

廣東工業大學

Guangdong University of Technology



自动化学院物联网工程专业 人才培养方案

自 2022 级开始执行

执笔：（签字） _____ 专业负责人：（签字） _____

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自动化学院

物联网工程本科专业人才培养方案

Undergraduates Cultivation Scheme

前言（修订说明）

物联网是继计算机、互联网和移动通信之后又一次信息产业的革命性发展，目前被正式列为国家重点发展的战略性新兴产业之一。物联网产业以车联网、智能电网、智能家居、安防监控、移动支付、智能穿戴、远程医疗等应用领域为代表，具有产业链长、涉及多个产业群的特点，其应用范围几乎覆盖了各行各业。

物联网工程专业是面向我国战略性新兴产业的新专业，物联网工程专业学习“物”如何被连接到互联网；学习如何编织一个包括万“物”的互联网（即物联网）；学习如何智能化地管理互联网中“物”；学习如何分析处理互联网中“物”所产生的大数据。因此，物联网工程专业既要学习传感器、电子技术、自动控制等基础知识，又要学习无线传感网络、射频识别、移动通讯等通信技术，还要学习嵌入式系统、数据库、软件设计和智能信息处理等专业知识和技能。

物联网应用系统开发能力是物联网工程专业学生应具备的核心能力，我们在前期的培养工作中发现迫切需要增加操作系统和人工智能的相关知识，以期更好地提高学生的物联网应用开发能力，同时技术的迅速发展对学生编程能力的提升提出了更高的要求。对比 2018 版培养方案，本次修订主要针对核心课程进行了如下持续改进：

1、优化核心课程设置。基于物联网设备管理和应用开发需求，增设了《操作系统》；基于物联网应用场景对智能功能的需求，增设了《人工智能》课程；基于 Python 语言在开发物联网终端设备、网关设备、Web 后台程序的优势，增设了《Python 基础》课程。同时增加了《程序设计》课程的学时。

2、优化核心课程授课顺序。进一步优化核心课程的授课学期，优化每个学期的授课课程组合。

3、课程思政内容的建设。本次修订也进一步加强了课程思政内容的建设，主要体现在课程教学大纲的修订，明确课程思政的内容。

Introduction

Being another revolutionary development of the information industry after computer, Internet and mobile communication, Internet of things is officially listed as one of the strategic emerging industries, which include various application fields such as Internet of vehicles, smart grid, smart home, security monitoring, mobile payment, smart wearing, and remote medical treatment and so on. It has the characteristics of long industrial chain and multiple industrial clusters. Its scope covers almost all industrial applications.

Internet of things engineering is a new major for national strategic emerging industries, which covers many contents, such as, how things are connected to the Internet, how to interconnect so many things (namely Internet of things), how to intelligently manage things on the Internet, and how to analyze and deal with big data generated by things on the Internet. Therefore, the students of Internet of things engineering major should not only learn the basic knowledge of sensors, electronic technology and automatic control, but also learn the communication technologies such as, wireless sensor network, radio frequency identification and mobile communication. Furthermore, the students should learn the professional knowledge and skills such as embedded system, database, software design and intelligent information processing.

Internet of things engineering is a new major for national strategic emerging industries. Focusing on the Internet of things and mobile Internet, cloud computing and big data, relying on the Robot and Intelligent Manufacturing Laboratory and Big Data Cloud Platform, the major is committed to building a matching knowledge training system, carrying out basic theory and engineering quality teaching schemes centered on the core technologies of Internet of things , cloud computing, wireless sensor network and embedded system, and focusing on the ability training of information management, mobile application development. The whole teaching plan has distinctive new engineering characteristics and emphasizes the cultivation of practical ability and application innovation ability.

The main purpose of this revision is to further sort out the arrangement of core courses of the major and to add ideological and political elements to the courses.

1、Optimize the core curriculum. Based on the needs of IoT device management and application development, the course named Operation System is added; based on the intelligent function needs of IoT application scenarios, the course named Artificial Intelligence is added; and based on the advantages of Python language on the development of IoT terminal equipment, gateway equipment, and Web backend program, the course named Python Basics is added. Meanwhile, the course hours of the Programming Design have been increased.

2、Optimize the teaching sequence of core courses. We further optimize the teaching semester of core courses and optimize the combination of teaching courses in each semester.

3、The construction of ideological and political content of the course. This revision also further strengthens the construction of the ideological and political content of the course, which is mainly reflected in the revision of the course syllabus to clarify the content of the ideological and political content of the course.

表 1 课程构成表(Course Composition)

模块 Module	学分 Credit	课程类别 Course Category	课程名称 Course Name	学分 Credit	性质 Course Nature			
基础模块 120 学分 Basic Module 120 Credits	28.5	自然科学基 础 Fundamentals of Natural Science	高等数学 A(1) (2) Advanced Mathematics(1) (2)	10.5	必修+公共选 修课 Compulsory + Public Elective Courses			
			离散数学 Discrete Mathematics	3.0				
			线性代数 Linear Algebra	2.5				
			概率论与数理统计 B Probability Theory and Mathematical Statistics B	3.5				
			大学物理 B(1) (2) +实验 University Physics (1) (2) + Experiment	6.0				
			自然科学公选 Natural Science Public Election	3.0				
	47.5	人文社科基 础 Fundamentals of Humanities and Social Sciences	马克思主义基本原理 Basic Principles of Marxism	3.0	必修+公共选 修课 Compulsory + Public Elective Courses			
			毛泽东思想和中国特色社会主义理论体 系概论 Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics	3.0				
			习近平新时代中国特色社会主义思想概 论 Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	3.0				
			中国近现代史纲要 Conspectus of Chinese Modern History	3.0				
			形势与政策 Situation and Policy	2.0				
			思想道德与法治 Cultivation of Ethic Thought & Fundamentals of Law	3.0				
			国家安全教育 National Security Education	1.0				
			大学生心理健康教育 Mental Health Education for College Students	2.0				
			大学生职业规划与创业教育 Career Planning and Entrepreneurship Education for College Students	1.0				
			大学生就业创业指导 Employment and Entrepreneurship Guidance for College Students	1.5				
			大学英语(1) (2) College English (1) (2)	8.0				
			军事理论 Military Theory	2.0				
			军训 Military Training	2.0				
			体育(1) (2) (3) (4) Physical Training (1) (2) (3) (4)	4.0				
			人文社科公选	9.0				
			44	专业基础 Professional Foundation		专业导论 Professional Introduction	1.0	必修 (37 学分) Compulsory Courses
						程序设计+实验+课程设计 (3.0+1.0+1.0) Program Design + Experiment + Curriculum Design (3.0 + 1.0 + 1.0)	5.0	

模块 Module	学分 Credit	课程类别 Course Category	课程名称 Course Name	学分 Credit	性质 Course Nature	
			工程训练 C Engineering Training C	1.5	(37 Credits)	
			数据结构与算法设计+实验 (2.5+1.0) Data Structure and Algorithm Design + Experiment (2.5 + 1.0)	3.5		
			电路与电子学 Circuits and Electronics	3.5		
			信号与系统 Signal and System	2.0		
			数字电子技术+实验 (2.0+1.0) Digital Electronic Technology + Experiment (2.0 + 1.0)	3.0		
			计算机网络+课程设计 (3.0+1.0) Computer Network + Curriculum Design (3.0 + 1.0)	4.0		
			操作系统 Operating System	2.5		
			数据库原理及应用+实验+课程设计 (2.0+1.0+1.0) Database Principle and Application + Experiment + Curriculum Design (2.0 + 1.0 + 1.0)	4.0		
			微机原理及单片机应用+实验 (2.0+1.0) Microcomputer Principle and Single Chip Technology + Experiment (2.0+1.0)	3.0		
			通信概论 Communication Introduction	2.0		
			专业英语应用能力训练 Professional English Application Ability Training	1.0		
			科技创新活动 Innovative Activities in Science and Technology	1.0		
			射频识别技术 Radio Frequency Identification Technology	2.5		选修 (至少选7学 分) Elective Courses (at least 7 Credits)
			传感器与检测技术 Sensor and Detection Technology	2.0		
			自动控制原理 Automatic Control Principle	2.0		
			物联网系统集成技术 Integrated Technology of IoT	2.0		
			数据挖掘与应用 Data Mining and Application	2.0		
			新技术专题 New Technical Project	1.0		
			人工智能 Artificial Intelligence	2.0	必修 (9.5 学 分) Compulsory Courses (9.5 Credits)	
			嵌入式系统+实验+课程设计(2.0+0.5+1.0) Embedded system + Experiment + Curriculum Design(2.0+0.5+1.0)	3.5		
无线传感器网络+实验+课程设计 (2.0+1.0+1.0) Wireless Sensor Network + Experiment + Curriculum Design(2.0+1.0+1.0)	4.0					
Python 基础 Fundamentals of Python Programming	2.0	选修(至少 18 学分) Elective Courses				
Java 程序设计 Java Program Design	2.0					
专业领域 模块 42.5 学分 Professional Domain Module 42.5 Credits	27.5	专业领域 Professional Field				

模块 Module	学分 Credit	课程类别 Course Category	课程名称 Course Name	学分 Credit	性质 Course Nature	
			多媒体技术 Multimedia Technology	2.0	(18 Credits)	
			物联网软件开发技术+实验 (2.0+1.0) Software Development Technology of Internet of Things + Experiment (2.0+1.0)	3.0		
			机器视觉 Machine Vision	2.0		
			智能电网与能源互联网技术 Smart Grid and Energy Internet Technology	3.0		
			北斗卫星导航技术+实验 (2.0+1.0) BeiDou Satellite Navigation Technology + Experiment (2.0 + 1.0)	3.0		
			智能信息处理技术+实验 (3.0+1.0) Intelligent Information Processing Technology + Experiment (3.0 + 1.0)	4.0		
			信息安全技术+实验 (3.0+1.0) Information Security Technology + Experiment (3.0 + 1.0)	4.0		
			物联网系统工程 System Engineering of Internet of Things	3.0		
			智能机器人 Intelligent Robot	2.0		
			物联网工程综合设计(1)(2) Comprehensive Design of Internet of Things Engineering (1) (2)	6.0		
			生产实习 Production Practice	2.0		必修 Compulsory Courses
			毕业设计 Graduation Design	13.0		

教务处指导意见指标
Target Achievement with the Indicators Guided by Dean's Office

指标 Target	本方案 Scheme	达成度 Degree of Achievement
总学分≤160 学分 Total Credits Less than 160	162.5	非常接近 Approximately Achieved
基本模块≤128 学分 (人文社科基础、自然科学基础、专业基础) Credits of Basic Module Less than 128	120	达成 Achieved
专业领域≥32 学分 Credits of Professional Module at Least 32	42.5	达成 Achieved
选修≥25% (40 学分) Credits of Elective Module at Least 40 (accounts for 25%)	公选 12+专业基础选修 7.0+专业领域选修 18= 37 37 Credits including 12 Credits of Public Elective Course, 7 Credits of Professional Basic Elective Course, 18 Credits of Professional Elective Course	非常接近 Approximately Achieved
实验、实习、实训、设计≥ (40 学分) More than 40 Credits (accounts for 25%) of Experiment, Practice, Training and Design	41.5 (单独实验课+课内实 验+专业领域选修实验课) 41.5 Credits (Individual experimental course + in class experiment + elective experimental course in professional field)	达成 Achieved
人文社科基础约占 29% The foundation of Humanities and Social Sciences accounts for about 29%	29.2%	达成 Achieved
自然科学基础约占 20% Natural Science Foundation accounts for about 20%	17.6%	达成 Achieved
专业基础约占 30% Professional foundation accounts for about 30%	27.2%	达成 Achieved
专业领域约占 20% Professional fields account for about 20%	26.5%	达成 Achieved
自然科学公选课 3 学分 3 credits of public elective course of Natural Science	3 学分 3 Credits	达成 Achieved
人文社科公选课 9 学分 (其中创新思维类不低于 2 学分) 9 credits of public elective courses in Humanities and Social Sciences (among which, innovative thinking at least 2 credits)	9 学分 9 Credits	达成 Achieved
高等数学 11 学分 Advanced mathematics 11 Credits	10.5	非常接近 Approximately Achieved
大学物理 + 实验 11 学分 University Physics +Experiment 11 Credits	6	不满足, 本专业不需要那么多学分 Fail to meet the requirements. There's no need for so many credits.
工程制图 3 学分 Engineering drawing 3 Credits	0	不满足, 本专业不需要 Fail to meet the requirements. There's no need for so many credits.
工程训练 3 学分 Engineering training 3 Credits	1.5	不满足, 本专业不需要那么多学分 Fail to meet the requirements. There's no need for so many credits.

专业名称：物联网工程

Major: Engineering of Internet of Things

专业代码：080905

Code: 080905

学制：四年

Length of Schooling: Four Years

授予学位：工学学士

Degree: Bachelor Degree of Engineering

制定（修订）时间：2022年1月10日

Time of revision: 2022/01/10

一、培养目标

I. Educational objectives

培养学生成为德才兼备，具有家国情怀、创新精神与协同意识，能在物联网行业从事系统设计、开发、集成、运行维护、工程管理等工作，具有创新精神和实践能力，能解决复杂工程问题的高素质应用型人才。

Cultivate students to become high-quality applied talents with both ability and morality, patriotism, innovative spirit and collaborative consciousness, who can engage in system design, development, integration, operation and maintenance, engineering management and other work in the Internet of things field, innovative spirit and practical ability, and can solve complex engineering problems.

学生毕业5年后预期达到以下具体目标：

Five years after graduation, students are expected to achieve the following specific objectives.

目标1：具有家国情怀，知晓物联网行业技术标准和政策法规，坚守职业道德与专业操守。

Objective 1: Have a national feeling, awareness of technical standards and policies and regulations in the relevant areas of engineering of Internet of things, and have the ability to demonstrate ethical and moral responsibility in engineering.

目标1的二级指标包括：

1.1 具有家国情怀，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 具有积极主动的工作态度，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。

The secondary objectives for objective 1 include:

1.1 Have a national feeling, and adhere to the principles of public interest first and sustainable development in engineering practice.

1.2 Be familiar with and comply with relevant laws, regulations, standards and norms, and respect social values in different cultures.

1.3 Have a proactive working attitude and adhere to the principles of objectivity, impartiality and integrity in their own business.

1.4 Respect others and have a good cooperative attitude.

目标2：具有系统思维与专业素养，具备解决不确定环境下物联网领域复杂工程问题能力。

Objective 2: Have systematic thinking and professional quality and the ability to solve complex engineering problems in the field of Internet of things in an uncertain environment.

目标2的二级指标包括：

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 掌握物联网领域的专业知识与工程技能，熟悉物联网相关技术领域，能够对多种资源综合利用。

2.3 能够跟踪相关领域前沿技术，具有对物联网领域复杂工程问题进行理解、分析、综合、比较、概括、抽象、推理、论证和判断的能力。

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。

The secondary objectives for objective 2 include:

2.1 Have the ability of systematic thinking, interdisciplinary knowledge integration and application.

2.2 Master professional knowledge and engineering skills in the field of Internet of things, be familiar with electrical related technology, and be able to make comprehensive utilization of multiple resources.

2.3 Be able to track cutting-edge technologies in related fields and have the ability to understand, analyze, synthesize, compare, generalize, abstract, reason, argue and judge complex engineering problems in the field of Internet of things.

2.4 Can fully consider the relevant factors of society, economy, security, ethics under uncertain environment to provide innovative solutions through analysis, research, experiment and demonstration.

目标 3: 具备良好的沟通与协调能力，具备组织与实施物联网领域工程项目的团队合作或领导能力。

Objective 3: Have good communication and coordination skills and be capable in skills of teamwork or leadership on organizing and implementing engineering projects in the field of Internet of things.

目标 3 的二级指标包括:

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或领导能力。

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。

The secondary objectives for objective 3 include:

3.1 Have the ability to communicate effectively with colleagues, customers and the public.

3.2 The ability to find partners, professional organizations and access various resources in the community.

3.3 Have the team work spirit or leadership ability to integrate, lead and drive team.

3.4 Be familiar with knowledge and skills in engineering economy and management, and have the ability to organize and coordinate project implementation.

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。

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

目标 4 的二级指标包括:

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，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。

The secondary objectives for objective 4 include:

4.1 Have the awareness of self-renewal and lifelong learning.

4.2 Could actively participate in post training and promote career development.

4.3 Be able to formulate personal development plans according to social and economic development trends, find learning resources and improve personal literacy.

4.4 Have globalization and international vision, and be able to actively adapt to the changing domestic and international situation and environment.

培养预期: 本专业学生毕业 5 年左右能够发展为物联网领域合格的工程师，能够独立解决领域内的复杂工程问题，并成为技术或管理骨干。

Program Design Experiment: Students graduated from this major are expected to become qualified engineers in the field of Internet of Things after about five years graduation, and further to become technical leaders or senior managers who are able to solve complex engineering problems of Internet of Things in the future.

二、毕业要求

II. Graduation requirements

本专业的学生应具有爱岗敬业、求实创新、团结合作的品质；具有良好的思想品德、社会公德和职业道德。应具有良好的科学素养、较强的创新意识；具有全面的文化素质、良好的知识结构和较强的适应新环境、新群体的能力，以及良好的语言（中、英文）运用能力。

The students in major of IoT engineering should have the qualities of dedication, innovation, unity and cooperation, and have ideology and morality and professional ethics. They also should have scientific literacy, professional knowledge of the major and strong ability to adapt to the new environment. Good language (especially English) skills are necessary.

物联网工程专业毕业生应熟悉物联网产业链中标识、感知、处理和信息传送四个环节，掌握电子、射频、无线通信等物联网专业知识和技能，能从事物联网技术研究方面的工作，又可以从事物联网技术应用、维护等工作，既具有较强的实践工作能力又具有创新能力的高层次物联网技术人才。学生毕业后能胜任物联网技术在智能交通、环境保护、地质灾害监测、政府工作、公共安全、智能家居、智能消防、工业监测、个人健康等领域的应用工作。

The graduates in major of IoT engineering should be familiar with the four aspects of IoT, namely identification, sensing, processing and transporting. They should have professional knowledge of IoT, master the technologies of electronics, radio-frequency identification, wireless communication, wireless sensor network, and other related technologies of IoT, and have practical ability and strong innovative capacity. They can engage in the research and development (R&D), system integration, maintenance and some other related work of IoT application fields such as intelligent transportation, environmental protection, geological disaster monitoring, government, public safety, safe home, smart fire protection, industrial monitoring, personal health, and etc.

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：

After four years of comprehensive learning, the students should reach the following graduation requirements when they graduate.

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物联网复杂工程问题。

Engineering knowledge: Being able to use mathematics, natural science, engineering fundamental and professional knowledge to solve complex engineering problems.

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物联网复杂工程问题，以获得有效结论。

Analysis of issues: Applying basic principle of mathematics, natural science and engineering science to identify, express and analyze the Internet of Things and complex engineering problems through literature research, so as to obtain effective conclusions.

3.设计/开发解决方案：能够设计针对物联网复杂工程问题的解决方案，设计满足特定需求的系统、元器件或工艺流程，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。

Design/development solutions: Designing solutions for the complex engineering problems of Internet of Things that not only meet the specific needs of the system, unit (components) or fabrication process, but reflect the sense of innovation and consider the factors about social, health, safety, laws, cultural and environment in the design process.

4.研究：能够基于科学原理并采用科学方法对物联网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。

Research: Using scientific methods to analyze the complex engineering problem of Internet of Things based on scientific theories. The methods include design of experiment, analysis and interpretation of data and acquisition of rational conclusions through comprehensive information processing.

5.使用现代工具：具有利用现代信息技术获取相关信息的初步能力，具有综合运用所学理论和技术手段，分析并解决物联网工程实际问题的基本能力；

Applying modern tools: Being able to develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for the complex engineering problems of Internet of Things, which include predicting and simulating engineering problems, as well as understanding its constraints.

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物联网

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。

Engineering and society: Through correlative engineering background knowledge, rationally analyzing and evaluating the solutions on professional engineering practice and complex engineering of Internet of Things, and not only its influence on society, health, safety, legal and cultural, but also its responsibilities.

7.环境和可持续发展：能够理解和评价针对物联网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 sustainable development: According to the complex engineering problem of Internet of Things, being able to understand and evaluate the impacts of professional engineering practices on the sustainability of environment and society.

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。

Professional norms: Equipping with humanistic community scientific literacy and social responsibility, understanding and complying with the engineering professional morals and norms in engineering practices.

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。

Individuals and teams: Playing the role of individual, team members and the person in charge in the team with multi-subject background.

10.沟通：能够就物联网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。

Communication: Effectively communicating with the industry and the public about the complex engineering problem of Internet of Things, which including reports writing and presentation, drafts designing and expressing or instructions responding, and having a certain international vision and the capability of communication and exchange in cross-cultural environments.

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 theory of engineering management and economic decision method, and being able to apply them in multi-subject environment.

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 learning: Having the awareness of autonomous learning and lifelong learning and the capability of continual learning and adapting to the development.

三、专业培养特色

III. Features of speciality cultivation

物联网产生大数据，大数据助力物联网。2015年国务院印发《促进大数据发展行动纲要》，高屋建瓴地指明了大数据在各个领域的应用和发展。大数据的精准性、预测性和智能性，为各行业在规划、治理、管理、决策、营销等方面的决策提供了强有力支持，在商业、金融、物流、零售、医疗、教育、制造业等行业的应用已经十分明显。从国内外的发展现状来看，物联网是现代社会发展的必然趋势，国际和国内都迫切需要物联网工程专业的相关技术人才。

Internet of things produces big data and big data promotes Internet of things. In 2015, the State Council issued the Action Plan for Promoting Big Data Development, highlighting the application and development of big data in various fields. The accuracy, predictability and intelligence of big data provide strong support for decision-making in planning, governance, management, decision-making, marketing, etc., and have been very obvious in the commercial, financial, logistics, retail, medical, education, manufacturing and other industries. From the development of the status quo at home and abroad, the Internet of Things is the inevitable trend of the development of modern society, international and domestic are urgently needed Internet of Things engineering related technical personnel.

依托科研优势，物联网工程专业着重在智能交通/物流、智能电网、制造物联和健康医疗等领域，注重培养能适应物联网工程所涉及的多学科发展需求的新型创新人才，培养能够从事物联网工程规划、设计、管理等方面的高素质应用型人才；课程建设遵循现代科学技术发展的前沿技术，教材建设以最新技术的基础，确保培养学生符合国际信息化战略和广东经济社会科技发展的需求，重点突出实践能力和应用创新能力的培养。注重培养能适应物联

网工程所涉及的多学科发展需求的新型创新人才,为我国以物联网和传感网为代表的下一代信息技术新兴产业发展输送急需的科研、管理、生产等人才。

Relying on the advantages of scientific research, Internet of Things engineering focuses on intelligent transportation / logistics, smart grid, manufacturing and health care and other fields, and pay attention to cultivating new innovative students can adapt to the development of multi-disciplinary development, and to cultivate high-quality applied talents who can be engaged in network engineering planning, design, management and other aspects. We will focus on cultivating new and innovative talents who can meet the needs of multidisciplinary development in the fields of Internet of Things, and send the necessary scientific research, management and production talents for the development of the next generation of information technology emerging industries represented by Internet of Things and Sensor's Sensitive Network.

专业特色: 依托科研优势, 强化应用、实践与创新能力的培养, 展开以物联网核心技术、云计算、无线网络技术、嵌入式系统、信息处理等为重点的基础理论和工程素质教育, 重点突出科研与教学、教学与企业需求相结合, 将科研引入教学, 强化应用、实践与创新能力的培养, 展开以物联网核心技术为重点的基础理论和工程素质教育, 并从平台建设、人才培养和重大项目等多方面努力, 为国家培养亟需的物联网优秀人才。

Professional features: Driving industrialization with information is the national significant decision. To meet the requirement of this decision, our major is committed to cultivating high quality engineering application-oriented students with characteristics of rich knowledge, multi-disciplinary and innovation.

培养方法: 坚持本专业的特色, 重点突出科研与教学、教学与企业需求相结合, 试行“3+1”及“导师工作室”并行的模式, 将科研引入教学, 通过课程设计、课外科技实践、各种类型竞赛活动等多个环节, 以达到培养“有较强创业精神、创新能力和实践能力”的应用型创新人才的目标。

Cultivation pattern: Based on our major's characteristics, we will persist in the idea of scientific research and teaching integration, teaching and enterprise requirement integration, and promote “3+1” teaching mode and “systems of tutor studio” teaching mode in parallel and introduce scientific research into teaching. We will finally achieve the objective of developing students' practical and innovative abilities through course design, extracurricular scientific activities, and various discipline competitions.

四、专业主干学科

IV. Key discipline for the specialty

计算机科学与技术、控制科学与工程

Computer Science and Technology, Control Science and Engineering

五、专业核心课程

V. Core courses

本专业的基础核心课程有: 电路与电子学、数字电子技术、信号与系统、程序设计、计算机网络、数据结构与算法设计、数据库原理及应用、射频识别技术、嵌入式系统、无线传感器网络、智能信息处理技术、物联网系统集成技术、物联网系统工程等。

Core courses of the Internet of Things engineering includes: Circuits and Electronics, Digital Electronic Technology, Signals and Systems, Program Design, Computer Network, Data Structure and Algorithm Design, Database Principle and Application, Technology of Radio Frequency Identification, Embedded System, Wireless Sensor Network, Intelligent Information Processing Technology, System Integration Technology of Internet of Things, System Engineering of Internet of Things, etc.

六. 特色课程 (全英课程、双语课程及其他特色教学改革课程)

VI. Featured courses (English courses, bilingual courses and other featured reforming courses)

本专业开设双语课程: 计算机网络、数据库原理及应用; 特色教学改革课程: 物联网系统集成技术。

Computer Network, Database Principle and Applications, System Integration Technology of Internet of Things

七. 毕业学分要求

VII. Credits required for graduation

本专业要求学生修满不低于 162.5 个学分，其中实践教学环节不少于 41.5 学分。

Class total credits are not less than 162.5, the practice teaching credits are not less than 41.5.

八. 主要实践教学环节

VIII. Main components of practical teaching

物联网工程专业的实践教学环节主要有：数据结构与算法设计实验、计算机网络课程设计、数据库原理及应用实验及课程设计、嵌入式系统实验及课程设计、无线传感器网络实验及课程设计、智能信息处理实验、物联网工程综合设计、生产实习、毕业设计（论文）等。

The practice teaching of the Internet of Things engineering includes: Experiment of Data Structure and Algorithm Design, Curriculum Design of Computer Network, Experiments and Curriculum Design of Database Principle and Application, Experiments and Curriculum Design of Embedded System, Curriculum Design of Wireless Sensor Network, Experiments of Intelligent Information Processing Technology, Integrated Course Design of System Engineering of Internet of Things, Production Practice, Graduation Design (Thesis), etc.

九. 课程体系的构成及课程学分分配比例

IX. Course system structure and course credit proportion

课程体系按认证标准所列出的课程学分占比

课程类别 Course Category			学时 Teaching Hours		学分 Credit	
			学时数 Teaching Hours	比例 (%) Percentage (%)	学分数 Credit	比例 (%) Percentage (%)
专业核心课程 Core courses	工程基础课程 General engineering courses	必修 Compulsory Courses	604	21.15%	37.5	23.08%
	专业基础类课程 Subject foundation requirements	必修 Compulsory Courses	324	11.34%	20	12.31%
		选修 Elective courses	112	3.92%	7	4.31%
	专业类课程 Subject area requirements	必修 Compulsory Courses	96	3.36%	6	3.69%
		选修 Elective courses	160	5.60%	10	6.15%
	工程实践与毕业设计(论文) Engineering practice and graduation project (thesis)	必修 Compulsory Courses	652	22.83%	33.5	20.62%
		选修 Elective courses	144	5.04%	8	4.92%
	通识课程 General education program	必修 Compulsory Courses	572	20.03%	28.5	17.54%
选修 Elective courses		192	6.72%	12	7.38%	
最低毕业学时 Minimum Graduation Teaching Hours			2856	最低毕业学分 Minimum Graduation Credit		162.5

注：比例 (%) 为必修学时/学分占最低毕业学时/学分比例，选修学时/学分占最低毕业学时/学分比例

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 Compulsory Courses	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 & Political Theories, University Physical Education, College English, Advanced Mathematics, Basic Computer Literary.	54	980	33.2%	56.6%
	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。	32	520	19.7%	

		Courses for constructing the basic concepts, theories and knowledge underlying the specialty.				
	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.	6.0	96	3.7%	
	实验实习实训 Experimental and Practical Courses		15.5	332	9.5%	20.6%
	设计（论文） Design (Thesis)		18.0	320	11.1%	
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	7.3%	17.8%
	专业基础课 （至少选 7.0 学分） Basic specialty courses (A minimum of 7 credits required)	指相关学科和跨学科的基础理论和知识的课程。 Courses for basic theories and knowledge in the main discipline and related disciplines.	7.0	112	4.3%	
	专业课 （至少选 10.0 学分）Specialty courses(A minimum of 10 credits required)	指学科方向和跨学科方向的基础理论和知识的课程。 Courses for basic theories and knowledge in the disciplinary emphasis and interdisciplinary emphasis.	10.0	160	6.2%	
	实验实习实训 （至少选 2.0 学分） Experimental and practical courses(A minimum of 2 credits required)		2.0	48	1.2%	4.9%
	设计（论文） （至少选 6.0 学分）Design (Thesis) (A minimum of 6 credits required)		6.0	96	3.7%	
合 计 Total			162.5	2856		100%

2、课外部分 Extra-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 Part	入学教育 Entrance education	0.5	0.5 周 0.5 week			
	社会实践 Social practice	2.0	32			
	“毛泽东思想、邓小平理论和‘三个代表’重要思想概论”课外导读 Extra-curricular guided reading of An Introduction to Mao Tse Tung Thoughts, Deng Xiaoping Theory and the Important Thoughts of “Three Represents”	1.0	16			
	毕业教育 Graduation education	0.5	0.5 周 0.5 week			
	高年级体育锻炼 Physical exercise of junior and senior students	1.0	16			
	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
	选修 Elective Part	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
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
			获系统分析师证书者 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.课程设计及学时（学分）分配

X. Program requirements and credit (teaching hours) distribution

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		
	高等数学 A Advanced Mathematics A	10.5	168				
	大学英语 College English	8.0	128	32			
	体育 Physical training	4.0	144		80		
	军事理论 Military Theory	2.0	36				
	国家安全教育 National Security Education	1.0	16		10		
	大学生职业规划与创业教育 College Students' Career Planning and Entrepreneurship Education	1.0	16		8		
	大学生心理健康教育 College students' mental health education	2.0	32		8		
	思想道德与法治 Cultivation of Ethic Thought & Fundamentals of Law	3.0	48		12		
	大学物理 B University Physics B	4.5	72				
	线性代数 Linear Algebra	2.5	40				
	毛泽东思想和中国特色社会主义理论体系概论 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 Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	3.0	48				
	马克思主义基本原理 Basic Principles of Marxism	3.0	48		12		
	大学生就业创业指导 College Students Employment and Entrepreneurship Guidance	1.5	24		16		
	形势与政策 Situation and Policy	2.0	64		32		
	小计 Subtotal	54	980	32	202		
	专业基础课 Basic Specialty Courses	专业导论 Introduction to Internet of Things	1.0	16			
		程序设计 Program Design	3.0	48			
		离散数学 Discrete Mathematics	3.0	48			
数据结构与算法设计 Data Structure and Algorithm Design		2.5	40				
电路与电子学* Circuits and Electronics*		3.5	60	12			

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
	概率论与数理统计 B Probability and Mathematical Statistics B	3.5	56			
	数字电子技术* Digital Electronic Technology*	2.0	32			
	信号与系统 Signals and Systems	2.0	32			
	计算机网络 **/BL Computer Network **/BL	3.0	52	12		
	数据库原理及应用 (BL) Database Principle and Application (BL)	2.0	32			
	操作系统 Operating System	2.5	40			
	微机原理及单片机应用 Microcomputer Principle and Single-Chip Application	2.0	32			
	通信概论 Introduction of Communication	2.0	32			
	小 计 Subtotal	32.0	520	24		
	专业课 Specialty courses	人工智能 Artificial Intelligence	2.0	32		
嵌入式系统*/**/# Embedded System */**/#		2.0	32			
无线传感器网络** Wireless Sensor Network**		2.0	32			
小 计 Subtotal		6.0	96			
实验实习实训 Experimental and Practical Courses	军训 Military Training	2.0	2周		32	
	程序设计实验 Experiments of Program Design	1.0	24			24
	工程训练 C Engineering Training C	1.5	24		24	
	大学物理实验 Experiments of University Physics	1.5	24	24		
	数据结构与算法设计实验 Experiment of Data Structure and Algorithm Design	1.0	24			24
	数字电子技术实验 Experiments of Digital Electronic Technology	1.0	24	24		
	数据库原理及应用实验 Experiments of Database Principle and Application	1.0	24			24
	微机原理及单片机应用实验 Experiments of Microcomputer Principle and Single-Chip Application	1.0	24	24		
	专业英语应用能力训练 Professional English Application Ability Training	1.0	分散		24	
	嵌入式系统实验 Experiments of Embedded System	0.5	12	12		
	无线传感器网络实验 Experiments of Wireless Sensor Network	1.0	24	24		
	生产实习 Production Practice	2.0	2周 2 weeks		48	
	科技创新活动 Innovative Activities in Science and Technology	1.0	分散		24	
	小 计 Subtotal	15.5	332	108	152	72

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	
设计 (论文) Design (Thesis)	程序设计课程设计 Curriculum Design of Program Design	1.0	1周			16	
	计算机网络课程设计 Curriculum Design of Computer Network	1.0	1周			16	
	数据库原理及应用课程设计 Curriculum Design of Database Principle and Application	1.0	1周			16	
	嵌入式系统课程设计 Curriculum Design of Embedded System	1.0	1周	16			
	无线传感器网络课程设计 Curriculum Design of Wireless Sensor Network	1.0	1周	16			
	毕业设计(论文) Graduation Design (Thesis)	13.0	15周				
	小 计 Subtotal	18.0	320				
选修 Elective Courses	工程伦理 Engineering Ethics	1.5	24				
	劳动教育 Labor Education	1.5	32		28		
	“四史”大视野 The Grand Vision of “Four Histories”	1.0	16		8		
	美育类限选课程 Limited Courses for aesthetic education	2.0	32				
	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				
	其他 Others	1.5	24				
	自然科学公选课 Natural Sciences and Engineering Technology	1.5	24				
	其他 Others	1.5	24				
	小 计 (至少选12.0学分) Subtotal (A minimum of 12.0 credits required)	12.0	192				
	专业 基础课 Basic Specialty Courses	射频识别技术 **/# Radio Frequency Identification Technology**/#	2.5	44	12		
		传感器与检测技术** Sensor and Detection Technology**	2.0	36	12		
		自动控制原理* Automatic Control Principle*	2.0	32			
		数据挖掘与应用 Data Mining and Application	2.0	32			
物联网系统集成技术** Integrated Technology of IoT**		2.0	36	12			
新技术专题 New Technical Project		1.0	16				
小计 (至少选7.0学分) Subtotal (A minimum of 7.0 credits required)		7.0	112				
专业课 Specialty Courses		Python 基础 Fundamentals of Python Programming	2.0	36			12
Java 程序设计 Java Program Design	2.0	36			12		
多媒体技术 Multimedia Technology	2.0	36			12		

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
	物联网软件开发技术 Software Development Technology of IoT	2.0	32			
	机器视觉 Machine Vision	2.0	32			
	智能信息处理技术** Intelligent Information Processing Technology**	3.0	48			
	智能机器人 Intelligent Robot	2.0	36	12		
	智能电网与能源互联网技术 Smart Grid and Energy Internet Technology	3.0	48			
	北斗卫星导航技术 Beidou Satellite Navigation Technology	2.0	32			
	信息安全技术**/# Information Security Technology**/#	3.0	48			
	物联网系统工程 System Engineering of IoT	3.0	48			
	小计（至少选10.0学分） Subtotal (A minimum of 10.0 credits required)	10.0	160			
	实验实习实训 (Experimental and Practical Courses)	物联网软件开发技术实验 Experiments of Software Development Technology of IoT	1.0	24		
信息安全技术实验 Experiments of Information Security Technology		1.0	24	24		
智能信息处理技术实验 Experiments of Intelligent Information Processing Technology		1.0	24			24
北斗卫星导航技术实验 Experiments of Beidou Satellite Navigation Technology		1.0	24	24		
小计（至少选 2.0 学分） Subtotal (A minimum of 2.0 credits required)		2.0	48	48		48
设计（论文） Design (Thesis)	物联网工程综合设计(1) Comprehensive Design of Internet of Things Engineering (1)	3.0	3周/分散			
	物联网工程综合设计(2) Comprehensive Design of Internet of Things Engineering (2)	3.0	3周/分散			
	小计（至少选 6.0 学分） Subtotal (A minimum of 6.0 credits required)	6.0	96			

* 标注该符号为大类平台课程 (Symbol Marked as the General Platform Course)

** 标注该符号为专业核心课程 (Symbol Marked as the Professional Core Course)

BL 标注该符号为双语课程 (Symbol Marked as the Bilingual Course)

标注该符号为开放课程 (Symbol Marked as the Open Course)

附录

1、毕业要求对培养目标的支撑关系

Support of graduation requirements for training objectives

专业毕业要求对培养目标的支撑关系，可用矩阵图或其他适当形式说明。专业的毕业要求完全覆盖了《工程教育认证标准》通用标准的毕业要求，具体见表2；专业的毕业要求支撑了培养目标的实现，具体见表3。

The supporting relationship between the graduation requirements of this major and the training objectives can be explained in matrix or other appropriate forms. The graduation requirements of the major completely cover the graduation requirements of the General Standard of Engineering Education Certification Standard. See table 2 for details; The graduation requirements of the major support the realization of the training objectives. See table 3 for details.

表2 物联网工程专业毕业要求与论证标准的毕业要求

Table 2 Comparison between Graduation Requirements and Certification Standards

通用标准毕业要求项 General Standard Graduation Requirements	1	2	3	4	5	6	7	8	9	10	11	12
本专业目标相应支撑项 Corresponding Supporting Items of Professional Objectives	1	2	3	4	5	6	7	8	9	10	11	12

表3 物联网工程专业毕业要求支撑专业培养目标

Table3 Support Index between Graduation Requirements and Professional 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
1. 工程知识 Engineering Knowledge	√	√		√
2. 问题分析 Problem Analysis			√	
3. 设计/开发解决方案 Design / Develop Solutions	√	√		
4. 研究 Research				√
5. 使用现代工具 Use of Modern Tools			√	
6. 工程与社会 Engineering and Society	√	√		√
7. 环境和可持续发展 Environment and Sustainable Development	√	√		√
8. 职业规范 Professional Norms	√	√	√	√
9. 个人和团队 Individuals and Teams	√		√	√
10. 沟通 Communication Skills	√		√	√
11. 项目管理 Project Management	√	√	√	√
12. 终身学习			√	√

Lifelong Learning				
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2、专业课程对毕业要求的支撑

Support of professional curriculum for graduation requirements

本专业课程体系对毕业要求的支撑关系，可用矩阵图或其他合适形式说明。物联网工程专业课程体系对毕业要求的支撑关系，参见表 4。

The supporting relationship between the professional curriculum system and the graduation requirements can be explained by matrix diagram or other appropriate forms. See Table 4 for details.

表 4 物联网工程专业课程体系对毕业要求的支撑

Table 4 The support of professional curriculum system for graduation requirements

课程体系 Professional Curriculum System	课程名称 Course Name	1. 工程知识 Engineering Knowledge	2. 问题分析 Problem Analysis	3. 设计/开发解决方案 Design / Development Solutions	4. 研究 Research	5. 使用现代工具 Use of Modern Tools	6. 工程与社会 Engineering and Society	7. 环境和可持续发展 Environment and Sustainable Development	8. 职业规范 Professional Norms	9. 个人和团队 Individuals and Teams	10. 沟通 Communication Skills	11. 项目管理 Project Management	12. 终身学习 Lifelong Learning
数学与自然科学类课程 Mathematics and natural science courses	高等数学 A Advanced Mathematics A	√											
	大学物理 B University Physics B	√											
	线性代数 Linear Algebra	√											
	离散数学 Discrete Mathematics	√	√										
	概率论与数理统计 B Probability Theory and Mathematical Statistics B	√											
专业基础必修课 Professional basic compulsory courses	专业导论 Professional Introduction					√							
	数据结构与算法设计 Data Structure and Algorithm Design	√			√								
	程序设计 Program Design	√											
	电路与电子学 Circuits and Electronics	√	√										
	操作系统 Operating System		√			√							
	信号与系统 Signal and System	√											
	数字电子技术 Digital Electronic Technology	√	√										
计算机网络 Computer Network	√					√							

课程体系 Professional Curriculum System	课程名称 Course Name	1. 工程知识 Engineering Knowledge	2. 问题分析 Problem Analysis	3. 设计/开发解决方案 Design / Develop Solutions	4. 研究 Research	5. 使用现代工具 Use of Modern Tools	6. 工程与社会 Engineering and Society	7. 环境和可持续发展 Environment and Sustainable Development	8. 职业规范 Professional Norms	9. 个人和团队 Individuals and Teams	10. 沟通 Communication Skills	11. 项目管理 Project Management	12. 终身学习 Life-long Learning
	数据库原理及应用 Database Principle and Application		√			√							
	微机原理及单片机应用 Microcomputer Principle and Single-Chip Application					√							
	通信概论 Introduction of Communication	√						√					
专业基础课 选修课 Elective courses of professional basic courses	射频识别技术 Radio Frequency Identification Technology		√										
	传感器与检测技术 Sensor and Detection Technology		√										
	自动控制原理 Automatic Control Principle							√					
	物联网系统集成技术 Integrated Technology of IoT					√	√						
专业必修课 Professional compulsory courses	嵌入式系统 Embedded System		√										
	人工智能 Artificial Intelligence	√											
	无线传感器网络 Wireless Sensor Network		√										
专业选修课 Professional elective courses	Python 基础 Fundamentals of Python Programming	√											
	物联网软件开发技术 Software Development Technology of IoT					√							
	智能信息处理技术 Intelligent Information Processing Technology	√											

课程体系 Professional Curriculum System	课程名称 Course Name	1. 工程知识 Engineering Knowledge	2. 问题分析 Problem Analysis	3. 设计/开发解决方案 Design / Develop Solutions	4. 研究 Research	5. 使用现代工具 Use of Modern Tools	6. 工程与社会 Engineering and Society	7. 环境和可持续发展 Environment and Sustainable Development	8. 职业规范 Professional Norms	9. 个人和团队 Individuals and Teams	10. 沟通 Communication Skills	11. 项目管理 Project Management	12. 终身学习 Life-long Learning
	信息安全技术 Information Security Technology						√						
	物联网系统工程 System Engineering of IoT						√	√				√	
人文社会科学类通识教育课程 General education courses of Humanities and Social Sciences	思想道德与法治 Cultivation of Ethic Thought & Fundamentals of Law						√	√	√				
	马克思主义基本原理 Basic Principles of Marxism								√				
	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics									√			√
	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era							√					
	形势与政策 Situation and Policy							√	√				
	大学英语 College English										√		
	军训 Military Training									√			
	工程管理 Engineering Management			√			√					√	
	自然科学与工程技术类公选课 Public Elective Courses of Natural Science and Engineering							√					

课程体系 Professional Curriculum System	课程名称 Course Name	1. 工程知识 Engineering Knowledge	2. 问题分析 Problem Analysis	3. 设计/开发解决方案 Design / Develop Solutions	4. 研究 Research	5. 使用现代工具 Use of Modern Tools	6. 工程与社会 Engineering and Society	7. 环境和可持续发展 Environment and Sustainable Development	8. 职业规范 Professional Norms	9. 个人和团队 Individuals and Teams	10. 沟通 Communication Skills	11. 项目管理 Project Management	12. 终身学习 Life-long Learning
	Technology												
	工程伦理 Engineering Ethics			√			√		√				
	人文社科类公选课 Public Elective Courses in Humanities and Social Sciences								√				
基础实验实训 Basic experimental training	工程训练 C Engineering Training C				√					√			
	程序设计实验 Experiments of Program Design					√							
	数据结构与算法设计实验 Experiment of Data Structure and Algorithm Design				√								
	数字电子技术实验 Experiments of Digital Electronic Technology				√								
	嵌入式系统实验 Experiment of Embedded System				√								
	数据库原理及应用实验 Experiments of Database Principle and Application				√								
	微机原理及单片机应用实验 Experiments of Microcomputer Principle and Single-Chip Application				√								
	无线传感器网络实验 Experiment of Wireless Sensor Network				√								
	信息安全技术实验 Experiments of Information Security Technology					√							

课程体系 Professional Curriculum System	课程名称 Course Name	1. 工程知识 Engineering Knowledge	2. 问题分析 Problem Analysis	3. 设计/开发解决方案 Design / Develop Solutions	4. 研究 Research	5. 使用现代工具 Use of Modern Tools	6. 工程与社会 Engineering and Society	7. 环境和可持续发展 Environment and Sustainable Development	8. 职业规范 Professional Norms	9. 个人和团队 Individuals and Teams	10. 沟通 Communication Skills	11. 项目管理 Project Management	12. 终身学习 Life-long Learning
	专业英语应用能力训练 Professional English Application Ability Training		√								√		
	科技创新活动 Innovative Activities in Science and Technology			√									
	物联网软件开发技术实验 Experiments of Software Development Technology of IoT				√						√		
	智能信息处理技术实验 Experiments of Intelligent Information Processing Technology				√								
专业知识综合应用实践环节 Comprehensive application practice of professional knowledge	程序设计课程设计 Curriculum Design of Program Design			√									
	计算机网络课程设计 Curriculum Design of Computer Network						√						
	数据库原理及应用课程设计 Curriculum Design of Database Principle and Application			√									
	嵌入式系统课程设计 Curriculum Design of Embedded System										√		
	无线传感器网络课程设计 Curriculum Design of Wireless Sensor Network			√									
	物联网工程综合设计(1) Comprehensive Design of Internet of		√	√							√		

课程体系 Professional Curriculum System	课程名称 Course Name	1. 工程知识 Engineering Knowledge	2. 问题分析 Problem Analysis	3. 设计/开发解决方案 Design / Develop Solutions	4. 研究 Research	5. 使用现代工具 Use of Modern Tools	6. 工程与社会 Engineering and Society	7. 环境和可持续发展 Environment and Sustainable Development	8. 职业规范 Professional Norms	9. 个人和团队 Individuals and Teams	10. 沟通 Communication Skills	11. 项目管理 Project Management	12. 终身学习 Life-long Learning
	Things Engineering(1)												
	物联网工程综合设计(2) Comprehensive Design of Internet of Things Engineering(2)		√	√								√	
	生产实习 Production Practice						√	√	√		√		
	毕业设计（论文） Graduation Design (Thesis)	√				√		√			√	√	

3、毕业要求达成度评价

Evaluation of achievement degree of graduation requirements

本专业毕业要求达成度评价的机制，包括评价方法、数据来源、评价机构、评价周期、结果反馈等，并任选 1-2 项毕业要求项举例说明评价实施情况。

The evaluation mechanism of the degree of achievement of graduation requirements include evaluation method, data source, evaluation organization, evaluation cycle, result feedback, etc., One or two graduation requirements are optionally selected to illustrate the implementation of the evaluation.

本专业根据矩阵表 5、6 课程体系对毕业要求的支撑，综合考虑理论课程、实验实训、毕业设计等实践课程对各项毕业要求及其指标点达成的关联程度，同时将每项毕业要求（或指标点）归一化，制定以下权重系数设定规则：

- 1) 理论课程的权重系数：学分数*1；
- 2) 实验课程的权重系数：学分数*1.5；
- 3) 课程设计及实训课的权重系数：学分*1.5；其中采用 PBL 模式的权重系数：学分*2；
- 4) 毕业设计的权重系数：学分*2。根据以上规则，我们制定了各门课程支撑各项毕业要求实现的权重系数表，具体参见矩阵表 5。

According to matrix table 4 and the relevance of the theoretical courses, experimental training, graduation design and other practical courses to the graduation requirements, each graduation requirement (or index point) is normalized and the following weight coefficient setting rules are formulated.

- 1) For weight coefficient of theoretical courses: credits* 1;
- 2) For weight coefficient of experimental course: credits * 1.5;
- 3) For weight coefficient of course design and practical training courses: credits * 1.5; Especially, the weight coefficient of courses based on PBL teaching mode: credits * 2;
- 4) For weight coefficient of graduation design: credits * 2.

According to the above rules, we have formulated the weight coefficient table of each course to support the realization of various graduation requirements. See matrix table 5 for details.

表 5 课程支撑毕业要求实现的权重系数表

Table 5 Weight Coefficient of Course Meeting with Graduation Requirements

指标点 Index point	指标点 权重 Weight of Index Point	主要教学环节 Main Course	教学环节权 重 Weight of Main Course	备注 Re- marks	
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物联网复杂工程问题。 Engineering knowledge: Being able to use mathematics, natural science, engineering fundamental and professional knowledge to solve complex engineering problems for the Internet of Things.	0.28	高等数学 A Advanced Mathematics A	0.20		
		离散数学 Discrete Mathematics	0.20		
		线性代数 Linear Algebra	0.20		
		大学物理 B University Physics B	0.20		
		概率论与数理统计 B Probability and Mathematical Statistics B	0.20		
	1.2 能应用数学、自然科学和工程基础的知识,并将其应用于物联网工程问题分析。 Be able to apply knowledge of mathematics, natural sciences and engineering fundamentals to analyze IoT engineering problem.	0.28	数字电子技术 Digital Electronic Technology	0.27	
			信号与系统 Signal and System	0.23	
			通信概论 Introduction of Communication	0.23	
			电路与电子学 Circuits and Electronics	0.27	
	1.3 能够理解和掌握计算机学科的基础和专业知识。 Be able to understand and master the basic and professional knowledge of computer science.	0.22	程序设计 Program Design	0.27	
			Python 基础 Fundamentals of Python Programming	0.23	
			计算机网络 Computer Network	0.23	
			数据结构与算法设计 Data Structure and Algorithm Design	0.27	
1.4 具备计算机学科基础和专业知识,能够将其应用于物联网领域工程问题解决方案的比较与综合。 Master the basic and professional knowledge of computer science, and be able to apply it to the comparison and generation of engineering problem solutions in the field of Internet of Things.	0.22	人工智能 Artificial Intelligence	0.20		
		智能信息处理技术 Intelligent Information Processing Technology	0.20		
		毕业设计(论文) Graduation Design (Thesis)	0.60		
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物联网复杂工程问题,以获得有效结	0.4	离散数学 Discrete Mathematics	0.28		
		数据库原理及应用	0.22		

<p>论。 Analysis of issues: Applying basic principle of mathematics, natural science and engineering science to identify, express and analyze the complex engineering problems for Internet of Things through literature research, so as to form effective conclusions.</p>	<p>环节和制约因素，借助图形、公式及文字等正确地表达物联网领域复杂工程问题。 Be able to use the basic knowledge and principles of mathematics, natural science and computer science to identify and assess the critical steps and restrictive factors of engineering problems for the Internet of Things, and correctly express the complex engineering problems in the field of Internet of Things with graphics, formulas and words.</p>		Database Principle and Application			
			电路与电子学 Circuits and Electronics	0.28		
	<p>2.2 具有文献检索、资料查询、文献综述能力和分析能力，能够获得物联网工程中复杂问题的相关信息，并能予以提炼、分析和评价。 Possess the ability of literature retrieval, data query, literature review and analysis, and be able to obtain relevant information about complex problems in Internet of Things engineering, and to refine, analyze and evaluate them.</p>	0.3		数字电子技术 Digital Electronic Technology	0.22	
				无线传感器网络 Wireless Sensor Network	0.30	
				传感器与检测技术 Sensor and Detection Technology	0.20	
				射频识别技术 Radio Frequency Identification Technology	0.20	
	<p>2.3 能够借助文献研究，分析物联网领域工程问题的影响因素，确定具体适合的解决方案，形成有效结论。 Be able to use literature research to analyze the influencing factors of complex engineering problems of Internet of Things, to propose specific and suitable solutions, forming effective conclusions.</p>	0.3		嵌入式系统 Embedded System	0.30	
				专业英语应用能力训练 Professional English Application Ability Training	0.20	
				操作系统 Operating System	0.20	
				物联网工程综合设计(1) Comprehensive Design of Internet of Things Engineering (1)	0.30	
<p>3、设计/开发解决方案：能够设计针对物联网复杂工程问题的解决方案，设计满足特定需求的系统、元器件或工艺流程，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</p>	<p>3.1 能够对复杂物联网工程问题进行分析 and 提炼，根据用户需求或者任务需求，设计/开发解决方案并对其可行性进行初步分析与论证，选择合理方案予以实施，针</p>	0.6		物联网工程综合设计(2) Comprehensive Design of Internet of Things Engineering (2)	0.30	
				程序设计课程设计 Curriculum Design of Program Design	0.25	
			无线传感器网络课程设计 Curriculum Design of Wireless Sensor Network	0.25		

<p>等因素。 Design/develop solutions: Designing solutions for the complex engineering problems of Internet of things that not only meet the specific needs of the system, unit (components) or models, but reflect the sense of innovation and consider the factors about social, health, safety, laws, cultural and environment in the design process.</p>	<p>对所设计/开发的方案，开发满足特定需求的复杂系统、单元、部件和工艺流程。 Was able to analyze and refine complex Internet of things engineering problems, design/develop solutions and conduct preliminary analysis on their feasibility according to user requirements or task requirements, choose the reasonable solution to implement, for the designed/developed plan, develop the complex systems, units, components and processes for specific needs.</p>		<p>数据库原理及应用课程设计 Curriculum Design of Database Principle and Application</p>	<p>0.25</p>	
<p>4、研究：能够基于科学原理并采用科学方法对物联网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。 Research: Using scientific methods to analyze the complex engineering problem of Internet of Things based on scientific theories. The methods include design of experiment, data analysis and interpretation, and acquisition of rational conclusions through comprehensive information processing.</p>	<p>3.2 能够对复杂物联网工程问题的设计开发方案进行综合和评价，并能够在设计环节中体现创新意识，尝试进行改进和优化，设计开发过程中能够综合考虑经济、环境、法律、安全、健康、伦理等制约因素，并得出可接受的指标。 Be able to colligate and evaluate the proposed scheme of complex Internet of Things engineering problems, reflect the innovation consciousness in the design process, try to improve and optimize the scheme, and comprehensively consider economic, environmental, legal, safety, health, ethics and other constraints in the design and development process, and achieve acceptable indicators.</p>	<p>0.4</p>	<p>工程伦理 Engineering Ethics</p> <p>科技创新活动 Innovative Activities in Science and Technology</p> <p>工程管理 Engineering Management</p> <p>物联网工程综合设计(1) Comprehensive Design of Internet of Things Engineering (1)</p> <p>物联网工程综合设计(2) Comprehensive Design of Internet of Things Engineering (2)</p>	<p>0.20</p> <p>0.20</p> <p>0.20</p> <p>0.20</p> <p>0.20</p>	

	力, 正确操作实验装置, 安全开展实验。 Be able to build experimental systems and design experimental operating procedures for complex Internet of Things engineering problems; Be capable to operate the experimental equipment, correctly operate the experimental equipment and safely carry out experiments.		System		
			数据库原理及应用实验 Experiments of Database Principle and Application	0.35	
	4.3 能够正确开展实验, 采集、整理实验数据, 并对实验结果进行分析和解释, 并通过信息综合判断得到合理有效的结论。 Can correctly collect and sort out experimental data, analyze and explain experimental results, and get reasonable and effective conclusions through comprehensive judgment of information.	0.3	数据结构与算法设计实验 Experiment of Data Structure and Algorithm Design	0.32	
			数字电子技术实验 Experiments of Digital Electronic Technology	0.38	
			智能信息处理技术实验 Experiments of Intelligent Information Processing Technology	0.30	
	5.1 针对物联网领域复杂工程问题, 能够选择和使用合适的信息检索工具开展文献检索和资料查询。 Be able to select and use appropriate information retrieval tools to carry out literature retrieval and data query For complex engineering problems in the field of Internet of Things.	0.2	程序设计 Program Design	0.25	
			Java 程序设计 Java Program Design	0.20	
			计算机网络 Computer Network	0.30	
			数据库原理及应用 Database Principle and Application	0.25	
5、使用现代工具: 具有利用现代信息技术获取相关信息的初步能力, 具有综合运用所学理论和技术手段, 分析并解决物联网工程实际问题的基本能力。 Applying modern tools: Possess the preliminary ability to use modern information technology to retrieve relevant information, being able to analyze and solve the practical engineering problems in Internet of Things by comprehensively applying the learned theory and technology.	5.2 理解计算机领域相关常用现代工具特点, 能够选择恰当的平台、技术、资源、现代工程工具和信息技术工具用于物联网领域工程问题的分析与设计。 Understand the characteristics of commonly used modern tools in the computer field, and be able to choose appropriate platforms, technologies, resources, modern engineering tools and information technology tools for the analysis and solution design of engineering problems in the field of Internet of Things.	0.5	物联网软件开发技术 Software Development Technology of IoT	0.20	
			微机原理及单片机应用 Microcomputer Principle and Single-Chip Application	0.30	
			物联网系统集成技术 Integrated Technology of IoT	0.30	
			操作系统 Operating System	0.20	
	5.3 针对复杂技术问题, 能够选择、使用、开发恰当的工具, 对复杂工程问题的预测与模拟, 并能够理解其局限性。	0.3	程序设计实验 Experiments of Program Design	0.30	
			信息安全技术实验 Experiments of Information Security Technology	0.25	

	Can select, use, and develop appropriate tools to predict and simulate complex engineering problems, and understand their limitations.		毕业设计（论文） Graduation Design (Thesis)	0.45	
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物联网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。 Engineering and society: Through correlative engineering background knowledge, rationally analyzing and evaluating the solutions on professional engineering practice and complex engineering of Internet of Things, and not only its influence to society, health, safety, legal and cultural, but also its responsibilities.	6.1 了解物联网技术的历史和文化背景、技术标准、知识产权、产业政策和法律法规等知识。通过实习和社会实践，了解物联网工程实践与客观世界的相互关系和相互影响。 Understand the historical and cultural background, technical standards, intellectual property rights, industrial policies and laws and regulations of Internet of Things technology. Through internship and social practice, understand the relationship and mutual influence between Internet of Things engineering practice and the objective world.	0.5	物联网系统集成技术 Integrated Technology of IoT	0.20	
			思想道德与法治 Cultivation of Ethic Thought & Fundamentals of Law	0.20	
			习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	0.20	
			专业导论 Professional Introduction	0.20	
			生产实习 Production Practice	0.20	
6.2 能够正确评价物联网工程领域及相关新产品、新技术、新工艺、新材料等具体工程实践活动对社会、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 correctly evaluate the social, health, safety, legal and cultural impacts of new products, technologies, processes, materials and other specific engineering practices in the field of Internet of Things engineering, and understand their responsibilities.		0.5	工程伦理 Engineering Ethics	0.20	
			工程管理 Engineering Management	0.20	
			物联网系统工程 System Engineering of IoT	0.20	
			信息安全技术 Information Security Technology	0.20	
			计算机网络课程设计 Curriculum Design of Computer Network	0.20	
7、环境和可持续发展：能够理解和评价针对物联网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 sustainable development: According to the complex engineering problem of Internet of Things, being able to understand and evaluate the impacts of professional engineering practices on the sustainability of environment and society.	7.1 理解环境保护和社会可持续发展的内涵与意义，了解物联网技术可能对环境和可持续发展的影响情况。 Understand the connotation and significance of environmental protection and social sustainable development, understand the possible impact of Internet of Things technology on the environment and sustainable development.	0.4	思想道德与法治 Cultivation of Ethic Thought & Fundamentals of Law	0.22	
			形势与政策 Situation and Policy	0.38	
			生产实习 Production Practice	0.40	
	7.2 能够正确评价物联网复杂工程问题解决方案对环境和可持续发展的影响，提	0.6	物联网系统工程 System Engineering of IoT	0.30	

	出相应应对措施。 Can correctly evaluate the impact of solutions for complex engineering problems of the Internet of Things on the environment and sustainable development, and propose corresponding countermeasures.		通信概论 Introduction of Communication	0.20		
			自动控制原理 Automatic Control Principle	0.20		
			毕业设计（论文） Graduation Design (Thesis)	0.30		
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。 Professional norms: Equipping with humanistic community scientific literacy and social responsibility, understanding and complying with the engineering professional morals and norms in engineering practices.	8.1 掌握马克思主义的基本理论、基本方法和人文社会科学知识,树立正确的世界观、人生观和价值观。 Master the basic Marxism theory, basic methods and knowledge of humanities and social sciences, and establish positive world outlook, outlook on life and values.	0.7	思想道德与法治 Cultivation of Ethic Thought & Fundamentals of Law	0.20		
			国家安全教育 National Security Education	0.20		
			毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics	0.20		
			中国近现代史纲要 Conspectus of Chinese Modern History	0.20		
			马克思主义基本原理 Basic Principles of Marxism	0.20		
	8.2 具有人文社会科学素养，了解国情，具有社会责任感，理解社会人及专业工程师的责任，能够在具体工程实践中理解并遵守工程职业道德和规范，履行责任。 Equipped with humanistic community scientific literacy and social responsibility, understand the national conditions and the responsibilities of social people and professional engineers. Be able to understand and comply with engineering professional morals and norms in specific engineering practice and fulfill responsibilities.	0.3		形势与政策 Situation and Policy	0.20	
				工程伦理 Engineering Ethics	0.20	
				军事理论 Military Theory	0.20	
				军训 Military Training	0.20	
				生产实习 Production Practice	0.20	
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。 Individuals and teams: Playing the role of individual, team members and the person in charge in the team with multi-subject background.	9.1 理解多学科、大团队背景下的现代工程实践中个体的作用，理解个人与团队关系，具有合作意识，具备合作精神。 Understand the role of individuals in modern engineering practice under the background of multi-disciplines and large teams, understand the relationship between individuals and teams, and have cooperative consciousness and spirit.	0.6	大学生职业规划与创业教育 Career Planning and Entrepreneurship Education for College Students	0.35		
			大学生就业创业指导 Employment and Entrepreneurship Guidance for College Students	0.35		
			大学生心理健康教育 Mental Health Education for College Students	0.30		
	9.2 具备合作能力，能够胜任成员、或负责人的角色与	0.4		工程训练 C Engineering Training C	0.20	

	责任, 共同达成工作目标。 Ability to work cooperatively and be able to perform the roles and responsibilities of a team member or leader.		物联网工程综合设计(1) Comprehensive Design of Internet of Things Engineering (1)	0.40	
			物联网工程综合设计(2) Comprehensive Design of Internet of Things Engineering (2)	0.40	
10、沟通: 能够就物联网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。 Communication: Effectively communicating with the industry and the public about the complex engineering problem of Internet of Things, which include reports writing and presentation, drafts designing and expressing or instructions responding, and having a certain international vision and the capability of communication and exchange in cross-cultural environments.	10.1 具有良好的表达能力与人际交往技能, 能应用物联网工程专业术语就计算机领域复杂工程问题通过设计文稿、模型演示、撰写报告、陈述发言、答辩等方式严谨、准确、有效地表达专业见解, 实现有效交流与沟通。 Possess excellent communication skills and interpersonal skills, and can use engineering terminology of Internet of Things to rigorously, accurately and effectively express professional opinions on complex engineering issues in the computer field through drafts designing, model demonstrations, reports writing, presentation and oral defense, to achieve effective communication and exchange.	0.6	嵌入式系统课程设计 Curriculum Design of Embedded System	0.45	
			物联网软件开发技术实验 Experiments of Software Development Technology of IoT	0.35	
			毕业设计(论文) Graduation Design (Thesis)	0.20	
	10.2 具备一定的国际视野, 了解计算机行业先进技术, 具备良好的英语读写能力以及具备一定的英语听说能力, 能够在跨文化背景下就物联网工程问题进行基本沟通和交流。 Have a certain international vision, good English reading and writing skills, and basic English listening and speaking skills, understand the advanced technologies in the computer industry, be able to communicate and exchange opinions in cross-cultural environments on engineering problems of Internet of Things.	0.4	专业英语应用能力训练 Professional English Application Ability Training	0.25	
			大学英语 College English	0.30	
			生产实习 Production Practice	0.45	
11、项目管理: 理解并掌握工程管理原理与经济决策方法, 能在多学科环境中应用。 Project management: Understanding and mastering the theory of engineering management, and economic decision method, being able to apply them in multi-subject	11.1 理解和掌握工程活动涉及的工程管理原理与经济决策方法基本知识。 Understand and master basics of engineering management principles and economic decision-making methods.	0.5	物联网系统工程 System Engineering of IoT	0.30	
			工程管理 Engineering Management	0.25	
			毕业设计(论文) Graduation Design (Thesis)	0.45	

environment.	<p>11.2 能将工程管理原理和经济决策方法综合应用于与多学科知识相关的物联网领域科学实践。</p> <p>Ability to comprehensively apply engineering management principles and economic decision-making methods in scientific practice of Internet of Things in a multidisciplinary environment.</p>	0.5	物联网工程综合设计(1) Comprehensive Design of Internet of Things Engineering (1)	0.40	
			物联网工程综合设计(2) Comprehensive Design of Internet of Things Engineering (2)	0.60	
<p>12、终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。</p> <p>Lifelong learning: Having the awareness of autonomous learning and lifelong learning and the capability of continual learning and adapting to the development.</p>	<p>12.1 能够认识不断探索和学习的必要性，具有自主学习和终身学习的意识。</p> <p>Recognizing the necessity for continuous exploration and learning, having the awareness of autonomous learning and lifelong learning.</p>	0.4	大学生职业规划与创业教育 Career Planning and Entrepreneurship Education for College Students	0.35	
			毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics	0.65	
	<p>12.2 具有自主学习能力，包括对问题的理解能力、归纳总结能力和提出问题能力，能够针对物联网领域的复杂问题不断学习，适应物联网技术不断发展的趋势。</p> <p>Capable of autonomous learning, including the ability to understand the problem, the ability to summarize and raise questions, be able to continuously learn about complex issues in the field of Internet of Things, to adapt to the continuous technology development of Internet of Things.</p>	0.6	大学生就业创业指导 Employment and Entrepreneurship Guidance for College Students	0.50	
			大学生心理健康教育 Mental Health Education for College Students	0.50	