

廣東工業大學

Guangdong University of Technology



自动化学院

自动化专业人才培养方案

自 2022 级开始执行

执笔：（签字）_____ 专业负责人：（签字）_____

教学副院长：（签字）_____

行政负责人：（签字/学院盖章）：_____

前言

我校设立自动化专业有 50 多年的历史，围绕自动化的理论基础和技术内涵，开展专门人才的培养，为国家社会经济建设培养了大量各行各业的优秀人才，是一个综合的跨行业专业。新一轮工业革命比以往的三次工业革命来得更加深刻，新原理、新技术、新方法蜂拥而至，受到影响的产业更多，赋予自动化技术也有更高的要求。大数据、云计算、网络化等新技术为控制提供了更加丰富和精确的信息资源和控制要素，为智能制造的实现提供了条件。

为适应这些变化，在 2022 版培养方案中，构建三大基础一个领域的课程体系，强调综合与实践，致力于培养新工科人才，使他们更加具备价值理性、解决复杂工程问题能力、创造力、领导力、国际视野及交往能力、终生学习能力。

2022 版自动化专业培养方案制定的指导原则为：

1) 构建“三大基础、一个领域”课程体系。分为人文科学基础、自然科学基础、自动化专业基础、自动化专业领域四大类，课程体系满足工程认证的要求。

课程体系呈现金字塔结构，形成三大基础、一个领域的课程体系，其中三大基础课程为 133 学分，占总学分的 81.6%。专业领域课程为 30 学分，占总学分的 18.4%。如图 1 所示。

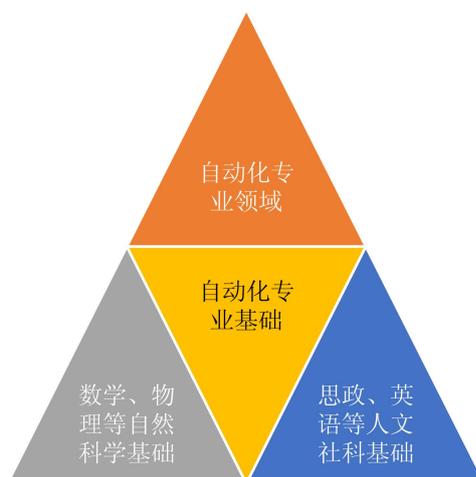


图 1 自动化专业课程体系结构

人文社科基础培养学生生活广度，自然科学基础培养学生学术深度，专业基础涵盖本专业的基础知识并完成运用知识能力的基础训练，专业领域重点培养学生综合运用知识能力，适当体现专业特色。

2) **强调综合与实践，培养新工科人才。**开设电子电路入门设计、电子电路 CAD、嵌入式系统设计与实践、自动化综合课程设计等一系列综合实践训练课程。从一年级到四年级，综合实践训练由浅入深，纵向贯穿；由点及面，横向连通；完善自动化专业技术、电子信息技术、计算机技术、自动化综合课程设计四大核心课程群，对每一个课程群，通过协调课程群内相关课程的授课内容、教学安排与考核方式，以一个统一的、体现当前及未来主流技术实践对象开展教学活动，促进学生综合运用所学，实现能力的渐进培养，培养学生具备价值理性，解决复杂工程问题能力、创造力、领导力、国际视野及交往、终生学习等能力。

3) **以产出为导向，通过学生取得的成果体现培养特色。**自动化专业以智能制造为主要方向，在此基础上再遴选培养学术创新、卓越工程师和机器人方面的人才。

智能制造作为自动化专业的主体方向，针对传统工科人才培养专业划分偏窄、细，缺乏交叉性等问题，安排工程管理、经济决策等学科交叉课程，通过工业 4.0 产线，融合大数据、云计算、网络化等新技术，以自动化系列综合课程设计为载体，采用 PBL 教学模式，重点培养学生形成正确价值观，具备解决复杂工程问题、合作交流、终生学习等能力。学生在毕业五年左右具备在国内外知名企业担任研发、管理工程师的能力。

在此基础上，根据学生个人兴趣及意愿，选拔组成创新班和卓越班。两个特色班实施小班教学，推动基于案例、基于项目的学习等多种研究性学习方法。

创新班试点加强数学在工程中的应用的实践训练、科研训练，在培养学生形成正确价值观，具备解决复杂工程问题、合作交流、终生学习等能力基础上，**重点培养学生学术科研能力**。学生在毕业五年左右能在国内外知名高校获得博士学位，具备在高等学校、科研院所等教学科研岗位任职的资格。

卓越工程师班试点一定学分任选外学院的专业课程，培养学生的学科交叉兴趣，并在第六学期实施全英教学。在培养学生形成正确价值观，具备解决复杂工程问题、合作交流、终生学习等能力基础上，重点培养学生具备集成产品开发 (IPD)、综合管理理念。学生在毕业五年左右能具备综合产品开发管理的能力。

课程体系学分构成比例如图 2 所示。其中自动化专业领域课程以智能制造方向为主体，在此基础上选拔生源，开设创新班、卓越班。

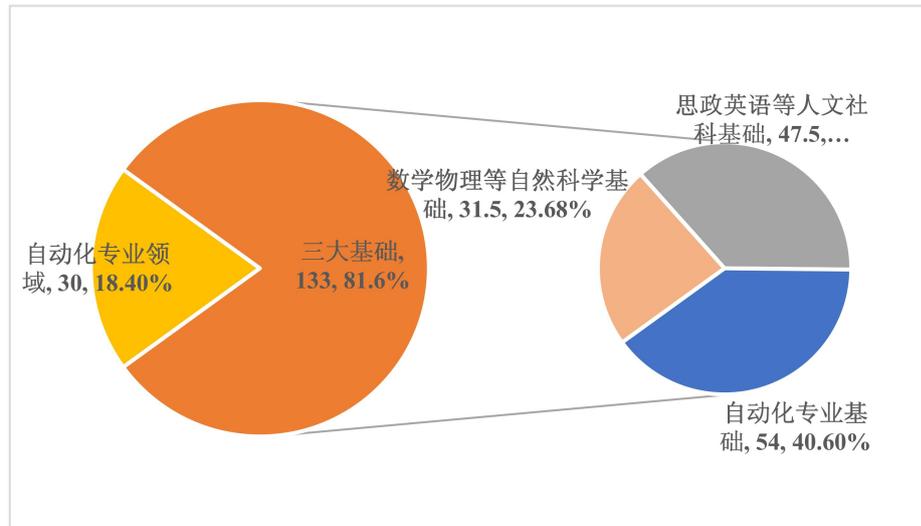


图 2 课程体系学分比例

具体课程构成如表 1 所示：

表 1 具体课程构成

模块	学分	课程类别	课程名称	学分	性质
基础 模块 133 学分	31.5	自然科学 基础	线性代数	2.5	必修
			大学物理（1）（2）+实验	11	
			高等数学 A（1）（2）	10.5	
			复变函数与积分变换	2	
			概率论与数理统计 C	2.5	
			自然科学公选	3	
	47.5	人文社科 基础	大学生职业规划与创新教育	1	必修
			大学生就业创业指导	1.5	
			思想道德与法治	3	
			形势与政策	2	
			毛泽东思想和中国特色社会主义理论体系概论	3	
			习近平新时代中国特色社会主义思想概论	3	
			中国近现代史纲要	3	
			马克思主义基本原理	3	
			军事理论	2	
			大学生心理健康教育	2	
			军训	2	
			体育	4	
			大学英语	8	
	国家安全教育	1			
人文科学公选	9				
54	专业基础	工程训练 C	1.5	必修	
		工程制图	2		
		电子电路入门设计	3		

			电子电路 CAD 实训	1	
			电路+实验 (3+1)	4	
			模拟电子技术 B+实验 (2+1)	3	
			数字电子技术+实验 (2+1)	3	
			微机原理及单片机应用	2.5	
			计算机网络	2	
			算法与数据结构	2	
			程序设计	2	
			人工智能原理	2	
			嵌入式系统设计与开发 (2+1)	3	
			专业导论	1	
			自动控制原理+实验 (4+1)	5	
			现代控制理论基础	2	
			专业英语综合训练	1	
			信号与系统	2	
			检测原理	2	
			电力电子技术	2.5	
			电气控制技术与可编辑控制器	2.5	
			电力拖动与运动控制	3	
			现场总线控制技术	2	
智能制造方向, 30 学分	30	自动化专业领域	软件工程与数据库技术	2	任选不少于 4 学分
			模式识别	2	
			机器学习	2	
			过程控制	2	
			自动化生产线技术	2	
			机器人学	2	
			工业大数据	2	
			工厂供电	2	
			FPGA 系统设计技术	2	
			模糊数学方法及其应用	2	
			数字信号与图像处理	3	
			楼宇智能化技术	2	
			生产实习	2	
			自动化综合课程设计 I	3	
			自动化综合课程设计 II	3	
			自动化综合课程设计 III	3	
			自动化综合课程设计 IV	3	
			毕业设计(校内/企业)	12	
学术	30	自动化专业领域	前沿讲座	1	限选
			软件工程与数据库技术	2	
			科研实践	3	
			生产实习	2	

创新 班, 30 学分			模式识别	2	
			机器人学	2	
			自动化综合课程设计 I	3	
			自动化综合课程设计 II	3	
			自动化综合课程设计 III	3	
			自动化综合课程设计 IV	3	
			毕业设计(校内/企业)	12	
			前沿讲座	1	
卓越 班, 30 学分	30	自动化专 业领域	软件工程与数据库技术	2	限选
			工程实践	3	
			模式识别	2	
			机器人学	2	
			生产实习	2	
			自动化综合课程设计 I	3	
			自动化综合课程设计 II	3	
			自动化综合课程设计 III	3	
			自动化综合课程设计 IV	3	
			毕业设计(企业)	12	

Preface

Our university has established the Automation for more than 50 years. Focusing on the theoretical basis and technical connotation of automation, we have carried out the training of specialized talents, and trained a large number of outstanding talents from all walks of life for the national social and economic construction. It is a comprehensive cross industry specialty. The new round of industrial revolution is more profound than the previous three industrial revolutions. New principles, new technologies and new methods are pouring in, more industries are affected, and higher requirements are given to automation technology. New technologies such as big data, cloud computing and networking provide more accurate information resources and control elements for control, and provide conditions for the realization of intelligent manufacturing.

In order to adapt to these changes, in the 2022 training program, we will build a curriculum system of three foundations and one field, emphasize integration and practice, and devote ourselves to training new engineering talents, so as to make them more rational in value, capable of solving complex engineering problems, creativity, leadership, international vision and communication ability, and lifelong learning ability.

The guiding principles for the development of the 2022 Automation training program are as follows:

1) Construct the curriculum system of "three foundations and one field". It is divided into four categories: the foundation of humanities, the foundation of natural sciences, the foundation of automation specialty and the field of automation specialty. The curriculum system meets the requirements of engineering certification.

The curriculum system presents a pyramid structure, forming a curriculum system of three foundations and one field, of which the three basic courses have 132 credits, accounting for 81.5% of the total credits. Courses in professional fields have 30 credits, accounting for 18.5% of the total credits. As shown in Figure 1.

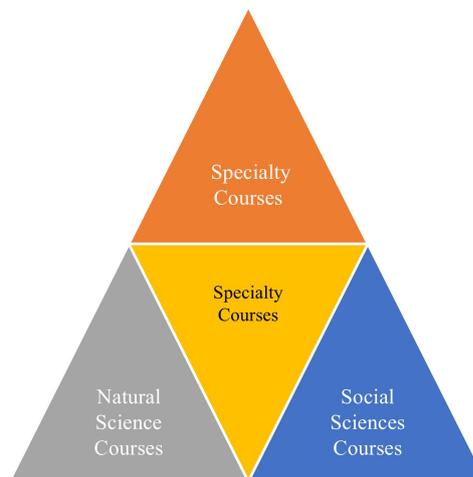


Figure 1 Curriculum architecture of Automation

The foundation of Humanities and Social Sciences cultivates the breadth of students' life, the foundation of natural sciences cultivates students' academic depth, the professional foundation covers the basic knowledge of the major and completes the basic training of the ability to use knowledge, and the professional field focuses on cultivating students' ability to comprehensively use knowledge and appropriately reflect the professional characteristics.

2) Emphasize synthesis and practice, and cultivate new engineering talents. Set up a series of comprehensive practical training courses, such as Introduction to the Project Design of Electronic Circuit, Design and Practice of Embedded System, Design and Practice of Control System, Automation integrated curriculum design, etc. From grade one to grade four, comprehensive practical training runs through from shallow to deep; Horizontally connected from point to surface; Improve the four core curriculum groups of automation professional technology, electronic information technology, computer technology and automation integrated curriculum design and a series of comprehensive practical training courses such as automation comprehensive curriculum design. From grade one to grade four, comprehensive practical training runs through from shallow to deep; Horizontally connected from point to surface; Improve the four core curriculum groups of automation professional technology, electronic information technology, computer technology and automation comprehensive curriculum design. For each curriculum group, by coordinating the teaching contents, teaching arrangements and assessment methods of relevant courses in the curriculum group, carry out teaching activities with a unified object that reflects the current and future

mainstream technology practice, so as to promote the comprehensive application of what students have learned and realize the gradual cultivation of ability, Cultivate students' value rationality, ability to solve complex engineering problems, creativity, leadership, international vision and communication, lifelong learning and other abilities.

3) Take output as the guidance, and reflect the training characteristics through the results obtained by students. Automation takes intelligent manufacturing as the main direction, and then selects and trains talents in academic innovation, excellent engineers and robots.

As the main direction of Automation, intelligent manufacturing, aiming at the problems of narrow and fine division of traditional engineering talent training specialty and lack of intersection, arranges interdisciplinary courses such as engineering management and economic decision-making, integrates new technologies such as big data, cloud computing and networking through the industrial 4.0 production line, takes the design of automation series comprehensive courses as the carrier, adopts PBL teaching mode, and focuses on cultivating students to form correct values, Have the ability to solve complex engineering problems, cooperate and exchange, lifelong learning, etc. About five years after graduation, students have the ability to work as R & D and management engineers in well-known enterprises at home and abroad.

On this basis, Academic innovation class and Excellent engineers class are selected and formed according to students' personal interests and wishes. There are two small classes based on project research, and a variety of teaching methods based on case study.

The academic innovation class strengthens the practical training and scientific research training of the application of mathematics in engineering, and focuses on cultivating students' academic and scientific research ability on the basis of cultivating students to form correct values and have the ability to solve complex engineering problems, cooperate and exchange, lifelong learning and so on. About five years after graduation, students can obtain a doctorate in well-known colleges and universities at home and abroad, and are qualified to work in teaching and scientific research posts such as colleges and universities and scientific research institutes.

The excellent engineer class piloted certain credits to choose professional courses from

foreign colleges, cultivated students' interdisciplinary interest, and implemented English Teaching in the sixth semester. On the basis of cultivating students to form correct values, have the ability to solve complex engineering problems, cooperate and exchange, lifelong learning and other abilities, focus on cultivating students to have the concept of integrated product development (IPD) and comprehensive management. Students can have the ability of comprehensive product development and management in about five years after graduation. The composition proportion of course system credits is shown in Figure 2.

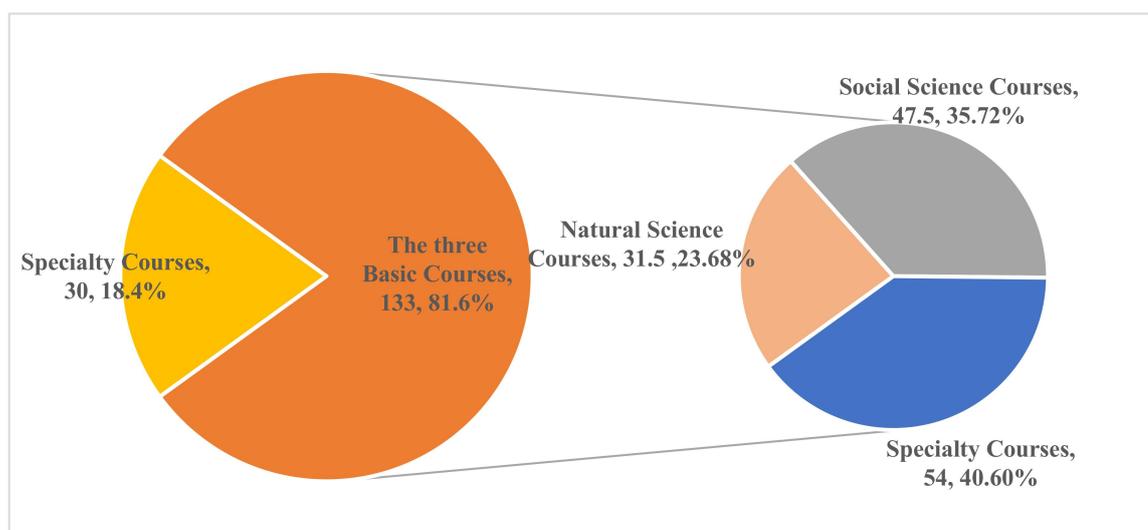


Figure 2 The ratio of course system

The course composition is shown in Table 1:

Table 1: Curriculum composition

Modular	Credits	Course Category	Course Name	Credits	Course Category	
Basic Module 133 Credit	31.5	Natural Science Courses	Linear Algebra	2.5	Compulsor courses	
			College Physics Experiment A (1) (2)	11		
			Advanced Mathematics	10.5		
			Complex Function	2		
			Probability & Statistics	2.5		
				Natural Science Public Selection	3	
	47.5	Social Sciences Courses	College Students Employment and Entrepreneurship Guidance	1.5	Compulsor courses	
			College Students Employment and Entrepreneurship Guidance	1		
			Ethic Thought & Law	3		
			Situation and Policy	2		
An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics			3			

			An Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	3	
			Conspectus of Chinese Modern History	3	
			Introduction to The Basic Principles of Marxism	3	
			Military Theory	2	
			Mental Fitness Education of University Students	2	
			Military Training	2	
			Physical Training	4	
			College English	8	
			National Security Education	1	
			Public Choice of Humanities and Social Sciences (Engineering Ethics +Others)	9	
	54	Basic Specialty Courses	Engineering Training C	1.5	Compulsor courses
			Engineering Drawing	2	
			Introduction to the Project Design of Electronic Circuit	3	
			Practice of Electronic CAD	1	
			Circuit + Experiment	4	
			Analog Electronic Technology +Experiment	3	
			Digital Electronics+ Experiment	3	
			Microcomputer Principle and Application of Microcontroller	2.5	
			Computer Networks	2	
			Algorithms And Data Structures	2	
			Programming	2	
			Artificial Intelligence Principle	2	
			Embedded System Design and Development	3	
			Specialty Introduction	1	
			Automatic Control Principle+ Experiment	5	
			Modern Control Theory	2	
			Specialized English Comprehensive Training	1	
			Signals and Systems	2	
			Detection Principle	2	
			Power Electronics	2.5	
			Electrical Control Technology and Programmable Logic Controller	2.5	
			Power Drive and Motion	3	
	Fieldbus Control Technology	2			
	Software Engineering and Database Technology	2			
			Software Engineering and Database	2	A

Intelligent manufacturing direction,30 Credit	30	Specialty courses	Technology		minimum of 4.0 credits required
			Pattern Recognition	2	
			Machine learning	2	
			Process Control	2	
			Automatic Production Line	2	
			Robotics	2	
			Industrial Big Data	2	
			Factory Electricity Supply	2	
			Design Technology of FPGA System	2	
			Fuzzy Mathematics Method and Its Application	2	
			Digital Signal and Image Processing	3	
			Intelligent Building Technology	2	
			Production Practice	2	
			Integrated Automation Curriculum Design I	3	Restricted courses
			Integrated Automation Curriculum Design II	3	
			Integrated Automation Curriculum Design III	3	
			Integrated Automation Curriculum Design IV	3	
Companies Practice	12				
Maths Practice	2				
Academic innovation class, 30 Credit	30	Specialty courses	Software Engineering and Database Technology	2	Restricted courses
			Leading Front Forum	1	
			Scientific Research Practice	3	
			Production Practice	2	
			Pattern Recognition	2	
			Robotics	2	
			Integrated Automation Curriculum Design I	3	
			Integrated Automation Curriculum Design II	3	
			Integrated Automation Curriculum Design III	3	
			Integrated Automation Curriculum Design IV	3	
			Companies Practice	12	
			Leading Front Forum	1	
			Excellent engineers class, 30 Credit	30	
Companies Practice	3				
Pattern Recognition	2				
Robotics	2				
Integrated Automation Curriculum Design	3				

			I		
			Integrated Automation Curriculum Design II	3	
			Integrated Automation Curriculum Design III	3	
			Integrated Automation Curriculum Design IV	3	
			Companies Practice	12	

自动化

Automation

专业代码:080801

Major code: 080801

学 制: 四年

Length of Schooling: Four Years

学 位: 工学学士

Degree: Bachelor of Engineering

制订时间: 2022 年 1 月 10 日

Time of Formulation: January 10, 2022

一、培养目标

广东是中国制造大省和全球重要的制造业基地，汇集了大批的机器人、电器机械、纺织服装、食品饮料、汽车、医药、造纸等制造企业。广东同时也是电子信息产业强省，汇聚了华为、中兴、腾讯、大疆创新等一批电子信息产业的国际知名企业。制造业作为我们国家国民经济的战略性、基础性和先导性支柱产业，对于维护国家安全、促进社会就业、拉动经济增长、调整产业结构和转变发展方式具有十分重要的作用。而制造业与信息技术的深度融合，正在引发影响深远的产业变革，形成新的生产方式、产业形态、商业模式和经济增长点。身居制造业和电子信息产业的强省，广东对自动化专业人才有着强烈的内在需求。行业企业要求毕业生不仅掌握控制、电子、信息领域扎实的基础理论和专门的知识及技能，还具有在相关领域跟踪和发展新知识、新技术、新理论的能力，要求毕业生具有团队合作、交流沟通、项目管理等能力。

基于广东工业大学的定位和社会经济的需求，自动化专业的培养目标为：

具有社会责任感与职业道德，能够在工业自动化、智能装备、信息技术等领域从事工程设计、技术开发、科学研究和项目管理等工作的高素质创新性应用型人才。

培养目标包含以下四个子目标：

培养目标	二级指标
目标 1: 具备社会责任感, 知晓行业技术标准和政策法规, 坚守职业道德与专业操守;	1.1 在工程实践中能够坚持公共利益优先与可持续性发展原则。
	1.2 熟悉并遵守相关的法律、法规、标准与规范, 尊重不同文化下的社会价值。
	1.3 在本职业务中能够坚守客观、公正、诚信的原则。
	1.4 尊重他人, 具有良好的合作态度与协作精神
	1.5 主动积极的工作态度, 持续钻研以提高专业素养
目标 2: 具有系统思维与专业素养, 具备解决复杂工程项目的能力;	2.1 具有系统思维, 多学科知识交叉融合与应用的能力。
	2.2 精通所在领域的工程知识与技能, 熟悉相关技术领域, 能够对多种资源综合利用。

	2.3 能够跟踪与社会发展密切相关领域前沿技术，具备一定的工程创新能力，解决由于广泛的或相互冲突的技术、工程相互影响而产生的问题。
	2.4 不确定环境下，能充分考虑社会、经济、安全、伦理等方面的相关因素，通过分析、研究、实验与论证，提供创新性的解决方案
目标 3：具备良好的沟通与协调能力，具备组织与实施工程项目的团队合作和领导能力；	3.1 具有与同事、客户和公众有效沟通的能力。
	3.2 能寻找合作伙伴、专业组织，获取社会各种资源与协助。
	3.3 具有融入、领导及带动团队发展的团队合作精神与领导能力。
	3.4 熟悉工程经济和管理方面的知识 with 技能，具有组织、协调项目实施的能力。
目标 4：致力于终身学习与职业发展，能够适应技术、经济与社会的持续发展。	4.1 具备自我更新及终身学习的意识。
	4.2 积极参与岗位进修，推进职业发展。
	4.3 能够根据社会与经济发展趋势制定个人发展规划，因地制宜寻找学习资源，提高个人素养。
	4.4 具有一定的全球化意识和国际视野，能够积极主动适应不断变化的国内外形势和环境。

I Educational Objectives

Guangdong is China's largest manufacturing province and an important global manufacturing base, A large number of robot, electronic information, electrical equipment, machinery, textiles, clothing, food, beverages, automobiles, pharmaceuticals, paper mills and other manufacturing plants have been collected. At the same time, Guangdong is also a powerful province of electronic information industry. It has brought together a number of internationally known enterprises of electronic information industry, such as HUAWEI, ZTE, Tencent, DJI-Innovations. The manufacturing industry as a national strategic, fundamental and leading pillar industry, to promote social employment, stimulating economic growth, adjusting the industrial structure, change the mode of development and plays an important role in safeguarding national security. The deep integration of manufacturing industry and the new generation of information technology is causing far-reaching changes in industry, forming new production methods, industrial forms, business models and economic growth points. Guangdong, as a strong province of manufacturing and electronic information industry, has a strong internal demand for automation professionals. Industry requirements graduates not only master control, electronics, information theory field of solid and specialized knowledge and skills, but also has the capability of tracking and the development of new knowledge, new technology and new theory in related fields, the graduates have team, communication and project management skills.

Based on the orientation of Guangdong University of Technology and the demand of social economy in Guangdong, the training objective of Automation Specialty is:

With a sense of social responsibility and professional ethics, high-quality applied innovative talents can be engaged in engineering design, technology development, scientific research and project management in industrial automation, intelligent equipment, information technology and other fields.

Goal 1: know industry technical standards and policies and regulations, respecting social values and observing engineering professional standards;

Goal 2: ability to solve complex engineering projects, with systematic thinking and professional accomplishment;

Goal 3: Good communication and coordination skills, team cooperation and leadership ability in organizing and implementing projects;

Goal 4: Committed to lifelong learning and career development, able to adapt to the sustainable development of technology, economy and society.

二、毕业要求

经过四年的系统学习，本专业学生在毕业时应达成以下毕业要求。

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自动化复杂工程问题。

2.问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析自动化复杂工程问题，以获得有效结论。

3.设计/开发解决方案：能够设计针对自动化复杂工程问题的解决方案，设计满足特定需求的系统、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。

4.研究：能够基于科学原理并采用科学方法对自动化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：能够针对自动化复杂工程问题，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，包括对自动化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，评价专业工程实践和自动化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：能够理解和评价针对自动化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：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。

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

10.沟通：能够就自动化复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

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。

II Graduation Requirements

After four years of systematic study, the students should complete the following graduation requirements

1、Engineering knowledge : The ability to use mathematics, natural sciences, engineering fundamentals and expertise to solve the problem of automated complex engineering.

2、problem analysis : Can be applied to the basic principles of mathematics, natural sciences and engineering science, identify, express, and through the literature research and analysis of complex engineering problems in order to obtain effective conclusions.

3、Design / development solution : Designed for solutions that automate complex engineering problems, systems, units (components) or processes that meet specific needs are designed and can reflect

innovation in the design process, taking into account social, health, safety, legal, cultural, and environmental factors.

4、Research : Can be based on scientific principles and the use of scientific methods to automate complex engineering issues, including design experiments, analysis and interpretation of data, and through information synthesis to be reasonable and effective conclusions.

5、Use modern tools : Develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for automating complex engineering issues, including the prediction and simulation of automated complex engineering problems and the ability to understand its limitations.

6、Engineering and society : Can be based on the relevant background knowledge of the project to conduct a reasonable analysis, evaluation of professional engineering practice and automation of complex engineering problem solutions on social, health, safety, legal and cultural impact, and understand the responsibility.

7、Environment and sustainable development : Able to understand and evaluate the impact of professional engineering practice on the complex and complex engineering problems on environmental and social sustainable development.

8、Professional norms: With humanities and social sciences, social responsibility, to understand and comply with engineering ethics and norms in engineering practice, fulfill their responsibilities.

9、Personal and team: Ability to take on individual, team members, and roles in a multidisciplinary team.

10、Communication: Able to communicate and communicate effectively with industry peers and the public on the issue of automated and complex engineering issues, including writing reports and design manuscripts, presenting statements, clearly expressing or responding to directives. And have a certain international perspective, to cross-cultural background to communicate and exchange.

11、Project management: Understand and master engineering management principles and economic decision-making methods, and can be applied in a multidisciplinary environment.

12、life-long learning: With independent learning and lifelong learning awareness, have the ability to continue to learn and adapt to development.

三、专业培养特色

国家一流专业，专业方向为智能制造工程。以能力为导向、综合实践为抓手，实现控制、通讯、计算、工程管理等多学科知识与技能的融会贯通，培养具备“集成创新、系统思维、职业素养”能力与素质的创新性工程科技人才。

III. Characteristics of the Specialty Education

The professional design for the national characteristics of professional, Guangdong Province brand-name professional, curriculum design to follow the "wide caliber, thick foundation, strong ability, high quality" principle, student training outstanding engineering practice ability and rigorous scientific attitude, curriculum system reference " Education professional certification standards 2015 "electronic information and electrical engineering in the professional set of automation, emphasizing the students engineering thinking literacy, engineering design and engineering application ability training. Improving three main curriculum groups including automation technology、 electronic information technology and computer technology, via harmonizing course content、 teaching arrangement and assessment method; conducting pedagogical practice with an unified、 mainstream-technology-featured practical object, in order

to facilitate students' comprehensive application ability, realize gradual cultivation of students' abilities and equip students with necessary career ability in the fields of automation technology、 electronic information technology and computer technology.

四、专业主干学科

控制科学与工程、计算机科学与技术、电子科学与技术；

IV. Main Discipline for the Specialty

Control science and engineering, Computer science and technology, Electronic Science and technology;

五、专业核心课程

自动控制原理、电力拖动与运动控制、电力电子技术、电气控制技术与可编程控制器、嵌入式系统设计与开发、自动化综合课程设计 I、II、III、IV；

V. Core Courses of the Specialty

Automatic Control Principle、Power Drive and Motion Control、Power Electronic Technology 、Electrical Control Technology and Programmable Logic Controller、Embedded System Design and Development、Integrated Automation Curriculum DesignI、II、III、IV；

六、双语课程

自动控制原理、电子电路入门设计；

VI. Bilingual Courses

Automatic Control Principle、Introduction to the Project Design of Electronic Circuit ；

七、毕业学分要求

课内总学分不低于 163 学分，实践教学环节（含课内实验）学分不少于 40 学分；

VII. Credits Required for Graduation

Class total credits are not less than 163, the credits of practical (including experiments) shall not be less than 40 credits;

八、主要实践教学环节

电子电路入门设计、自动化综合课程设计、生产实习；

VIII. Main Components of Practical Teaching

Engineering training, Robot project, Automation integrated curriculum design, Production practice;

九、课程体系的构成及课程学分分配比例

IX. Structure of the Course System and Proportion of Course Credits

1、课内部分 Intra-curricular Sector

课程类别 Course Category		内容说明 Description	总学分 Total Credits	总学时 Total Teaching Hours	占总学分比例 Percentage	小计 Subtotal
必修 Compulsor	公共基础课 Basic public courses	含“思想政治理论课”、体育、大学英语、高等数学、大学物理等。 Courses such as Ideological &	61.5	984	37.7%	86.5%

y Courses		Political Theories, University Physical Education, College English, Advanced Mathematics, Basic Computer Literary.				
	专业基础课 Basic specialty courses	构筑专业基础平台的基本概念、理论和基础知识的课程。 Courses for constructing the basic concepts, theories and knowledge underlying the specialty.	28.0	448	15.3%	
	专业课 Specialty courses	构筑专业方向的概念、理论和知识的课程。 Courses for constructing concepts, theories and knowledge of the specialty emphasis.	17.0	272	10.4%	
	实验实习实训 Experimental and practical courses		16.5	264	10.1%	
	设计（论文） Design (Thesis)		18.0	288	11.0%	
选修 Elective Courses	全校性公共课（至少选12.0学分） University wide public courses(A minimum of 12.0 credits required)	指人文社科类、自然科学与工程技术类全校性公选课。 University wide public elective courses in humanities and social sciences, natural sciences, and engineering.	12.0	192	7.4%	13.5%
	专业方向（至少选4.0学分） Specialty courses (A minimum of 4.0 credits required)	指学科方向和跨学科方向的理论和知识的课程。 Courses for theories and knowledge in the main discipline and related disciplines.	4.0	64	2.4%	
	设计或论文（至少选6.0学分） Specialty courses (A minimum of 6.0 credits required)	指学科方向和跨学科方向的知识技能的综合设计课程。 Courses for knowledge and skills in the disciplinary emphasis and interdisciplinary emphasis.	6.0	96	3.7%	
合计 Total			163	2608		100%

2、课外部分 Extra-curricular sector

课程类别 Category	课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验学时 Teaching Hours for Experiments	实习实训学时 Teaching Hours for Practice	上机学时 Teaching Hours with Computers
必修 Compulsory Part	入学教育 Entrance education	0.5	0.5 周 0.5 week			
	公益活动 Social Work	1.0	16			
	社会实践 Social practice	2.0	32			
	“毛泽东思想和中国特色社会主义	1.0	16			

		理论体系概论”课外导读 Extra-curricular guided reading of An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics				
		毕业教育 Graduation education	0.5	0.5 周 0.5 week		
		小计 Subtotal	5.0			
课外活动名称 Extra-curricular activities	课外活动和社会实践的要求 Requirements for extra-curricular activity and social practice					课外学分 Extra-curricular credits
英语及计算机考试 English and computer tests	全国大学英语六级考试 National College English Test (CET) 6		考试成绩达到学校要求者 Meeting score requirement of the university		2	
	全国计算机等级考试 National Computer Rank Examination (NCRE)		获二级以上证书者 Granted certificate of or above Level 2		2	
	全国计算机软件资格、水平考试 National computer software qualification and proficiency tests		获程序员证书者 Granted programmer's certificate		2	
			获高级程序员证书者 Granted advanced programmer's certificate		3	
			获系统分析员证书者 Granted system analyst's certificate		4	
行业资格考试 Professional qualification tests	参加全国行业资格统考 Nationwide uniform professional qualification tests		获行业资格证书者 Granted professional qualification certificate		1	
竞赛 Contests	校级 University level		获一等奖者 Awarded first prize		2	
			获二等奖者 Awarded second prize		1	
			获三等奖者 Awarded third prize		0.5	
	省级 Provincial level		获一等奖者 Awarded first prize		3	
			获二等奖者 Awarded second prize		2	
			获三等奖者 Awarded third prize		1	
	全国 National level		获一等奖者 Awarded first prize		5	
			获二等奖者 Awarded second prize		4	
			获三等奖者 Awarded third prize		3	
系列讲座 Serial lectures	参加学校组织的系列讲座 Attending serial lectures held on the campus		参加累计 4 场次以上 Attending a minimum of 4 lectures		1	

论文 Academic papers	在全国性一般刊物发表论文 Having papers published in nationwide average journals	每篇论文 Per paper	1
	核心刊物发表论文 Having papers published in nationwide key journals	每篇论文 Per paper	2
课外科技创新活动 Extra-curricular scientific and technological innovation activities	参与课外科技创新活动 Participating extra-curricular scientific and technological innovation activities	每项 Per event	1

十、课程设置及学时（学分）分配

X. Structure of the Course and Proportion of Course Credits

1、课内部分 Intra-curricular Sector

课程类别 Course Category	课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验 学时 Teaching Hours for Experiments	实习实 训学时 Teaching Hours for Practice	上机 学时 Teaching Hours with Computers
必修 Compulsory Courses	中国近现代史纲要 Conspectus of Chinese Modern History	3.0	48		12	
	大学英语（4+4） College English	8.0	128		32	
	思想道德与法治 Ethic Thought & Law	3.0	48		12	
	体育 Physical Training	4.0	144		80	
	国家安全教育 National Security Education	1.0	16		10	
	马克思主义基本原理 Introduction to The Basic Principles of Marxism	3.0	48		12	
	毛泽东思想和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	3.0	48		12	
	习近平新时代中国特色社会主义思想概论 An Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	3.0	48			
	形势与政策 Situation and Policy	2.0	64		32	
	大学生心理健康教育 Mental Fitness Education of University Students	2.0	32		24	
	军事理论 Military Theory	2.0	36			
	大学生职业规划与创业教育 College Students' Career Planning and Entrepreneurship Education	1.0	16		8	
	大学生就业创业指导 College Students Employment and Entrepreneurship Guidance	1.5	24		16	
	大学物理 A College Physics A	8.0	128			
	高等数学 A（1）（2） Advanced Mathematics	10.5	168			
	概率论与数理统计 C Probability & Statistics	2.5	40			
	线性代数 Linear Algebra	2.5	40			
	复变函数与积分变换 Complex Function	2.0	32			

课程类别 Course Category	课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验 学时 Teaching Hours for Experiments	实习实 训学时 Teaching Hours for Practice	上机 学时 Teaching Hours with Computers
	小计 Subtotal	62	1108			
专业基 础课 Basic Specialty Courses	工程制图 Engineering Drawing	2.0	32			
	电路* Circuit + Experiment	3.0	48			
	模拟电子技术 B* Analog Electronic Technology +Experiment	2.0	32			
	数字电子技术* Digital Electronics+ Experiment	2.0	32			
	微机原理及单片机应用 Microcomputer Principle and Application of Microcontroller	2.5	40	8		
	程序设计* Programming	2.0	32			
	算法与数据结构 Algorithms And Data Structures	2.0	32			
	计算机网络 Computer Networks	2.0	32			
	人工智能原理 Artificial Intelligence Principle	2.0	32			12
	信号与系统* Signals and Systems	2.0	32			
	检测原理* Detection Principle	2.0	32	8		
	自动控制原理*/**/BL/# Automatic Control Principle+ Experiment	4.0	64			
	现代控制理论基础# Modern Control Theory	2.0	32			
	小计 Subtotal	29.5	472			
	专业必 修课 Professi onal Require d Course	专业导论 Specialty Introduction	1.0	16		
电力电子技术 Power Electronic Technology		2.5	40	8		
电气控制技术与可编程控制器** Electrical Control Technology and Programmable Logic Controller		2.5	40	8		
专业英语综合训练 Specialized English Comprehensive Training		1.0	16			
现场总线控制技术 Fieldbus Control Technology		2.0	32			

课程类别 Course Category	课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验 学时 Teaching Hours for Experiments	实习实 训学时 Teaching Hours for Practice	上机 学时 Teaching Hours with Computers	
	嵌入式系统设计与开发** (2+1) Embedded System Design and Development	3.0	48		16		
	电力拖动与运动控制**/# Power Drive and Motion Control	3.0	48	8			
	小计 Subtotal	15.0	240				
	实验实 习实训 Experiment Practice Training	大学物理实验 A (1) (2) College Physics Experiment A (1) (2)	3.0	48	48		
		电子电路入门设计*/BL/# Introduction to the Project Design of Electronic Circuit	3.0	48	30		
		工程训练 C Engineering Training B	1.5	24		21	
		电路实验 A Circuit ExperimentA	1.0	16	16		
		模拟电子技术 B 实验 Analog Electronic Technology Experiment	1.0	16	16		
		数字电子技术实验 Digital Electronic Technology Experiment	1.0	16	16		
		自动控制原理实验 Experiment Of Automatic Control Principle	1.0	16	16		
		生产实习 Production Practice	2.0	32		32	
		电子电路 CAD 实训* Practice of Electronic CAD	1.0	16	16		
		军训 Military Training	2.0	32		32	
	小计 Subtotal	16.5	264				
	设计(论 文) Design (Thesis)	自动化综合课程设计 I** Integrated Automation Curriculum Design I	3.0	48			
		自动化综合课程设计 II** Integrated Automation Curriculum Design II	3.0	48			
		毕业设计 Graduation Design (Thesis)	12.0	192		192	
		小计 Subtotal	18.0	288			
	选 修 Elective Courses	公共选 修课 Public Elective Course	自然科学公选 Natural Science Public Selection	工程管理 Engineering Management	1.5	24	
			其他 Others	1.5	24		
人文社科公选 Public Choice of		工程伦理 Engineering Ethics	1.5	24			

课程类别 Course Category	课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验学时 Teaching Hours for Experiments	实习实训学时 Teaching Hours for Practice	上机学时 Teaching Hours with Computers	
	Humanities and Social Sciences	马克思主义中国化进程与青年学生使命担当 The Sinicization of Marxism and the mission of young students	1.5	24		8	
		“四史”大视野 The Grand Vision of “Four Histories”	1.0	16		8	
		劳动教育 Labor Education	1.5	32		28	
		美育类限选课程 Limited Courses for aesthetic education	2.0	32			
		其他 Others	1.5	24			
		小计（至少选 12.0 学分） Subtotal(A minimum of 2.0 credits required)	12.0	200			
	专业选修课 (至少选 4.0 学分) Specialty Elective courses (A minimum of 4.0 credits required)	楼宇智能化技术 Intelligent Building Technology	2.0	32	6		
		软件工程及数据库技术 Software Engineering and Database Technology/	2.0	32			
		过程控制 Process Control	2.0	32			
		自动化生产线技术 Automatic Production Line	2.0	32			
		机器人学 Robotics	2.0	32			
		工业大数据 Industrial Big Data	2.0	32			
工厂供电 Factory Electricity Supply		2.0	32				
FPGA 系统设计技术 Design Technology of FPGA System		2.0	32				
模糊数学方法及其应用 Fuzzy Mathematics Method and Its Application		2.0	32				
模糊逻辑与智能系统 Fuzzy Logic and Intelligent System		2.0	32				
数字信号与图像处理 Digital Signal and Image Processing	3.0	48					
科研实践 Scientific Research Practice	3.0	48		24			
前沿讲座 Leading Front Forum	1.0	16					

课程类别 Course Category	课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验 学时 Teaching Hours for Experiments	实习实 训学时 Teaching Hours for Practice	上机 学时 Teaching Hours with Computers
	工程实践 Engineering Practice	3.0	48		24	
	模式识别 Pattern Recognition	2.0	32			
	小计（至少选 4.0 学分） Subtotal(A minimum of 10.0 credits required)	4.0	64			
	自动化综合课程设计 III** Integrated Automation Curriculum Design III	3.0	48			
	自动化综合课程设计 IV** Integrated Automation Curriculum Design IV	3.0	48			
	小计（至少选 6.0 学分） Subtotal(A minimum of 10.0 credits required)	6.0	96			

* 标注该符号为大类平台课程

** 标注该符号为专业核心课程

BL 标注该符号为双语课程

标注该符号为开放课程

自动化专业培养方案涉及到的课程包括四大部分：思政、英语等人文社科基础，数学、物理等自然科学基础，自动化专业基础和自动化专业领域；自动化专业的不同方向由专业领域课程群的设计决定。思政、英语等人文社科基础，数学、物理等自然科学基础，自动化专业基础和毕业设计，共 133 学分，占总学分 81.6%；18.4%的自动化专业领域课程，根据不同方向做出相应调整，具体课程群安排如上所示。

The automation of professional training programs on different training plan to formulate the corresponding courses, the courses required courses, including public courses, professional basic courses, professional courses, experimental training (Compulsory) and design or thesis (Compulsory) a total of 133credits, accounting for 81.6% total credits, 18.4% elective courses according to the different adjust the corresponding training plan, specific courses are as follows.

附录

毕业要求指标点分解及相应教学环节支撑

The supporting relationship between course system and its graduation requirements

毕业要求	指标点	支撑课程	学分	权重	
<p>1. 工程知识：能够将数学、自然科学、工程基础和专业知用于解决自动化领域的复杂工程问题。</p> <p>1. Engineering knowledge:</p> <p>Be able to apply mathematics, natural sciences, engineering fundamentals and professional knowledge to solve complex engineering problems in the automation field.</p>	<p>1.1 能将数学、自然科学、工程科学的语言工具用于工程问题的表述。</p> <p>1.1 Be able to use mathematics, natural science, engineering foundation and professional knowledge to explain complex engineering problems in automation majors;</p>	高等数学 A (1) (2) Advanced Mathematics	10.5	0.25	
		大学物理 A (1) (2) + 实验 College Physics A (1) (2) + Experiment A	8+3	0.25	
		线性代数 Linear Algebra	2.5	0.1	
		电子电路入门设计 Introduction to the Project Design of Electronic Circuit	3	0.1	
		电路+实验 Circuit + Experiment	3+1	0.2	
		电子电路 CAD 实训 Practice of Electronic CAD	1	0.1	
	<p>1.2 能针对具体的对象建立数学模型并求解。</p> <p>1.2 Be able to establish mathematical model and solve it for specific objects.</p>	信号与系统 Signals and Systems	2	0.2	
		模拟电子技术 B+实验 Analog Electronic Technology +Experiment	2+1	0.3	
		自动控制原理+实验 Automatic Control Principle+ Experiment	4+1	0.5	
		自动化综合课程设计 I Integrated Automation Curriculum Design I	3	0.5	
		<p>1.3 能够将相关知识和数学模型方法用于推演、分析自动化复杂工程问题，用于解决方案的比较与综合。</p> <p>1.3 Be able to use relevant knowledge and mathematical model to deduce and analyze complex automation engineering problems, and to compare and synthesize solutions.</p>	嵌入式系统设计与实践 Embedded System Design and Development	3	0.5
<p>2. 问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析自</p>	<p>2.1 能够识别和判断工程问题的关键环节和参数，并能基于相关科学原理和数学模型方法正确表达复杂工程问题。</p>	信号与系统 Signals and Systems	2	0.3	
		检测原理 Detection Principle	2	0.3	
		电力电子技术	2.5	0.4	

毕业要求	指标点	支撑课程	学分	权重
<p>动化复杂工程问题，以获得有效结论。</p> <p>2. Problem Analysis: Be able to apply the fundamental principles of mathematics, natural and engineering identify, analyse engineering problems in the automation field through literature research in order to reach valid conclusions.</p>	2.1 Be able to identify and judge the key links and parameters of engineering problems, and correctly express complex engineering problems based on relevant scientific principles and mathematical model methods.	Power Electronic Technology		
	2.2 能认识到解决问题有多种方案可选择，会通过文献研究寻求可替代的解决方案。	模拟电子技术+实验 Analog Electronic Technology +Experiment	2+1	0.2
	2.2 Be able to recognize that there are no more one solution to the problem, and will seek alternative solutions through literature research.	自动控制原理+实验 Automatic Control Principle+ Experiment	4+1	0.3
		电力拖动与运动控制 Power Drive and Motion Control	3	0.5
		嵌入式系统设计与实践 Embedded System Design and Development	3	0.5
	2.3 运用相关的基本原理，通过文献研究，分析自动化复杂工程问题，论证解决方案的合理性，获得有效结论。 2.3 Using the relevant basic principles, through literature research, analyze the complex engineering problems of automation, demonstrate the rationality of the solution, and obtain effective conclusions.	自动化综合课程设计 II Integrated Automation Curriculum Design II	3	0.5
<p>3. 设计/开发解决方案：能够设计针对自动化复杂工程问题的解决方案，设计满足特定需求的系统、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。</p> <p>3.Design/development solutions: Be able to design solutions to complex engineering problems in the electrical field, designing systems, units (components) or</p>	3.1 掌握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，能够对影响设计目标和技术方案的各种因素进行分析与评估。 3.1 Master the basic design / development methods and technologies of the whole cycle and process of engineering design and product development, and be able to analyze and evaluate various factors affecting design objectives and technical schemes.	数字电子技术+实验 Control System Design and Practice	2+1	0.5
		电气控制技术与可编程控制器 Electrical Control Technology and Programmable Logic Controller	2	0.5
	3.2 能够针对特定需求，完成单元（部件）的设计。 3.2 Be able to complete the design of units (components) according to specific requirements.	微机原理及单片机应用 Microcomputer Principle and Application of Microcontroller	2.5	0.2
		现代控制理论基础 Modern Control Theory	2	0.3

毕业要求	指标点	支撑课程	学分	权重
processes to meet specific needs, and be able to demonstrate a sense of innovation in design process, considering social, health, safety, legal, cultural and environmental factors.		电力拖动与运动控制 Power Drive and Motion Control	3	0.5
	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, 并在设计中能够考虑安全、健康、法律、文化及环境等制约因素。 3.3 Be able to carry out system or process design, reflect the sense of innovation in the design, and consider the restrictive factors such as safety, health, law, culture and environment in the design.	电子电路 CAD 实训 Practice of Electronic CAD	1	0.2
		嵌入式系统设计与实践 Embedded System Design and Development	3	0.3
		自动化综合课程设计 III Integrated Automation Curriculum Design III	3	0.2
		毕业设计 Graduation Design (Thesis)	12	0.3
4. 研究: 能够基于科学原理并采用科学方法对自动化复杂工程问题进行研究, 包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。 4. Research: Be able to research complex engineering problems in the electrical field based on scientific principles and using the scientific method, including designing experiments, analyzing and interpreting data, and synthesis information to reach reasonable and valid conclusions.	4.1 能够基于科学原理, 通过文献研究或相关方法, 调研和分析自动化专业工程问题的解决方案。 4.1 Be able to investigate and analyze solutions to engineering problems of Automation Specialty based on scientific principles and through literature research or relevant methods.	算法与数据结构 Algorithms And Data Structures	2	0.3
		自动控制原理+实验 Automatic Control Principle+ Experiment	4+1	0.3
	4.2 能够根据对象特征, 选择研究路线, 设计实验方案, 并构建实验系统, 安全地开展实验, 正确地采集实验数据。 4.2 According to the characteristics of the object, choose the research route, design the experimental scheme, build the experimental system, carry out the experiment safely and collect the experimental data correctly.	自动化综合课程设计 II Integrated Automation Curriculum Design II	3	0.4
		人工智能原理 Artificial Intelligence Principle	2	0.3
	4.3 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。 4.3 It can analyze and explain the experimental results, and get reasonable and effective conclusions through information synthesis.	现代控制理论基础 Modern Control Theory	2	0.3
		自动化综合课程设计 III Integrated Automation Curriculum Design III	3	0.4
		模式识别 Pattern Recognition	2	0.5
	5. 使用现代工具: 能够针对自动化复杂工程问题, 开发、选择与使用恰当的	5.1 了解专业常用的现代仪器、信息技术工具、工程工具和模拟软件的使用原理和方法, 并理解	程序设计 Programming	2
数字电子技术+实验 Digital Electronics+			2+1	0.3

毕业要求	指标点	支撑课程	学分	权重	
<p>技术、资源、现代工程工具和信息技术工具，包括对自动化复杂工程问题的预测与模拟，并能够理解其局限性。</p> <p>5. Using modern tools: Be able to develop, select and use appropriate techniques, resources, modern engineering tools and IT tools for complex engineering problems in the electrical field, including prediction and simulation of complex engineering problems in the electrical field, and be able to understand their limitations.</p>	其局限性。	Experiment			
	5.1 Understand the principles and methods of modern instruments, information technology tools, engineering tools and simulation software commonly used in the specialty, and understand their limitations.	自动化综合课程设计 I Integrated Automation Curriculum Design I	3	0.4	
	5.2 能够选择与使用恰当的仪器、信息资源、工程工具和专业模拟软件，对自动化复杂工程问题进行分析、计算与设计。	计算机网络 Computer Networks	2	0.2	
	5.2 Be able to select and use appropriate instruments, information resources, engineering tools and professional simulation software to analyze, calculate and design complex automatic engineering problems.	微机原理及单片机应用 Microcomputer Principle and Application of Microcontroller	2.5	0.3	
	5.3 能够针对具体的对象，开发或选用满足特定需求的现代工具，模拟和预测专业问题，并能够分析其局限性。	自动化综合课程设计 II Integrated Automation Curriculum Design II	3	0.5	
	5.3 Be able to develop or select modern tools to meet specific needs for specific objects, simulate and predict professional problems, and analyze their limitations.	现场总线技术 Fieldbus Control Technology	2	0.2	
		嵌入式系统设计与实践 Embedded System Design and Development	3	0.4	
		模式识别 Pattern Recognition	2	0.4	
	<p>6. Engineering and society: Be able to carry out reasonable analysis based on engineering-related background knowledge, and evaluate the social,</p>	6.1 了解专业相关领域的技术标准体系、知识产权、产业政策和法律法规，理解不同社会文化对工程活动的影响。	思想道德与法治 Ethic Thought & Law	3	0.3
		6.1 Understand the technical standard system, intellectual property rights, industrial policies, laws and regulations in professional related fields, and understand the impact of different social cultures on engineering activities.	毕业设计 Graduation Design (Thesis)	12	0.4
6.2 能分析和评价专业工程实践对社会、健康、安全、法律、文化的影响，以及这些制约因素对项目实施的影响，并理解应承担的责任。		生产实习 Production Practice	2	0.4	
6.2 Be able to analyze and evaluate the impact of professional engineering practice on society, health, safety, law, and culture, and understand the impact of these constraints on project implementation, and understand the responsibility.		自动化综合课程设计 IV Integrated Automation Curriculum Design IV	3	0.6	

毕业要求	指标点	支撑课程	学分	权重
health, safety, legal and cultural implications of engineering practices and solutions to complex engineering problems in the electrical field, and understand the responsibilities involved.	6.2 Be able to analyze and evaluate the impact of professional engineering practice on society, health, safety, law and culture, as well as the impact of these constraints on project implementation, and understand the responsibilities to be undertaken.			
<p>7. 环境和可持续发展：能够理解和评价针对自动化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。</p> <p>7. Environment and sustainable development: Be able to understand and evaluate the impact of engineering practice on environmental, socially sustainable development in response to complex engineering problems in the electrical field.</p>	<p>7.1 理解环境保护和社会可持续发展的内涵和意义；</p> <p>7.1 Understand the connotation and significance of environmental protection and social sustainable development;</p>	生产实习 Graduation Design (Thesis)	2	0.5
		毛泽东思想和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	3	0.5
	<p>7.2 能够站在环境保护和可持续发展的角度思考专业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。</p> <p>7.2 Be able to think about the sustainability of professional engineering practice from the perspective of environmental protection and sustainable development, and evaluate the possible damage and hidden dangers to human beings and the environment in the product cycle.</p>	自动化综合课程设计 IV Integrated Automation Curriculum Design IV	3	0.5
		毕业设计 Graduation Design (Thesis)	12	0.5
<p>8. 职业规范：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。</p> <p>8. Professional Code: Possess humanities and social science literacy, social responsibility, and the ability to understand</p>	<p>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。</p> <p>8.1 Establish a correct outlook on life and values, have humanities and social science literacy and a sense of social responsibility, and understand China's national conditions;</p>	中国近现代史纲要 Conspectus of Chinese Modern History	3	0.4
		马克思主义基本原理概论 Introduction to The Basic Principles of Marxism	3	0.6

毕业要求	指标点	支撑课程	学分	权重
and comply with engineering professional ethics and codes of conduct and fulfil responsibilities in engineering practice.	8.2 理解诚实公正、诚信守则的工程职业道德和规范, 并能在工程实践中自觉遵守。	工程伦理 Engineering Ethics	1	0.3
	8.2 Understand the engineering professional ethics and norms of honesty, fairness and integrity, and consciously abide by it in engineering practice;	毕业设计 Graduation Design (Thesis)	12	0.7
	8.3 理解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。	自动化综合课程设计 IV Integrated Automation Curriculum Design IV	3	0.6
	8.3 Understand the social responsibilities of electrical engineers to the safety, health, well-being and environmental protection of the public, and be able to consciously perform their responsibilities in engineering practice.	生产实习 Engineering Ethics	2	0.4
9. 个人和团队: 能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。 9. Individuals and teams: Be able to undertake the role of individual, team members and the person in charge in the team with multi-subject background.	9.1 能够在团队中有效沟通, 合作共事。	自动化综合课程设计 I Integrated Automation Curriculum Design I	3	0.4
	9.1 Able to communicate effectively and work cooperatively with members of other disciplines;	自动化综合课程设计 II Integrated Automation Curriculum Design II	3	0.6
	9.2 在 multidisciplinary 背景下, 能够独立或合作开展工作, 并具备组织、管理、协调团队工作的能力。	自动化综合课程设计 III Integrated Automation Curriculum Design III	3	0.5
	9.2 In a multi-disciplinary context, be able to work independently or cooperatively, and have the ability to organize, manage and coordinate team work.	专业英语综合训练 Specialized English Comprehensive Training	1	0.5
10. 沟通: 能够就自动化	10.1 能够就自动化复杂工程问	毕业设计 Graduation Design (Thesis)	12	0.6

毕业要求	指标点	支撑课程	学分	权重
<p>复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。</p> <p>10. Communication: Be able to communicate and interact effectively with industry colleagues and the public on complex engineering issues in the electrical field, including writing reports and design submissions, presenting statements, articulating or responding to instructions, and have an international perspective and be able to communicate and interact in a cross-cultural context.</p>	<p>题，与业界同行及社会公众通过口头和书面的方式进行技术交流和有效沟通。</p> <p>10.1 Be able to accurately express one's own views on complex engineering issues in the automation field by means of oral, manuscript, diagrams, etc., respond to doubts, and understand the differences in communication with peers in the industry and the public;</p>	<p>自动化综合课程设计 IV Integrated Automation Curriculum Design IV</p>	3	0.4
	<p>10.2 了解专业领域的国际发展趋势、研究热点。</p> <p>10.2 Understand the international development trends and research hotspots in the professional field.</p>	<p>人工智能原理 Artificial Intelligence Principle</p>	2	0.6
	<p>10.3 具备一定的国际视野，理解和尊重世界不同文化的差异性和多样性，能够在跨文化背景下进行沟通和交流。</p> <p>10.3 Understand and respect the differences and diversity of different cultures in the world, have language and written expression skills for cross-cultural communication, and be able to conduct basic communication and communication on professional issues in a cross-cultural context. communicate with.</p>	<p>模式识别 Pattern Recognition</p>	2	0.4
		<p>大学英语 College English</p>	8	0.5
		<p>专业英语综合训练 Specialized English Comprehensive Training</p>	1	0.5
	<p>11. 项目管理：理解并掌握工程管理原理方法，并能在多学科环境中应用。</p> <p>11.1 理解并把握工程项目管理和伦理的基本方法。</p> <p>11.1 Understand and grasp the</p>	<p>工程管理 Engineering Management</p>	1	0.5
<p>工程伦理 Engineering Ethics</p>		1	0.5	

毕业要求	指标点	支撑课程	学分	权重
11. Project management: Understand and master the principles of engineering management and economic decision-making methods and be able to apply them in a multidisciplinary environment.	basic methods of project management and ethics.			
	11.2 了解工程及产品全周期、全流程的成本构成，理解其中的时间、成本、质量、风险以及人力资源管理等问题，并在多学科环境下，设计开发解决方案的过程中，应用工程管理与经济决策方法。 11.2 Understand the cost composition of the whole cycle and process of engineering and products, understand the problems of time, cost, quality, risk and human resource management, and apply engineering management and economic decision-making methods in the process of designing and developing solutions in a multidisciplinary environment.	自动化综合课程设计 III Integrated Automation Curriculum Design III	3	1.0
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: A sense of self-directed and lifelong learning, with the ability to learn continuously and adapt to development.	12.1 认识到自主和终身学习的必要性，能够跟踪社会与技术发展的趋势。	自动化综合课程设计 I Integrated Automation Curriculum Design I	3	0.4
	12.1 Able to recognize the necessity of autonomous and lifelong learning in the context of social development;	人工智能原理 Artificial Intelligence Principle	2	0.6
	12.2 具有自主学习的能力，能够对技术问题进行分析探索、归纳总结、实践质疑，并寻找资源获取解决问题的方案。	模式识别 Pattern Recognition	2	0.5
	12.2 Have the ability to learn independently, including the ability to understand technical issues and the ability to summarize.	专业英语综合训练 Specialized English Comprehensive Training	1	0.5

本专业毕业要求对培养目标的支撑关系矩阵

培养目标 毕业要求		目标 1: 具备社会责任感, 知晓行业技术标准 and 政策法规, 坚守职业道德与专业操守;					目标 2: 具有系统思维与专业素养, 具备解决复杂工程项目的能力;				目标 3: 具备良好的沟通与协调能力, 具备组织与实施工程项目的团队合作和领导能力;				目标 4: 具有自主学习的能力、终身学习的追求与创新意识, 能够适应技术、经济与社会的持续发展。			
		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4
毕业要求 1(工程知识)	指标点 1.1						√	√										
	指标点 1.2						√	√		√								
	指标点 1.3							√	√	√								
毕业要求 2(问题分析)	指标点 2.1						√											
	指标点 2.2					√				√								
	指标点 2.3					√	√		√									
毕业要求 3(设计/开发解决方案)	指标点 3.1						√			√				√				
	指标点 3.2							√						√				
	指标点 3.3		√							√								
毕业要求 4(研究)	指标点 4.1									√		√						
	指标点 4.2													√				
	指标点 4.3									√					√			
毕业要求 5(使用现代工具)	指标点 5.1									√					√			
	指标点 5.2					√		√		√								
	指标点 5.3					√				√								
毕业要求 6(工程与社会)	指标点 6.1		√															

培养目标 毕业要求		目标1: 具备社会责任感, 知晓行业技术标准 and 政策法规, 坚守职业道德与专业操守;					目标2: 具有系统思维与专业素养, 具备解决复杂工程项目的能 力;				目标3: 具备良好的沟通与协调 能力, 具备组织与实施工程项目的 团队合作和领导能力;				目标4: 具有自主学习的能力、 终身学习的追求与创新意识, 能 够适应技术、经济与社会的持续 发展。			
		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4
毕业要求 6(工程与	指标点 6.2	√							√									
毕业要求 7(环境和 可持续发	指标点 7.1	√																
	指标点 7.2	√																√
毕业要求 8(职业规 范)	指标点 8.1		√	√														
	指标点 8.2			√	√													
	指标点 8.3	√																
毕业要求 9(个人和 团队)	指标点 9.1									√		√						
	指标点 9.2											√	√					
毕业要求 10(沟通)	指标点 10.1				√					√								
	指标点 10.2								√					√	√			
	指标点 10.3				√													√
毕业要求 11(项目 管理)	指标点 11.1												√					
	指标点 11.2		√										√					
毕业要求 12(终身 学习)	指标点 12.1					√								√	√			
	指标点 12.2														√	√		

The supporting relationship between graduation requirements and its objectives

Educational objectives Graduation requirements		Objective 1: Have a sense of social responsibility, know the industrial technical standards, policies and regulations, and adhere to professional ethics and professional ethics;					Objective 2: Have systematic thinking and professional quality and the ability to solve complex engineering problems in the field of automation engineering in an uncertain environment.				Objective 3: Have good communication and coordination skills and be capable in skills of teamwork or leadership on organizing and implementing engineering projects in automation engineering and other relevant fields.				Objective 4: Committed to lifelong learning and career development, can adapt to the sustainable development of technology, economy and society.			
		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4
1:Engineering knowledge	1.1						√	√										
	1.2						√	√		√								
	1.3							√	√	√								
2: Analysis of issues	2.1						√											
	2.2					√				√								
	2.3					√	√		√									
3 :Design/development solutions	3.1						√			√				√				
	3.2							√						√				
	3.3		√						√									
4: Research	4.1									√		√						
	4.2													√				
	4.3									√					√			
5:Using modern tools	5.1								√						√			
	5.2					√		√		√								
	5.3					√				√								
6:Engineering and society	6.1		√							√								

Educational objectives Graduation requirements		Objective 1: Have a sense of social responsibility, know the industrial technical standards, policies and regulations, and adhere to professional ethics and professional ethics;					Objective 2: Have systematic thinking and professional quality and the ability to solve complex engineering problems in the field of automation engineering in an uncertain environment.				Objective 3: Have good communication and coordination skills and be capable in skills of teamwork or leadership on organizing and implementing engineering projects in automation engineering and other relevant fields.				Objective 4: Committed to lifelong learning and career development, can adapt to the sustainable development of technology, economy and society.			
		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4
6:Engineering and society	6.2	√							√									
7:Environment and sustainable development	7.1	√																
	7.2	√																√
8: Professional Code	8.1		√	√														
	8.2			√	√													
	8.3	√																
9:Personal and team	9.1									√		√						
	9.2											√	√					
10:Communication	10.1				√					√								
	10.2								√					√	√			
	10.3				√													√
11:Project management	11.1												√					
	11.2		√										√					
12:life-long learning	12.1					√								√	√			
	12.2														√	√		

核心课程（含实践）与毕业要求的关联度矩阵

Correlation matrix between core courses and graduation requirements

课程名称 Courses	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		
	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3
高等数学 A Advanced Mathematics	√																	
大学物理 A+实验 College Physics Experiment A	√																	
电路+实验 Circuit ExperimentA	0.2																	
自动控制原理+实验 Automatic Control Principle+ Experiment		0.5			0.3					0.3								
模拟电子技术+实验 Analog Electronic Technology +Experiment		0.3			0.2													
专业英语综合训练 Specialized English Comprehensive Training																		
数字电子技术+实验 Digital Electronics+ Experiment							0.3						0.3					
大学英语 College English																		
检测原理 Detection Principle				0.3														
微机原理及单片机应用								0.2						0.3				

核心课程（含实践）与毕业要求的关联度矩阵

Correlation matrix between core courses and graduation requirements

课程名称 Courses	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		
	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3
	Microcomputer Principle and Application of Microcontroller																	
算法与数据结构 Algorithms And Data Structures										0.3								
计算机网络 Computer Networks														0.2				
线性代数 Linear Algebra	√																	
信号与系统 Signals and Systems		0.2		0.3														
现代控制理论基础 Modern Control Theory								0.3			0.3							
人工智能原理 Artificial Intelligence Principle											0.3							
模式识别 Pattern Recognition												0.4			0.4			
电力拖动与运动控制 Power Drive and Motion Control					0.5			0.5										
电力电子技术 Power Electronic Technology				0.4														
嵌入式系统设计与实践 Embedded System Design and			0.3			0.3			0.2						0.4			

核心课程（含实践）与毕业要求的关联度矩阵

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	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3
	Development																	
程序设计 Programming													0.3					
自动化综合课程设计 I Integrated Automation Curriculum Design I			0.4										0.4					
自动化综合课程设计 II Integrated Automation Curriculum Design II						0.3				0.4				0.5				
自动化综合课程设计 III Integrated Automation Curriculum Design III									0.2		0.4							
自动化综合课程设计 IV Integrated Automation Curriculum Design IV												0.3					0.6	
现场总线控制技术 Fieldbus Control Technology														0.2				
工程管理 Engineering Management																		
工程伦理 Engineering Ethics																	√	
电子电路入门设计 Introduction to the Project Design	0.2																	

核心课程（含实践）与毕业要求的关联度矩阵

Correlation matrix between core courses and graduation requirements

课程名称 Courses	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		
	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3
	of Electronic Circuit																	
思想道德与法治 Ethic Thought & Law																√		
毛泽东思想和中国特色社会主义 理论体系概论 An Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics																		
中国近代史纲要 Conspectus of Chinese Modern History																		
马克思主义基本原理 Introduction to The Basic Principles of Marxism																		
电气控制技术与可编程控制器 Electrical Control Technology and Programmable Logic Controller							0.3											
生产实习 Production Practice																	0.4	
毕业设计 Graduation Design (Thesis)									0.4							0.4		

核心课程（含实践）与毕业要求的关联度矩阵

Correlation matrix between core courses and graduation requirements

课程名称 Courses	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		
	7.1	7.2	7.3	8.1	8.2	8.3	9.1	9.2	9.3	10.1	10.2	10.3	11.1	11.2	11.3	12.1	12.2	12.3
	高等数学 A Advanced Mathematics																	
大学物理 A+实验 College Physics Experiment A																		
电路+实验 Circuit Experiment																		
自动控制原理+实验 Automatic Control Principle+ Experiment																		
模拟电子技术+实验 Analog Electronic Technology +Experiment																		
专业英语综合训练 Specialized English Comprehensive Training								0.5				0.5					0.5	
数字电子技术+实验 Digital Electronics+ Experiment																		
大学英语 College English												√						
检测原理 Detection Principle																		

核心课程（含实践）与毕业要求的关联度矩阵

Correlation matrix between core courses and graduation requirements

课程名称 Courses	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		
	7.1	7.2	7.3	8.1	8.2	8.3	9.1	9.2	9.3	10.1	10.2	10.3	11.1	11.2	11.3	12.1	12.2	12.3
	微机原理及单片机应用 Microcomputer Principle and Application of Microcontroller																	
算法与数据结构 Algorithms And Data Structures																		
计算机网络 Computer Networks																		
线性代数 Linear Algebra																		
信号与系统 Signals and Systems																		
现代控制理论基础 Modern Control Theory																		
人工智能原理 Artificial Intelligence Principle											0.6					0.6		
模式识别 Pattern Recognition											0.4						0.5	
电力拖动与运动控制 Power Drive and Motion Control																		
电力电子技术 Power Electronic Technology																		
嵌入式系统设计与实践																		

核心课程（含实践）与毕业要求的关联度矩阵

Correlation matrix between core courses and graduation requirements

课程名称 Courses	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		
	7.1	7.2	7.3	8.1	8.2	8.3	9.1	9.2	9.3	10.1	10.2	10.3	11.1	11.2	11.3	12.1	12.2	12.3
	Embedded System Design and Development																	
程序设计 Programming																		
自动化综合课程设计 I Integrated Automation Curriculum Design I							0.4									0.4		
自动化综合课程设计 II Integrated Automation Curriculum Design II							0.6											
自动化综合课程设计 III Integrated Automation Curriculum Design III								0.5						0.6				
自动化综合课程设计 IV Integrated Automation Curriculum Design IV		0.5				0.6				0.4								
现场总线技术 Fieldbus Control Technology																		
工程管理 Engineering Management													√					
工程伦理 Engineering Ethics					√													
电子电路入门设计																		

核心课程（含实践）与毕业要求的关联度矩阵

Correlation matrix between core courses and graduation requirements

课程名称 Courses	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		
	7.1	7.2	7.3	8.1	8.2	8.3	9.1	9.2	9.3	10.1	10.2	10.3	11.1	11.2	11.3	12.1	12.2	12.3
	Introduction to the Project Design of Electronic Circuit																	
思想道德与法治 Ethic Thought & Law																		
毛泽东思想和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	√																	
中国近代史纲要 Conspectus of Chinese Modern History				√														
马克思主义基本原理 Introduction to The Basic Principles of Marxism				√														
电气控制技术与可编程控制器 Electrical Control Technology and Programmable Logic Controller																		
生产实习 Production Practice	0.5					0.4												
毕业设计 Graduation Design (Thesis)		0.5			0.7					0.6								