

1.道德修养：具备良好的思想品德和人文科学素养，在工程实践或技术开发中理解并遵守道德规范、法律法规。

2.工程知识：具有解决物联网及相关领域复杂工程问题所需要的宽广的工程科学知识、工程技术知识和工程环境知识，熟悉本行业的应用现状和发展趋势。

3.工程能力：能够提炼、分析和解决本领域工程项目实施过程中遇到的关键问题，具备独立从事物联网及相关领域工程项目的设计与开发能力，具有一定的创新意识。

4.团队合作：具有良好的团队协作精神以及组织协调和交流沟通能力，能够在实际工作中承担相应角色。

5.终身学习：能够积极主动适应社会环境、技术的发展变化，拥有终身学习的习惯和自主学习的能力。

Facing the development needs of national strategic emerging industries, this major cultivates compound senior engineering and eechnology talents. They have a good humanistic quality and solid natural science foundation, master the relevant professional knowledge of Internet of Things engineering, have a sense of social responsibility and team cooperation ability, and can be engaged in product development, system integration, operation and maintenance, project management, etc. in the field of Internet of Things system design and product application.

Five years after graduation, students in this major achieve the following goals:

1. Moral cultivation: Have good ideological, moral and humanistic qualities, understanding and obeying ethics, laws and regulations in engineering practice or technological development.

2. Engineering knowledge: Have wide Engineering Science knowledge, engineering technology knowledge and engineering environment knowledge, to solve complex engineering problems in Internet of Things and related fields, to be familiar with the application status and development trend of this industry.

3. Engineering capability: Be able to extract, analyze and solve the key problems encountered in the

implementation of engineering projects in this field. Have the ability to design and develop engineering projects independently in the Internet of Things and related fields, and have a certain sense of innovation.

4. Team cooperation: Have good teamwork spirit, organizational coordination and communication skills; be able to play a corresponding role in practical work.

5. Lifelong learning: Be able to actively adapt to the social environment, technological development and changes, and have the habit of lifelong learning and the ability of self-learning.

□毕业要求(Graduation Requirements)

学生应德智体全面提高，知识、能力、素质协调发展。具有扎实的数学、自然科学、人文社会科学和工程技术基础理论，系统宽厚的物联网工程专业知识和实践能力，具有从事物联网系统装置/单元的分析、设计、制作、调测、维护或运营的基本能力。为此，毕业生需具有以下知识、能力和素质。

毕业要求 1——工程知识：具有从事物联网工程所需的数学、自然科学、工程基础和专业知识，能够解决物联网系统相关装置/单元的复杂工程问题。

毕业要求 2——问题分析：能够应用物联网工程相关的数学、自然科学和工程科学的基本原理，识别、表达、并通过文献分析及调研，对物联网系统相关装置/单元中的复杂工程问题进行建模与分析，以获得有效结论。

毕业要求 3——设计/开发解决方案：能够应用物联网工程专业知识设计物联网系统装置/单元中复杂工程问题的解决方案，设计满足特定需求的装置/单元及工艺流程，并能在设计环节体现创新意识，同时考虑社会、健康、安全、法律、文化以及环境等因素。

毕业要求 4——研究：能够应用数学、自然科学、物联网工程等领域的科学原理，针对物联网系统装置/单元中的复杂工程问题，设计合理的实验方法、数据分析与表达方法，信息综合与分析方法，以给出有效结论。

毕业要求 5——使用现代工具：能够针对物联网装置/单元中的复杂工程问题，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。

毕业要求 6——工程与社会：能够基于物联网工程、人文社会科学等领域相关的背景知识，解释专业工程实践和复杂工程问题的解决方案对社会、健康、安全、法律以及文化的影响，理解应承担的责任和义务，并协助专业团队开展相关评价。

毕业要求 7——环境和可持续发展：能够基于物联网工程、人文社会科学以及环境工程等领域相关的背景知识，理解和评价物联网系统装置/单元中复杂工程问题的专业工程实践对环境、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，能够在物联网装置/单元的工程实践中理解并遵守工程职业道德和规范，履行责任。

毕业要求 9——个人和团体：能够在多学科背景下的团体中承担个体、团队成员以及负责人的角色。

毕业要求 10——沟通与表达：能够就物联网系统装置/单元中的复杂工程问题与业界及社会公众进行有效沟通和交流，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。

毕业要求 11——项目管理：能够在物联网系统装置/单元的工程实践中，理解并掌握工程管理原理与经济决策方法，具有一定的组织和管理能力。

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。

Students should improve morality, intelligence and physique in an all-round way, and coordinate the development of knowledge, ability and quality. They have solid basic theory of mathematics, natural science, humanities and social sciences and engineering technology, broad professional knowledge and practical ability of Internet of Things engineering, and basic ability of analysis, design, production, survey, maintenance or operation of Internet of Things system devices/units. To this end, graduates should have the following knowledge, abilities and qualities.

Graduation requirement 1 - Engineering Knowledge: Have the mathematics, natural science, engineering foundation and professional knowledge required to engage in the Internet of Things project. Be able to solve the complex engineering problems of related devices/units in the Internet of Things system.

Graduation requirement 2 - Problem Analysis: Be able to apply the basic principles of mathematics, natural science and engineering science related to the Internet of Things to identify, express, and through literature analysis and investigation, model and analyze the complex engineering problems in the relevant devices/units of the Internet of Things system, so as to obtain effective conclusions.

Graduation requirement 3 - Design/Development Solutions: Being able to apply the professional knowledge of Internet of Things to design solutions to complex engineering problems in devices/units of Internet of Things system, to design devices/units and processes that meet specific needs, and to embody innovative consciousness in the design process, taking into account social, health, safety, legal, cultural and environmental factors.

Graduation requirement 4 - Research: Be able to apply the scientific principles of mathematics, natural science, Internet of Things engineering and other fields to design reasonable experimental methods, data analysis and expression methods, information synthesis and analysis methods for complex engineering problems in devices/units of Internet of Things system, in order to give effective conclusions.

Graduation requirement 5 - Use modern tools: Be able to select and use appropriate technology, resources, modern engineering tools and information technology tools for complex engineering problems in devices/units of the Internet of Things, including prediction and Simulation of complex engineering problems, and to understand their limitations.

Graduation requirement 6 - Engineering and Society: Be able to explain the social, health, safety, legal and cultural impacts of professional engineering practices and solutions to complex engineering problems based on relevant background knowledge in the fields of Internet of Things, humanities and social sciences, understand the responsibilities and obligations to be undertaken, and assist professional teams in relevant evaluation.

Graduation requirement 7 - Environment and sustainable development: Be able to understand and evaluate the impact of professional engineering practices on environmental and social sustainable development of

complex engineering problems in devices/units of Internet of Things based on relevant background knowledge in the fields of Internet of Things, humanities and social sciences, and environmental engineering.

Graduation requirement 8 - Professional norms: Have humanities and social sciences accomplishment and social responsibility; be able to understand and abide by engineering professional ethics and norms in the engineering practice of Internet of Things installations/units, and fulfill their responsibilities.

Graduation requirement 9 - Individuals and groups: Have the ability to assume the roles of individuals, team members and leaders in a multidisciplinary community.

Graduation requirement 10 - Communication and expression: Be able to effectively communicate and communicate with the industry and the public on the complex engineering problems in the devices/units of the Internet of Things, and have a certain international vision, and be able to communicate and communicate in the cross-cultural context.

Graduation requirement 11 - Project Management: Be able to understand and master engineering management principles and economic decision-making methods in the engineering practice of device/unit of Internet of Things system, and have certain organizational and management capabilities.

Graduation requirement 12 - Lifelong learning: Have awareness of self-learning and lifelong learning, ability to constantly learn and adapt to development.

□培养目标实现矩阵（毕业要求与课程的对应矩阵）Realization Matrix of Educational Objectives (Graduation Requirements by Courses)

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index (Knowledge and Capability Requirements)	支撑课程或培养环节 Realization
1.工程知识：具有从事物联网工程所需的数学、自然科学、工程基础和专业知识，能够解决物联网系统相关装置/单元的复杂工程问题。 1. Engineering Knowledge: Have the mathematics, natural science, engineering foundation and professional knowledge required to engage in the Internet of Things project, being able to solve the complex engineering problems of related devices/units in the Internet of Things system.	1.1 能够用数学和自然科学语言对工程问题进行初步描述； 1.1 Be able to describe engineering problems in mathematical and natural science languages.	高等数学 B1/B2 大学物理 D 概率论与数理统计 线性代数 集合论与图论 数理逻辑 Advanced Mathematics B1 Advanced Mathematics B2 College Physics D Probability and Mathematical Statistics Linear Algebra Mathematical logic
	1.2 能够将工程基础知识应用于信号、电路与电子系统的计算与分析； 1.2 The basic engineering knowledge can be applied to the calculation and analysis of signals, circuits and electronic systems.	电路与电子技术 1 数字电子技术 信号与系统 D 计算机原理及应用 Circuit and Electronic Technology 1 Digital Electronic Technology Signals and Systems D Computer Principles and Applications

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index (Knowledge and Capability Requirements)	支撑课程或培养环节 Realization
	1.3 能够将专业基础知识应用于物联网系统的建模、计算与分析； 1.3 Apply professional basic knowledge to the modeling, calculation and analysis of Internet of Things system.	数据结构 计算机网络 C 计算机操作系统 Data Structures Computer Network C Computer Operating System
	1.4 能够将专业知识用于解决物联网系统中的感知、传输、应用等复杂工程问题。 1.4 Apply professional knowledge to solve complex engineering problems such as perception, transmission and application in the Internet of Things system.	传感器原理及应用 RFID 应用系统 无线传感器网络 数据挖掘 D Sensor Principles and Applications RFID Application System Wireless Sensor Network Data Mining D
2.问题分析：能够应用物联网工程相关的数学、自然科学和工程科学的基本原理，识别、表达、并通过文献分析及调研，对物联网系统相关装置/单元中的复杂工程问题进行建模与分析，以获得有效结论。 2. Problem Analysis: Be able to apply the basic principles of mathematics, natural science and engineering science related to the Internet of Things to identify, express, and through literature analysis and investigation, model and analyze the complex engineering problems in the relevant devices/units of the Internet of Things system, so as to obtain effective conclusions.	2.1 能够应用数学、自然科学的基本原理，识别电路及电子系统、物联网系统中涉及的电路原理、信号分析等问题； 2.1 The basic principles of mathematics and natural sciences can be applied to identify circuit and electronic system, circuit principle and signal analysis involved in Internet of Things system, etc.	电路与电子技术 2 数字电子技术 信号与系统 计算机原理及应用 Circuit and Electronic Technology 2 Digital Electronic Technology Signals and Systems D Computer Principles and Applications
	2.2 能够应用工程科学基本原理，识别和表达物联网领域中的复杂工程问题，以获得有效结论； 2.2 To identify and express complex engineering problems in the field of Internet of Things by applying the basic principles of Engineering Science in order to obtain effective conclusions.	数据结构 计算机网络 C 物联网信息安全 物联网控制技术 Data Structures Computer Networks C Information Security of Internet of Things Control Technology of Internet of Things
	2.3 能够在文献调研的基础上，对物联网领域的复杂工程问题进行分析并提出解决方案。 2.3 On the basis of literature research, the complex engineering problems in the field of Internet of Things can be analyzed and solutions proposed.	物联网综合系统项目实训 物联网数据处理项目实训 物联网工程专业毕业设计 Integrated System Project Training of Internet of Things Data Processing Project Training of Internet of Things Graduation Design of Internet of Things Engineering

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index (Knowledge and Capability Requirements)	支撑课程或培养环节 Realization
3. 设计/开发解决方案：能够应用物联网工程专业知识设计物联网系统装置/单元中复杂工程问题的解决方案，设计满足特定需求的装置/单元及工艺流程，并能在设计环节体现创新意识，同时考虑社会、健康、安全、法律、文化以及环境等因素。 3. Design/Development Solutions: Be able to apply the professional knowledge of Internet of Things to design solutions to complex engineering problems in devices/units of Internet of Things system, to design devices/units and processes that meet specific needs, and to embody innovative consciousness in the design process, taking into account social, health, safety, legal, cultural and environmental factors.	3.1 能够根据物联网工程专业基础知识，设计简单物联网装置/单元的解决方案； 3.1 Be able to design simple device/unit solution of Internet of Things according to the basic knowledge of Internet of Things Engineering.	单片机应用技术 RFID 应用系统 物联网控制技术 数据库技术 软件技术课程设计 电子技术课程设计 Application Technology of Microcomputer RFID Application system Control Technology of Internet of Things Database Technology Course Design of Software Technology Course Design of Electronic Technology
	3.2 能够基于物联网工程专业知识，设计复杂物联网装置/单元的解决方案，并体现创新意识； 3.2 Be able to design solutions for complex devices/units of the Internet of Things based on professional knowledge of the Internet of Things, and reflect innovative awareness.	创新创业基础 物联网系统设计与应用 物联网综合系统项目实训 物联网工程专业毕业设计 Fundamentals of Innovation and Entrepreneurship The Design and Application of IOT Systems Integrated System Project Training of Internet of Things Graduation Design of Internet of Things Engineering
	3.3 能够在设计环节考虑社会、健康、安全、法律、文化以及环境等因素，并评价解决方案的可行性。 3.3 Be able to consider social, health, safety, legal, cultural and environmental factors in the design process and evaluate the feasibility of Solutions	思想道德修养与法律基础 形势与政策 1-8 Thought Morals Tutelage and Legal foundation Situation and Policy 1-8

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index (Knowledge and Capability Requirements)	支撑课程或培养环节 Realization
4. 研究：能够应用数学、自然科学、物联网工程等领域的科学原理，针对物联网系统装置/单元中的复杂工程问题，设计合理的实验方法、数据分析与表达方法，信息综合与分析方法，以给出有效结论。 4. Research: Be able to apply the scientific principles of mathematics, natural science, Internet of Things engineering and other fields to design reasonable experimental methods, data analysis and expression methods, information synthesis and analysis methods for complex engineering problems in devices/units of Internet of Things system, in order to give effective conclusions.	4.1 能够针对物联网装置/单元的复杂工程问题，利用理论分析等手段，给出研究目标和研究方案； 4.1 In view of the complex engineering problems of devices/units in the Internet of Things, the research objectives and schemes can be given by means of theoretical analysis and other means.	大学物理实验 B1 程序设计基础实验 计算机原理及应用实验 电路与电子技术实验 1/2 数字电子技术实验 A 电子技术课程设计 College Physics Experiment B1 Programing Experiment Experiments of Computer Principles and Applications Experiments of Circuit and Electronic Technology 1/2 Experiments of Digital Electronic Technology A Course Design of Electronic Technology
	4.2 能够针对物联网装置/单元的复杂工程问题，开展仿真或实验； 4.2 Be able to conduct simulation or experiment for complex engineering problems of devices/units in the Internet of Things.	传感器原理及应用实验 单片机应用技术实践 计算机网络实验 物联网控制技术实践 物联网信息安全 物联网系统设计与应用实践 Experiments of Sensor Principles and Applications Practice of Application Technology of Microcomputer Experiments of Computer Networks Practice of Control Technology of Internet of Things Information Security of Internet of Things Practice of The Design and Application of IOT Systems

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index (Knowledge and Capability Requirements)	支撑课程或培养环节 Realization
	4.3 能够开展实验研究，并根据实验结果，对实验中出现的问题和现象进行分析、解释和处理，以给出有效结论； 4.3 Be able to carry out experimental research, and according to the experimental results, analyze, explain and deal with the problems and phenomena in the experiment, so as to give effective conclusions.	物联网综合系统项目实训 物联网工程专业毕业设计 Integrated System Project Training of Internet of Things Graduation Design of Internet of Things Engineering
5.使用现代工具：能够针对物联网装置/单元中的复杂工程问题，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. Use modern tools: Be able to select and use appropriate technology, resources, modern engineering tools and information technology tools for complex engineering problems in devices/units of the Internet of Things, including prediction and Simulation of complex engineering problems, and to understand their limitations.	5.1 能够通过计算机网络等途径查询、检索、收集物联网工程专业文献及资料; 5.1 Be able to query, search and collect documents and materials of Internet of Things engineering specialty through computer network and other ways.	程序设计基础 JAVA 程序设计及应用 Programing Foundation JAVA Programming and Application
	5.2 能够选择与使用恰当的技术、资源和工具，用于复杂工程问题的设计、仿真与实现； 5.2 Be able to select and use appropriate technologies, resources and tools for the design, simulation and implementation of complex engineering problems.	程序设计基础 数据库技术 物联网数据处理项目实训 Programing Foundation Database Technology Data Processing Project Training of Internet of Things
	5.3 能够理解现代工具在复杂工程问题设计、仿真与实现中的优势和局限性。 5.3 Be able to understand the advantages and limitations of modern tools in the design, simulation and implementation of complex engineering problems.	物联网工程专业毕业设计 Graduation Design of Internet of Things Engineering
6.工程与社会：能够基于物联网工程、人文社会科学等领域相关的背景知识，解释专业工程实践和复杂工程问题的解决方案对社会、健康、安全、法律以及文化的影响，理解应承担的责任和义务，并协助专业团队开展相关评价。 6. Engineering and Society: Be able to explain the social, health, safety, legal and cultural impacts of professional engineering practices and	6.1 能够基于法律法规、产业政策和物联网领域相关技术标准评价专业工程实践和物联网系统对社会、健康、安全、法律以及文化的影响； 6.1 Be able to evaluate the social, health, safety, legal and cultural impacts of professional engineering practices and Internet of Things systems based on laws and regulations, industrial policies and relevant technical standards in the field of Internet of Things.	计算机学科导论 思想道德修养与法律基础 形势与政策 1-8 物联网工程专业毕业实习 Introduction to Computer Science Thought Morals Tutelage and Legal Foundation Situation and Policy 1-8 Graduation Practice of Internet of Things Engineering

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index (Knowledge and Capability Requirements)	支撑课程或培养环节 Realization
solutions to complex engineering problems based on relevant background knowledge in the fields of Internet of Things, humanities and social sciences, understand the responsibilities and obligations to be undertaken, and assist professional teams in relevant evaluation	6.2 能够理解工程技术人员在专业工程实践和物联网系统中应承担的社会责任。 6.2 Be able to understand the social responsibility of engineers and technicians in professional engineering practice and Internet of Things system.	入学教育 创新创业基础 物联网工程专业生产实习 Entrance education Fundamentals of Innovation and Entrepreneurship Production Practice of Internet of Things Engineering
7.环境和可持续发展：能够基于物联网工程、人文社会科学以及环境工程等领域相关的背景知识，理解和评价物联网系统装置/单元中复杂工程问题的专业工程实践对环境、社会可持续发展的影响。 7. Environment and sustainable development: Be able to understand and evaluate the impact of professional engineering practices on environmental and social sustainable development of complex engineering problems in devices/units of Internet of Things based on relevant background knowledge in the fields of Internet of Things, humanities and social sciences, and environmental engineering.	7.1 树立科学发展观，了解国家环境保护相关政策法规，理解社会可持续发展的重要性； 7.1 Be able to establish a scientific outlook on development, understand the relevant policies and regulations of national environmental protection, and understand the importance of social sustainable development.	创新创业基础 物联网工程专业生产实习 Fundamentals of Innovation and Entrepreneurship Production Practice of Internet of Things Engineering
	7.2 能够理解和评价物联网工程实践对环境、社会可持续发展的影响。 7.2 Be able to understand and evaluate the impact of Internet of Things project practice on the sustainable development of the environment and society.	入学教育 计算机学科导论 物联网工程专业毕业实习 Entrance education Introduction to Computer Science Graduation Practice of Internet of Things Engineering
8.职业规范：具有人文社会科学素养、社会责任感，能够在物联网装置/单元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. Professional norms: Have humanities and social sciences accomplishment and social responsibility, being able understand and abide by engineering professional ethics and norms in the engineering practice of Internet of Things installations/units, and fulfill their responsibilities.	8.1 树立正确的人生观、价值观和世界观，具有人文社会科学素养和社会责任感； 8.1 Be able to Establish a correct outlook on life, values and the world, with humanities and Social Sciences literacy and social responsibility.	中国近现代史纲要 毛泽东思想与中国特色社会主义理论体系概论 马克思主义基本原理概论 Conspectus of Chinese Modern History An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics Introduction to the Basic Principles of Marxism
	8.2 具有健康的身体和心理，具备履行社会责任的基础； 8.2 Have a healthy body and mind, have the basis of fulfilling social responsibility.	运动基础 军事理论 大学生心理健康教育 Sports Fundamental Military Theory Mental health education of college students

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index (Knowledge and Capability Requirements)	支撑课程或培养环节 Realization
	8.3 能够在物联网动系统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。 8.3 Be able to understand and abide by engineering professional ethics and norms in the engineering practice of Internet of Things (IOT) mobile system, and fulfill responsibilities.	思想道德修养与法律基础 思想政治理论课实践教学 创新创业基础 Thought Morals Tutelage and Legal foundation The Practical Teaching of Ideological and Political Theory Fundamentals of Innovation and Entrepreneurship
9.个人和团体：能够在多学科背景下的团体中承担个体、团队成员以及负责人的角色。 9. Individuals and groups: Have the ability to assume the roles of individuals, team members and leaders in a multidisciplinary community.	9.1 具备基本的人际交往与沟通能力，了解多学科背景下团队的构成以及不同角色成员的职责； 9.1 Contain basic interpersonal and communication skills; understand team composition and responsibilities of members with different roles in a multidisciplinary context.	军事理论 军事技能训练 工程训练（ERP） 思想政治理论课实践教学 Military Theory Military Skill Training Engineering Training(ERP) The Practical Teaching of Ideological and Political Theory
	9.2 能够在多学科背景下的团队中担当团队成员或团队负责人的角色，了解团队的组织管理方式，能够参与团队的组织或协作工作。 9.2 Be able to play the role of team member or team leader in a multidisciplinary team, understand the organization and management of the team, and participate in the organization or collaboration of the team.	物联网综合系统项目实训 物联网工程专业毕业设计 Integrated System Project Training of Internet of Things Graduation Design of Internet of Things Engineering
10.沟通与表达：能够就物联网系统装置/单元中的复杂工程问题与业界及社会公众进行有效沟通和交流，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. Communication and Expression: Be able to effectively communicate and communicate with the industry and the public on the complex engineering problems in the devices/units of the Internet of Things; have a certain international vision, and be able to communicate and communicate in the cross-cultural context.	10.1 能够通过口头及书面方式对物联网系统中的复杂工程问题进行表达，与业界同行及社会公众进行有效沟通和交流； 10.1 Through oral and written expression of complex engineering problems in the Internet of Things system, effective communication and communication with peers in the industry and the public.	软件技术课程设计 物联网综合系统项目实训 物联网工程专业毕业设计 Course Design of Software Technology Integrated System Project Training of Internet of Things Graduation Design of Internet of Things Engineering
	10.2 能够阅读外文文献资料，在跨文化背景下进行沟通和交流，具备一定的国际视野。 10.2 Be able to read foreign literature, communicate and communicate in cross-cultural context, with a certain international perspective.	综合外语 1-4 Comprehesive English 1-4

毕业要求 Graduation Requirements	指标点（知识与能力要求） Key Index (Knowledge and Capability Requirements)	支撑课程或培养环节 Realization
11. 项目管理：能够在物联网系统装置/单元的工程实践中，理解并掌握工程管理原理与经济决策方法，具有一定的组织和管理能力。 11. Project Management: Be able to understand and master engineering management principles and economic decision-making methods in the engineering practice of device/unit of Internet of Things system; have certain organizational and management capabilities.	11.1 能够在物联网装置/单元的设计、开发、调测、应用等工程实践中，理解工程管理原理与经济决策方法； 11.1 Be able to understand engineering management principles and economic decision-making methods in the design, development, survey and application of devices/units of the Internet of Things.	工程训练（ERP） 物联网工程专业生产实习 Engineering Training(ERP) Production Practice of Internet of Things Engineering
	11.2 能够在与物联网工程相关的多学科环境中应用工程管理原理与经济决策方法，具有一定的组织和管理能力。 11.2 Be able to apply engineering management principles and economic decision-making methods in the multidisciplinary environment related to Internet of Things, and having certain organizational and managerial capabilities.	创新创业基础 物联网工程专业毕业设计 Fundamentals of Innovation and Entrepreneurship Graduation Design of Internet of Things Engineering
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. Lifelong learning: Have awareness of self-learning and lifelong learning, ability to constantly learn and adapt to development.	12.1 能够认识自主学习和终身学习的重要性，具有终身学习意识； 12.1 Be able to recognize the importance of self-regulated learning and lifelong learning, and have a sense of lifelong learning.	马克思主义基本原理概论 毛泽东思想与中国特色社会主义理论体系概论 Introduction to the Basic Principles of Marxism An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics
	12.2 能够掌握一定的自主学习方法，了解拓展知识和能力的途径，能够适应社会发展。 12.2 Be able to master certain self-learning method and understand the ways to expand knowledge and ability, and be able to adapt to social development.	物联网工程专业生产实习 物联网工程专业毕业实习 物联网工程专业毕业设计 Production Practice of Internet of Things Engineering Graduation Practice of Internet of Things Engineering Graduation Design of Internet of Things Engineering

毕业要求对培养目标的支撑关系(The Support Relation between Graduation Requirements and Training Objectives)

培养目标(Training Objectives) / 毕业要求 (Graduation Requirements)	目标 1 Objective 1	目标 2 Objective 2	目标 3 Objective 3	目标 4 Objective 4	目标 5 Objective 5
毕业要求 1(Graduation Requirements 1)		√			
毕业要求 2(Graduation Requirements 2)		√			
毕业要求 3(Graduation Requirements 3)			√		
毕业要求 4(Graduation Requirements 4)		√	√		√
毕业要求 5(Graduation Requirements 5)			√		
毕业要求 6(Graduation Requirements 6)	√	√			
毕业要求 7(Graduation Requirements 7)	√	√			
毕业要求 8(Graduation Requirements 8)	√				
毕业要求 9(Graduation Requirements 9)				√	
毕业要求 10(Graduation Requirements 10)		√		√	
毕业要求 11(Graduation Requirements 11)		√	√	√	
毕业要求 12(Graduation Requirements 12)					√

□专业培养阶段教学进程计划表 (Courses Schedule of Educational Stages for the Major)

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
通识教育平台（必修） General Education Courses(Required)								
1	MY160080	马克思主义基本原理概论 Introduction to the basic principles of Marxism	3	48	48	0	3	
2	MY160110	毛泽东思想与中国特色社会主义理论体系概论 An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics	4	64	64	0	4	
3	MY190013	形势与政策 3(四年制) Situation and Policy 3（Four-year）	0.25	8	8	0	3	
4	MY190014	形势与政策 4(四年制) Situation and Policy 4（Four-year）	0.25	8	8	0	4	
5	MY190015	形势与政策 5(四年制) Situation and Policy 5（Four-year）	0.25	8	8	0	5	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
6	MY190016	形势与政策 6(四年制) Situation and Policy 6（Four-year）	0.25	8	8	0	6	
7	MY190017	形势与政策 7(四年制) Situation and Policy 7（Four-year）	0.25	8	8	0	7	
8	MY190018	形势与政策 8(四年制) Situation and Policy 8（Four-year）	0.25	8	8	0	8	
9	MY160280	思想政治理论课实践教学 The Practical Teaching of Ideological and Political Theory	2	32	0	32	3	
10	WY160203	综合英语 3 Comprehesive English 3	2	32	32	0	3	
11	WY160104	综合英语 4 Comprehesive English 4	2	32	32	0	4	
12	JW190010	创新创业基础 Fundamentals of Innovation and Entrepreneurship	2	32	32	0	4	
小计 Subtotal			16.5	288	256	32		
学科（大类）教育平台（必修） Discipline Coureses (Required)								
1	LX190020	概率论与数理统计 Probability and Mathematical Statistics	3	48	48	0	3	
2	LX190101	大学物理实验 B1 College Physics Experiment B1	1	16	0	16	3	
3	GC160010	工程训练(ERP) Engineering Training(ERP)	1	16	0	16	6	
小计 Subtotal			5	80	48	32		
专业教育平台（必修） Major Courses (Required)								
1	XX190271	电路与电子技术 1 Circuit and Electronic Technology 1	3	48	48	0	3	
2	XX190281	电路与电子技术实验 1 Experiments of Circuit and Electronic Technology 1	0.5	8	0	8	3	
3	XX190272	电路与电子技术 2 Circuit and Electronic Technology 2	3	48	48	0	4	★
4	XX190282	电路与电子技术实验 2 Experiments of Circuit and Electronic Technology 2	1	16	0	16	4	
5	XX160880	数字电子技术 Digital Electronic Technology	3.5	56	56	0	3	
6	XX161740	数字电子技术实验 A Experiments of Digital Electronic Technology A	1	16	0	16	3	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
7	XX190760	无线传感器网络 Wireless Sensor Network	2.5	40	40	0	5	★
8	XX190770	无线传感器网络实验 Experiments of Wireless Sensor Network	0.5	8	0	8	5	
9	XX160610	计算机原理及应用 Computer Principles and Applications	3	48	48	0	4	★
10	XX160620	计算机原理及应用实验 Experiments of Computer Principles and Applications	0.5	8	0	8	4	
11	XX190160	传感器原理及应用 Sensor Principles and Applications	2.5	40	40	0	5	
12	XX190170	传感器原理及应用实验 Experiments of Sensor Principles and Applications	0.5	8	0	8	5	
13	XX190130	RFID 应用系统 RFID Application System	2.5	40	40	0	5	★
14	XX190140	RFID 应用系统实验 Experiments of RFID Application System	0.5	8	0	8	5	
15	XX190870	物联网信息安全 Information Security of Internet of Things	2.5	40	32	8	6	
16	XX190820	物联网控制技术 Control Technology of Internet of Things	2	32	32	0	6	★
17	XX190830	物联网控制技术实践 Practice of Control Technology of Internet of Things	1	16	0	16	6	
18	XX190380	计算机操作系统 Computer Operating System	2	32	32	0	5	
19	JK160460	计算机网络 C Computer Networks C	2.5	40	40	0	4	★
20	JK160490	计算机网络实验 Experiments of Computer Networks	1	16	0	16	4	
21	XX190590	数据库技术 Database Technology	1	16	16	0	5	★
22	XX190600	数据库技术实践 Experiment of Database Technology	1	16	0	16	5	
23	XX160400	电子技术课程设计 Course Design of Electronic Technology	2	32	0	32	4	
24	XX160770	软件技术课程设计 Course Design of Software Technology	2	32	0	32	5	
25	XX190880	物联网综合系统项目实训 Integrated System Project Training of Internet of Things	3	48	0	48	6	★

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
26	XX190840	物联网数据处理项目实训 Data Processing Project Training of Internet of Things	3	48	0	48	7	
27	XX161050	物联网工程专业生产实习 Production Practice of Internet of Things Engineering	2	32	0	32	7	
28	XX190800	物联网工程专业毕业设计 Graduation Design of Internet of Things Engineering	14	224	0	224	8	
29	XX190810	物联网工程专业毕业实习 Graduation Practice of Internet of Things Engineering	2	32	0	32	8	
小计 Subtotal			65.5	1048	472	576		
个性化培养平台（选修课） Customized Education Courses(Selective)								
1	XX161180	信号与系统 D Signals and Systems D	2	32	32	0	5	
2	XX190850	物联网系统设计与应用 The Design and Application of IOT Systems	1.5	24	24	0	6	
3	XX190860	物联网系统设计与应用实践 Practice of The Design and Application of IOT Systems	1.5	24	0	24	6	
4	XX190610	数据挖掘 D Data Mining D	3	48	40	8	6	
5	XX190200	单片机应用技术 Application Technology of Microcomputer	2	32	32	0	3	
6	XX190210	单片机应用技术实践 Practice of Application Technology of Microcomputer	1	16	0	16	3	
7	XX190070	JAVA 程序设计及应用 JAVA Programming and Application	1.5	24	24	0	5	
8	XX190080	JAVA 程序设计及应用实践 JAVA Programming and Application Practice	1.5	24	0	24	5	
小计 Subtotal（培养限选 14 分）			14	224	152	72		
1	XX161760	数字信号处理 A Digital Signal Processing A	3	48	40	8	7	
2	XX190010	C++语言程序设计及应用 C++ Programming and Application	1.5	24	24	0	6	
3	XX190020	C++语言程序设计及应用实践 Practice of C++ Programming and Application	1.5	24	0	24	6	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	学时 Hours			开课学期 Semester	学位课 Diploma Course
				总学时 Total	理论学时 Class	实践学时 Practice		
4	XX190050	FPGA 技术 FPGA Technology	1.5	24	24	0	6	
5	XX190060	FPGA 技术实验 Experiments of FPGA Technology	1.5	24	0	24	6	
6	XX190030	DSP 技术 Digital Signal Processor Technology	2.5	40	24	16	6	
7	XX190110	Python 程序设计 Python Program Design	1.5	24	24	0	5	
8	XX190120	Python 程序设计实践 Python Programming Practice	1.5	24	0	24	5	
9	XX161630	计算机图像处理技术 A Computer Image Processing Technology A	2	32	24	8	5	
10	XX190520	人工智能基础 Foundation of Artificial Intelligence	2	32	32	0	7	
11	XX191040	云计算与大数据技术 Cloud Computing and Big Data Technology	2	32	32	0	6	
12	ZZ160400	工程经济学 A Engineering Economics A	2.5	40	40	0	6	
13	XX190900	现代通信原理 Modern Communication Principles	4	64	64	0	6	
14	XX161140	现代通信原理实验 Experiments of Modern Communication Principles	1	16	0	16	6	
15	XX190490	嵌入式系统设计 B Embedded System Design B	1.5	24	24	0	5	
16	XX190500	嵌入式系统设计 B 实验 Experiments of Embedded System Design B	1.5	24	0	24	5	
小计 Subtotal（个性任选 13 分）			31	496	352	144		

□集中实践环节（Intensive Practical Training Courses）

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	实践学时 Practice Hours	开课学期 Semester	学位课 Diploma Course
1	MY160280	思想政治理论课实践教学 The Practical Teaching of Ideological and Political Theory	2	32	3	
2	LX190101	大学物理实验 B1 College Physics Experiment B1	1	16	3	
3	GC160010	工程训练(ERP) Engineering Training(ERP)	1	16	6	
4	XX190281	电路与电子技术实验 1 Experiments of Circuit and Electronic Technology 1	0.5	8	3	
5	XX190282	电路与电子技术实验 2 Experiments of Circuit and Electronic Technology 2	1	16	4	
6	XX161740	数字电子技术实验 A Experiments of Digital Electronic Technology A	1	16	3	
7	XX190770	无线传感器网络实验 Experiments of Wireless Sensor Network	0.5	8	5	
8	XX160620	计算机原理及应用实验 Experiments of Computer Principles and Applications	0.5	8	4	
9	XX190170	传感器原理及应用实验 Experiments of Sensor Principles and Applications	0.5	8	5	
10	XX190140	RFID 应用系统实验 Experiments of RFID Application System	0.5	8	5	
11	XX190830	物联网控制技术实践 Practice of Control Technology of Internet of Things	1	16	6	
12	JK160490	计算机网络实验 Experiments of Computer Network	1	16	4	
13	XX190600	数据库技术实践 Experiment of Database Technology	1	16	5	
14	XX160400	电子技术课程设计 Course Design of Electronic Technology	2	32	4	
15	XX160770	软件技术课程设计 Course Design of Software Technology	2	32	5	
16	XX190880	物联网综合系统项目实训 Integrated System Project Training of Internet of Things	3	48	6	★
17	XX190840	物联网数据处理项目实训 Data Processing Project Training of Internet of Things	3	48	7	

序号 No.	课程编号 Course Code	课程名称 Course Name	学分 Credits	实践学时 Practice Hours	开课学期 Semester	学位课 Diploma Course
18	XX161050	物联网工程专业生产实习 Production Practice of Internet of Things Engineering	2	32	7	
19	XX190800	物联网工程专业毕业设计 Graduation Design of Internet of Things Engineering	14	224	8	
20	XX190810	物联网工程专业毕业实习 Graduation Practice of Internet of Things Engineering	2	32	8	
21	XX190860	物联网系统设计与应用实践 Practice of The Design and Application of IOT Systems	1.5	24	6	
22	XX190210	单片机应用技术实践 Practice of Application Technology of Microcomputer	1	16	3	
23	XX190080	JAVA 程序设计及应用实践 JAVA Programming and Application Practice	1.5	24	5	
小计 Subtotal（必修集中实践）			43.5	696		
1	XX190020	C++语言程序设计及应用实践 Practice of C++ Programming and Application	1.5	24	6	
2	XX190060	FPGA 技术实验 Experiments of FPGA Technology	1.5	24	6	
3	XX190120	Python 程序设计实践 Python Programming Practice	1.5	24	5	
4	XX161140	现代通信原理实验 Experiments of Modern Communication Principles	1	16	6	
5	XX190500	嵌入式系统设计 B 实验 Experiments of Embedded System Design B	1.5	24	5	
小计 Subtotal（限选集中实践）			7	112		

□核心课程和学位课程（Core Courses and Diploma Courses）

核心课程：高等数学 B1、数理逻辑、数据结构、程序设计基础、电路与电子技术 2、数字电子技术、传感器原理及应用、单片机应用技术、无线传感器网络、物联网控制技术、计算机操作系统、计算机网络、计算机原理及应用、数据库技术、JAVA 程序设计及应用、物联网综合系统项目实训等。

Core Courses: Advanced Mathematics B1, Mathematical Logic, Data Structures, Language Programming Foundation, Circuit and Electronic Technology 2, Digital Electronic Technology, Sensor Principles and Applications, Application Technology of Microcomputer, Wireless Sensor Network, Control Technology of Internet of Things, Computer Operating System, Computer Network, Computer Principles and Applications,

Database Technology, JAVA Programming and Application, Integrated System Project Training of Internet of Things.

学位课程: 高等数学 B2、程序设计基础、数据结构、综合英语 2、电路与电子技术 2、无线传感器网络、计算机原理及应用、RFID 应用系统、物联网控制技术、计算机网络 C、数据库技术、物联网综合系统项目实训等。

Diploma Courses: Advanced Mathematics B2, Language Programming Foundation, Data Structures, Comprehesive English 2, Circuit and Electronic Technology 2, Wireless Sensor Network, Computer Principles and Applications, RFID Application system, Control Technology of Internet of Things, Computer Network C, Database Technology, Integrated System Project Training of Internet of Things.

□课程体系结构图（The Curriculum Chart）

图 1 给出了物联网工程专业课程分布图，图 2 展示了物联网工程师能力培养拓扑图。

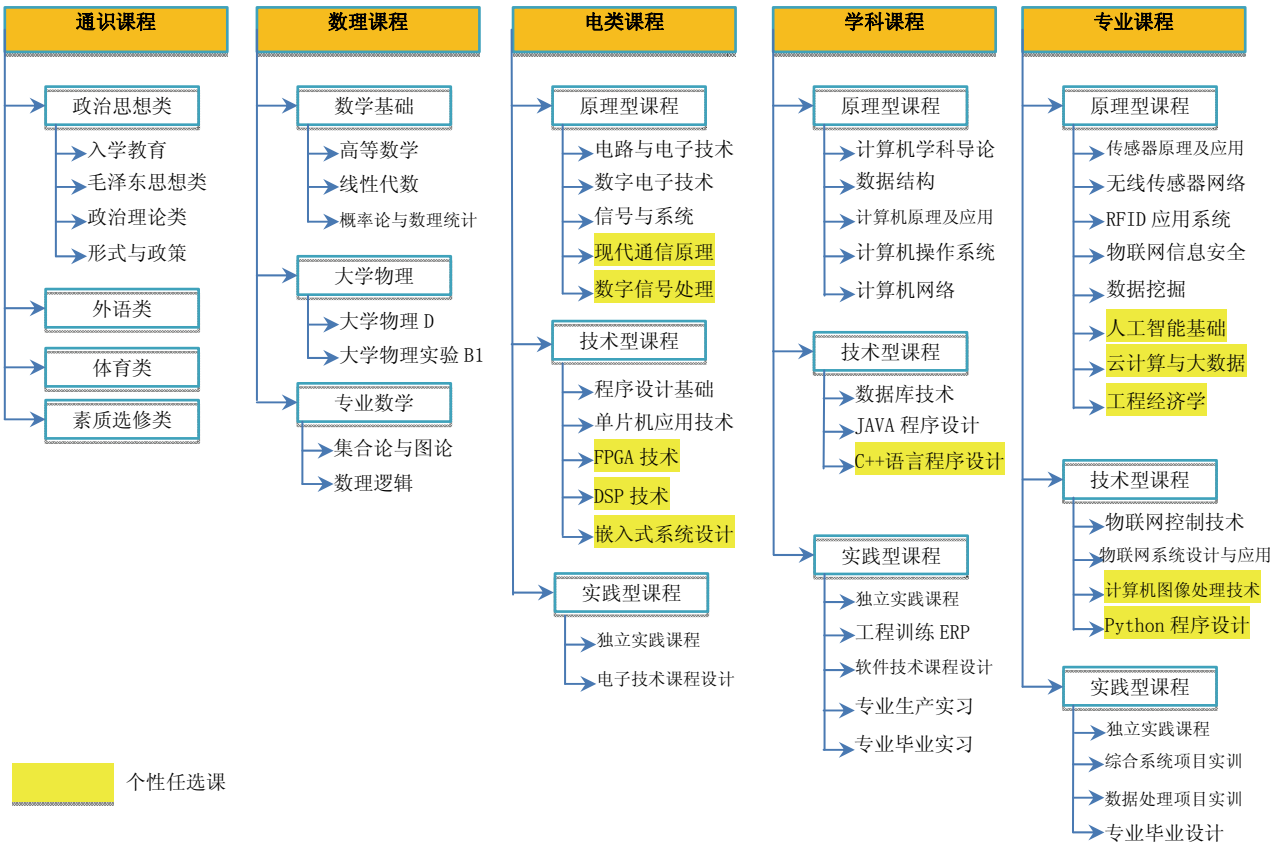


图 1 物联网工程专业课程分布图

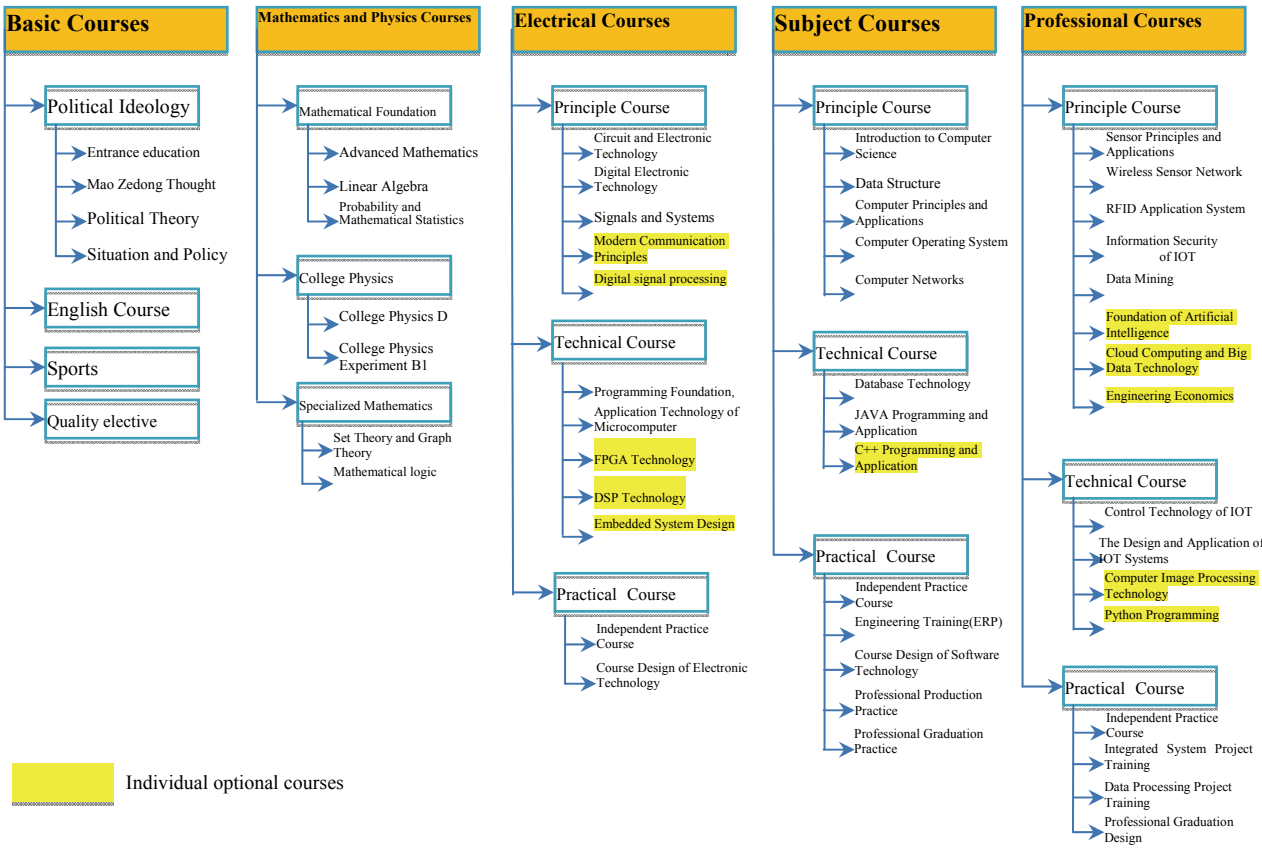


Figure 1 Course Distribution Map of Internet of Things Engineering

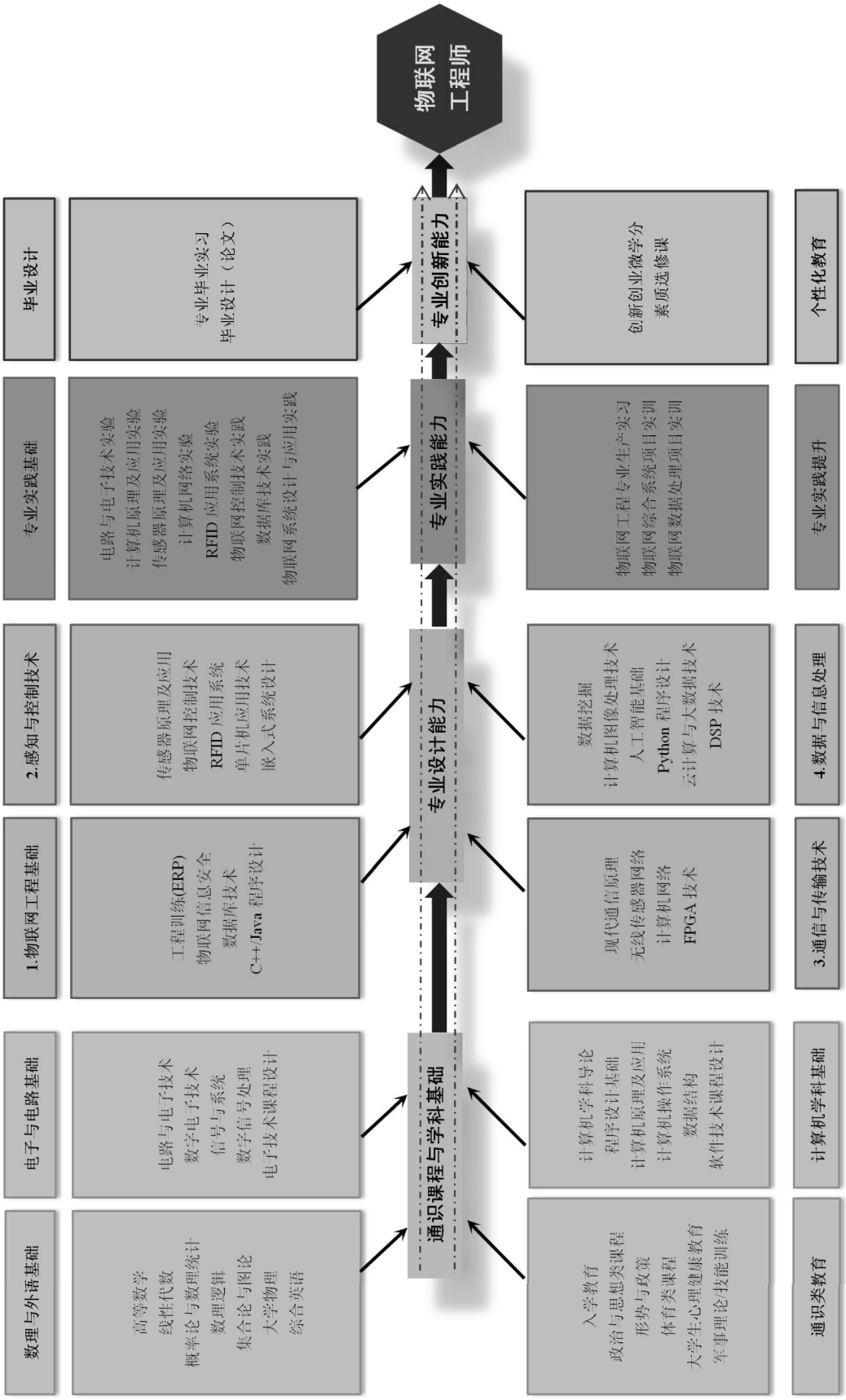


图 2 物联网工程师能力培养拓扑图

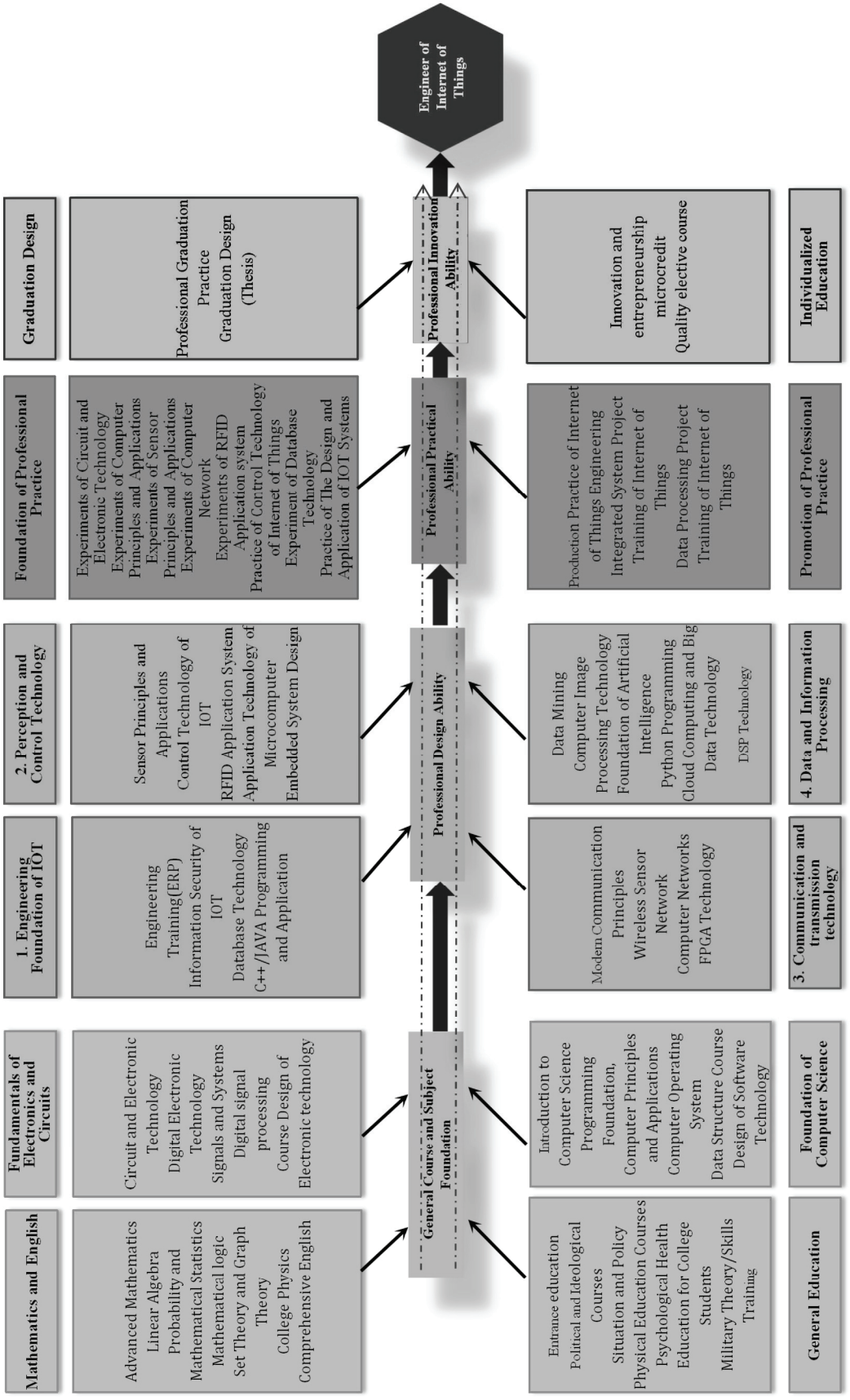


Figure 2 Topology Diagram of Ability Training for Internet of Things Engineers

针对个性化培养中的个性任选课按课程类型分(Selective courses for individualized training are classified according to the type of courses)：

1.原理课程(Principle courses)：数字信号处理 A、现代通信原理、人工智能基础、工程经济学 A

2.平台课程(Platform courses)：DSP 技术、FPGA 技术、嵌入式系统设计 B

3.语言课程(Language courses)：C++语言程序设计及应用、Python 程序设计

4.应用课程(Applied courses)：计算机图像处理技术 A、云计算与大数据技术

□学制及学分要求（Duration of Schooling and Credit Requirements）

1.学制：4 年。

2.学分要求：学生在校期间必须修满本方案规定的 170 学分方能毕业，其中，各环节的具体学分要求如下表。

1. Duration of Schooling：4~6 years.

2. Credit Requirements：Students must graduate with 170 credits as required by this program to graduate. The specific credits for each link are as follows.

	通识教育平台 General Education Courses	学科（大类）教育平台 Discipline Coureses	专业教育平台 Major Courses	个性化培养平台 Customized Education Courses	总学分 Total Credits
必修课 Required Courses	35.5	34	65.5	/	170
选修课 Selective Courses	/	/	/	35	

□授予学位（Degree Conferred）

毕业时符合学位授予条件的，授予工学学士学位。

Those who meet the conditions for conferring degrees upon graduation shall be conferred a Bachelor of Engineering degree.

□说明（Notes）

1.各学期应修学分建议(Credit Allotment for Each Semester)

学期 Semester	一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th	学分合计 Total
建议应修学分 Credits	19.75	24.25	24.25	23.25	27.25	24.75	10.25	16.25	170

2.素质选修课说明(Explanation of Quality Elective Course)

全校开设的素质选修课学期不定，所以各学期的应修学分建议数值不完全确定，仅供参考。

At present, the quality elective courses offered by the whole school have not yet decided the semester, so the recommended number of credits for each semester is not completely determined, for reference only.

3.个性化培养选课说明(Individualized Training Course Selection Instructions)

个性化培养平台分为了培养限选课和个性任选课。培养限选课要求本专业学生都必须选择；个性任选课开设了 16 门课程，共 31 学分，每个学生须选择不少于 13 学分。选课时应保证理论课与对应的实践课同时选修，否则仅选择理论课或实践课均不完整。

Individualized training platform is divided into training limited courses and individual optional courses. The training of restricted courses requires that all students in this major must choose; 16 courses are offered for individual optional courses, totaling 31 credits, and each student must choose no less than 13 credits. When choosing courses, you should ensure that theoretical courses and corresponding practical courses are chosen at the same time. Otherwise, only theoretical courses or practical courses are incomplete.