智能制造工程
Intelligent Manufacturing Engineering

专业代码：080213T　　　学　制：　4 年

Program Code: 080213T　　　Duration：　4 years

培养目标（Educational Objectives）：

　　智能制造工程专业面向国家"创新驱动发展战略"与"新一代人工智能发展规划"的重大需求，培养具有华工特色的"三力"（学习力、思想力、行动力）卓越的"三创型"（创新、创造、创业）新工科人才。学生将全面发展德智体美，系统学习数学、物理、信息处理等基础知识，以及机械、电子、自动化控制、计算机等多学科交叉知识，掌握智能工程基础理论与技术能力，具备科学素养、创新能力与国际视野，兼具社会责任感和国际胜任力，能在未来引领我国智能制造产业发展，并具有成为国际一流科学家、工程师或企业家的潜力。

　　本专业学生毕业 5 年左右预期达到的具体目标：

1. 拥有社会主义核心价值观，有健全的人格、高尚的人文情怀、良好职业道德和高度社会责任感的德智体美劳全面发展的新工科人才，在工程实践中注重人文关怀和伦理意识，积极促进智能制造的可持续发展；

2. 掌握扎实的智能制造基础理论和核心技术，熟悉智能制造系统的设计、控制和优化方法，具备深入理解和应用人工智能、物联网、云计算等相关技术的能力；

3. 具备发现问题、分析问题、解决问题的批判思维能力，能够提出创新的解决方案并进行实施，训练跨领域、跨文化、跨国界的书面表达及沟通能力；

4. 具备良好的沟通和协作能力，能够与团队成员高效合作，积极参与跨学科、跨领域的团队项目。能够实现智能制造系统的综合设计与开发，推动生产过程的智能化和优化；

5. 具备职业规划和自我发展能力，持续关注智能制造工程领域的最新发展，追求专业技术能力认证，不断提升知识和技能水平，在智能制造领域取得长足的职业发展。

　　Intelligent Manufacturing Engineering program is designed to meet the significant demands of the national "Innovation-Driven Development Strategy" and the "Development Plan for the New Generation of Artificial Intelligence." The program aims to cultivate outstanding "Three Abilities" (learning, thinking, action) and "Three Creativities" (innovation, creation, entrepreneurship) new engineering talents with SCUT's distinctive characteristics. Students will receive comprehensive development in terms of ethics, intellect, physique, and aesthetics. They will acquire a solid

foundation in mathematics, physics, and information processing, as well as gain interdisciplinary knowledge in fields such as mechanical, electronic, automation control, and computer. Additionally, they will master the fundamental theories and application technologies of intelligent engineering. The program focuses on fostering remarkable scientific literacy, innovation capacity, and international perspective in students. Graduates will possess a strong sense of social responsibility and international competence. With these qualities, they are poised to assume leadership roles in China's intelligent manufacturing development. Moreover, the graduates can have the potential to become outstanding top-tier talents internationally, including scientists, engineers, and entrepreneurs.

The specific goals expected to be achieved by students within approximately five years after graduation from this program are as follows:

1. Possessing positive socialist core values, with a sound character, noble humanistic sentiments, good professional ethics, and a strong sense of social responsibility, achieving comprehensive development in moral character, intelligence, physical fitness, aesthetics, and labor. Emphasizing humanistic care and ethical awareness in engineering practice, actively promoting the sustainable development of intelligent manufacturing.

2. Mastering solid foundational theories and core technologies in intelligent manufacturing, familiarizing themselves with the design, control, and optimization methods of intelligent manufacturing systems, and having a deep understanding and application abilities in related technologies such as artificial intelligence, Internet of Things, and cloud computing.

3. Having critical thinking skills to identify, analyze, and solve problems, proposing innovative solutions, and training in written expression and communication across disciplines, cultures, and borders.

4. Possessing excellent communication and collaboration skills, effectively communicate and collaborate with team members, actively participate in interdisciplinary and cross-domain team projects, accomplishing the integrated design and development of intelligent manufacturing systems, and promoting the intelligence and optimization of production processes.

5. Demonstrating career planning and self-development capabilities, maintaining awareness of the latest developments in the field of Intelligent Manufacturing Engineering, actively participating in industry training and academic seminars, pursuing academic or engineering technical certifications, continuously expanding their knowledge and skill levels, and continuously achieving major career developments in the broad field of intelligent manufacturing engineering.

毕业要求（Student Outcomes）：

№1. 工程知识：能够将数学、自然科学、计算、工程基础和专业知识用于解决复杂工程问题。

№1.1   掌握数学、自然科学、工程基础和智能制造工程专业知识，并能够运用这些知识对智能制造工程问题进行描述和建模，并找到解决问题的方法和途径；

№1.2   能够应用智能制造工程基础和专业知识来解释模型的数理含义，对模型进行正确的推理，对专业工程问题进行专业分析；

№1.3   能够将相关知识和数学模型方法用于智能制造工程专业工程问题解决方案的比较与综合。

№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复杂工程问题，综合考虑可持续发展的要求，以获得有效结论。

№2.1   能够应用数学、自然科学和工程科学的第一原理，识别和判断智能制造工程专业的复杂工程问题的关键环节，将智能制造工程的复杂工程问题构建为数学/物理模型；

№2.2   能够熟练运用数学、自然科学和工程科学的原理和模型，结合文献研究分析智能制造工程专业复杂工程问题的特性；

№2.3   能深入认识解决复杂工程问题的多种方案可行性，并能通过查阅和分析文献寻求创新的解决方案，对可持续发展进行整体考虑。

№3. 设计/开发解决方案：能够针对复杂工程问题设计和开发解决方案，设计满足特定需求的系统、单元（部件）或工艺流程，体现创新性，并从健康、安全与环境、全生命周期成本与净零碳要求、法律与伦理、社会与文化等角度考虑可行性。

№3.1   能够设计满足智能制造工程复杂工程问题特定需求的系统、部件和流程；

№3.2   能够在设计环节中适当考虑公共健康和安全、整个生命周期的成本、净零碳以及资源、文化、 社会和环境因素。

№4. 研究：能够基于科学原理并采用科学方法对复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

№4.1   能够使用研究方法，研究和分析智能制造复杂工程问题的解决方案；

№4.2   能够针对智能制造工程相关的各种控制规律、环节和系统，设计和实施实验方案；

№4.3   能够基于科学原理和科学方法对实验结果进行分析与解释数据，并通过信息综合得到有效的结论。

№5. 使用现代工具：能够针对复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。

№5.1   能使用机械工程技术、自动化控制系统，计算机软、硬件技术等，并能理解其局限性，分析智能制造工程系统规律、典型环节和系统特性；

№5.2   能够选择与使用恰当的数据信息资源、现代工程、信息技术、编程算法等工具对智能制造相关复杂工程问题进行分析、计算，设计和开发计算机系统；

№5.3   能够开发或者选用满足特定需求的现代工具，仿真和模拟智能制造工程问题，并能够分析其局限性。

№6. 工程与可持续发展：在解决复杂工程问题时，能够基于工程相关背景知识，分析和评

价工程实践对健康、安全、环境、法律以及经济和社会可持续发展的影响，并理解应承担的责任。

№6.1　了解智能制造工程领域相关的技术标准、知识产权、产业政策和法律法规，了解企业的管理体系；理解工程师应承担的责任；

№6.2　能够基于工程背景知识进行合理分析，评估智能制造工程领域相关工程实践和复杂工程问题解决方案对社会、经济、可持续性、健康与安全、法律、环境的影响，并理解应承担的责任。

№7. 工程伦理和职业规范：有工程报国、为民造福的意识，具有人文社会科学素养和社会责任感，能够理解和践行工程伦理，在工程实践中遵守工程职业道德、规范和相关法律，履行责任。

№7.1　能够在智能制造工程的工程项目实践中用伦理原则来指导行为和决策；

№7.2　能够在智能制造工程项目实践中遵守相关的国家和国际法律，理解和尊重多元化并包容。

№8. 个人与团队：能够在多样化、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。

№8.1　在多元化和包容性的团队中，能够根据阶段及整体目标，主动与他人沟通、合作，实施团队的组建、协调、指挥能力，提高团队积极性和凝聚力；

№8.2　能够在多学科、远程和分布式的环境中，独立或合作开展工作，完成团队中分配的任务。

№9. 沟通：能够就复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令；能够在跨文化背景下进行沟通和交流，理解、尊重语言和文化差异。

№9.1　能够对智能制造复杂工程、新技术、新产品与工业界及社会进行有效和包容的沟通，通过与团队成员的讨论撰有效的报告，并能对报告内容进行有效介绍；

№9.2　能够跟进专业领域的国际发展趋势、研究热点，具备跨文化交流的语言和书面表达能力，能就专业问题进行基本沟通和交流。

№10. 项目管理：理解并掌握与工程项目相关的管理原理与经济决策方法，并能够在多学科环境中应用。

№10.1　掌握工程项目管理原理与经济决策的基本原理和方法；

№10.2　能够将管理原理、经济决策应用于智能制造系统的开发、系统设计和生产过程控制等；

№10.3　能够作为团队成员或领导，管理项目和多学科环境。

№11. 终身学习：具有自主学习、终身学习和批判性思维的意识和能力，能够理解广泛的技术变革对工程和社会的影响，适应新技术变革。

№11.1　能够理解技术进步和发展对于知识和能力的影响和要求，具有终身学习的意识；

№11.2　能够针对个人和职业发展需求，采用合适的方法，独立学习，能适应智能制造工程相关技术的不断发展；

№11.3　面对技术变革能够具备批判性思维，并对其进行深入思考和评估。

№1. Engineering Knowledge：be capable of applying mathematics, natural sciences, computing, engineering fundamentals and professional knowledge to solve complex engineering problems.

№1.1. Mastering the knowledge of mathematics, natural sciences, engineering fundamentals, and intelligent manufacturing engineering, and being able to use this knowledge to describe and model intelligent manufacturing engineering problems, as well as find methods and approaches to solve them.

№1.2.Being able to apply the fundamentals and professional knowledge of intelligent manufacturing engineering to explain the mathematical and logical meanings of models, reason correctly about models, and analyze professional engineering problems.

№1.3.Being able to compare and synthesize relevant knowledge and mathematical modeling methods for the solution of complex engineering problems in the field of intelligent manufacturing engineering.

№2. Problem Analysis：be able to apply the basic principles of mathematics, natural sciences and engineering sciences to identify, express and analyze complex engineering problems through literature research, and consider the requirements of sustainable development to obtain effective conclusions.

№2.1. Being able to apply the first principles of mathematics, natural sciences, and engineering sciences to identify and evaluate the key aspects of complex engineering problems in Intelligent Manufacturing Engineering, and to formulate these problems as mathematical or physical models.

№2.2. Being able to analyze principles and models from mathematics, natural sciences, and engineering sciences, and capable of analyzing the characteristics of complex engineering problems in Intelligent Manufacturing Engineering with reference to relevant literature.

№2.3. Able to deeply assess the feasibility of various solutions to complex engineering problems and, through literature review and analysis, explore innovative approaches while taking sustainable development into comprehensive consideration.

№3. Design/Development of Solutions: be capable of designing and developing solutions for complex engineering problems, designing systems, units (components) or processes that meet specific needs, demonstrating innovation, and considering feasibility from the perspectives of health, safety and environment, life cycle cost and net zero carbon requirements, law and ethics, society and culture.

№3.1.Being able to design systems, components, and processes that meet the specific requirements of complex engineering problems in the field of intelligent manufacturing engineering.

№3.2. Being able to consider public health and safety, the life-cycle cost, net-zero carbon, as well

as resource, cultural, social, and environmental factors appropriately during the design process.

№4. Research: be able to conduct research on complex engineering problems based on scientific principles and using scientific methods, including designing experiments, analyzing and interpreting data, and synthesizing information to reach reasonable and effective conclusions.

№4.1. Being able to use research methods to study and analyze solutions for complex engineering problems in intelligent manufacturing.

№4.2. Being able to design and implement experimental plans for various control laws, processes, and systems related to intelligent manufacturing engineering.

№4.3. Being able to analyze and interpret data from experiments based on scientific principles and scientific methods, and draw effective conclusions through information synthesis.

№5. Use of Modern Tools: be capable of developing, selecting and using appropriate technologies, resources, modern engineering tools and information technology tools for complex engineering problems, including prediction and simulation, and understanding their limitations.

№5.1. Being able to use mechanical engineering technology, automation control systems, computer software and hardware technologies, etc., and understand their limitations, analyze the laws, typical aspects, and system characteristics of intelligent manufacturing engineering.

№5.2. Being able to select and use appropriate tools such as data information resources, modern engineering and information technology, programming algorithms, etc., to analyze, calculate, design, and develop computer systems for complex engineering problems related to intelligent manufacturing.

№5.3. Being able to develop or select modern tools that meet specific requirements, simulate and model intelligent manufacturing engineering problems, and analyze their limitations.

№6. Engineering and Sustainable Development: be able to analyze and evaluate the impact of engineering practices on health, safety, environment, law and economic and social sustainable development when solving complex engineering problems, and understand the responsibilities to be assumed.

№6.1. Understanding technical standards, intellectual property rights, industrial policies, and laws and regulations related to the field of intelligent manufacturing engineering, as well as understanding the management systems of enterprises; understanding the responsibilities that engineers should undertake.

№6.2. Being able to analyze and evaluate the impact of engineering practices and solutions to complex engineering problems in the field of intelligent manufacturing on social, economic, sustainability, health and safety, legal, and environmental aspects based on engineering background knowledge, and understanding the responsibilities that should be undertaken.

№7. Engineering Ethics and Professional Norms: have the awareness of serving the country and the people through engineering, possess humanistic and social science literacy and social

responsibility, be able to understand and practice engineering ethics, and abide by engineering professional ethics, norms and relevant laws in engineering practice, fulfilling responsibilities.

№7.1. Being able to use ethical principles to guide behavior and decision-making in engineering project practices related to intelligent manufacturing.

№7.2. Being able to comply with relevant national and international laws in engineering project practices related to intelligent manufacturing, understanding and respecting diversity and inclusiveness.

№8. Individual and Team: be capable of taking on the roles of individual, team member and leader in diverse and multidisciplinary teams.

№8.1.Being able to communicate and collaborate proactively with others in diverse and inclusive teams, according to the stage and overall goals, to establish, coordinate, and command the team, and enhance team motivation and cohesion.

№8.2. Being able to work independently or collaboratively in multidisciplinary, remote, and distributed environments and complete tasks assigned within the team.

№9. Communication: be able to effectively communicate and exchange with industry peers and the public on complex engineering problems, including writing reports and design documents, making presentations, clearly expressing or responding to instructions; be able to communicate and exchange in a cross-cultural context, understanding and respecting language and cultural differences.

№9.1. Being able to communicate effectively and inclusively with the industry and society about complex engineering problems, new technologies, and new products related to intelligent manufacturing, writing effective reports through discussions with team members, and delivering effective presentations on report contents.

№9.2. Being able to follow international trends and research hotspots in the professional field, possessing language and written expression skills for cross-cultural communication, and being able to engage in basic communication and exchange on professional issues.

№10. Project Management: understand and master the management principles and economic decision-making methods related to engineering projects, and be able to apply them in a multidisciplinary environment.

№10.1. Mastering the basic principles and methods of engineering project management and economic decision-making.

№10.2. Being able to apply management principles and economic decision-making to the development, system design, and production process control of intelligent manufacturing systems.

№10.3 .Being able to manage projects and multidisciplinary environments as a member or leader of a team.

№11. Lifelong Learning: have the awareness and ability of self-directed learning, lifelong

learning and critical thinking, be able to understand the impact of broad technological changes on engineering and society, and adapt to new technological changes.

№11.1 Ability to understand the impact and requirements of technological progress and development on knowledge and abilities, and have a consciousness of lifelong learning;

№11.2 Ability to independently learn using appropriate methods for personal and career development needs, and adapt to the continuous development of intelligent manufacturing engineering-related technologies.

№11.3 Ability to have critical thinking in the face of technological change, and to deeply think about and evaluate it.

培养目标与毕业要求关系矩阵：

培养目标 毕业要求	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
毕业要求 1.1		●	●		
毕业要求 1.2		●	●		
毕业要求 1.3		●	●		
毕业要求 2.1		●	●		
毕业要求 2.2		●	●		
毕业要求 2.3		●	●		
毕业要求 3.1		●	●	●	
毕业要求 3.2		●	●	●	
毕业要求 4.1		●	●	●	
毕业要求 4.2		●	●	●	
毕业要求 4.3		●	●	●	
毕业要求 5.1		●		●	
毕业要求 5.2		●		●	
毕业要求 5.3		●		●	
毕业要求 6.1	●		●	●	
毕业要求 6.2	●		●	●	
毕业要求 7.1	●		●		
毕业要求 7.2	●		●		
毕业要求 8.1			●	●	
毕业要求 8.2			●	●	
毕业要求 9.1	●		●	●	

毕业要求 9.2	●		●	●	
毕业要求 10.1	●	●	●		
毕业要求 10.2	●	●	●		
毕业要求 10.3	●	●	●		
毕业要求 11.1			●	●	●
毕业要求 11.2			●	●	●
毕业要求 11.3			●	●	●

Relationship Matrix between Educational Objectives and Student Outcomes：

Student Outcome \ Educational Objective	Educational Objective 1	Educational Objective 2	Educational Objective 3	Educational Objective 4	Educational Objective 5
Student Outcome 1.1		●	●		
Student Outcome 1.2		●	●		
Student Outcome 1.3		●	●		
Student Outcome 2.1		●	●		
Student Outcome 2.2		●	●		
Student Outcome 2.3		●	●		
Student Outcome 3.1		●	●	●	
Student Outcome 3.2		●	●	●	
Student Outcome 4.1		●	●	●	
Student Outcome 4.2		●	●	●	
Student Outcome 4.3		●	●	●	
Student Outcome 5.1		●		●	
Student Outcome 5.2		●		●	
Student Outcome 5.3		●		●	
Student Outcome 6.1	●		●	●	●
Student Outcome 6.2	●		●	●	●
Student Outcome 7.1	●		●		
Student Outcome 7.2	●		●		
Student Outcome 8.1			●	●	
Student Outcome 8.2			●	●	

Educational Objective ＼ Student Outcome	Educational Objective 1	Educational Objective 2	Educational Objective 3	Educational Objective 4	Educational Objective 5
Student Outcome 9.1	●		●	●	
Student Outcome 9.2	●		●	●	
Student Outcome 10.1	●	●	●		
Student Outcome 10.2	●	●	●		
Student Outcome 10.3	●	●	●		
Student Outcome 11.1			●	●	●
Student Outcome 11.2			●	●	●
Student Outcome 11.3			●	●	●

专业简介（Program Profile）：

智能制造工程是面向国家战略与产业升级设立的新兴工科专业。随着制造业向数字化、网络化、智能化不断发展，智能制造作为第四次工业革命的核心力量正加速落地，专业人才需求快速增长，人才培养亟需与技术变革深度融合。面向制造业转型升级与智能产业的融合发展，本专业致力于培养具备系统思维、跨学科背景与工程实践能力的创新型、综合型高层次人才，服务于国家制造强国战略与新一代人工智能技术的发展与应用。

该专业涵盖了先进制造技术、智能系统、系统建模和优化、信息整合、感知、自动化控制和机器人等领域的技术。通过结合理论教学与工程实践，学生将系统掌握数字化建模、信息物理系统集成、智能决策与制造过程优化等核心能力，具备分析与解决复杂工程问题的综合素质。

在人才素质培养方面，注重学生工程伦理、职业规范、沟通协作能力与社会责任感的塑造。强调多学科交叉合作与国际视野，提升学生在跨文化、跨行业背景下的组织协调与领导能力。智能制造工程专业毕业生将掌握智能制造领域的核心关键技术，在未来的智能制造产业中发挥引领作用，成为兼具学习力、思想力与行动力的"三力"卓越新工科人才和未来的智能制造行业领军者。

Intelligent Manufacturing Engineering is an emerging engineering discipline established in response to national strategies and industrial upgrading. As manufacturing continues to evolve toward digitalization, networking, and intelligence, intelligent manufacturing—at the heart of the Fourth Industrial Revolution—is rapidly transitioning from concept to implementation, driving a surging demand for specialized talent. Talent cultivation must therefore be deeply integrated with technological transformation. Oriented toward the transformation and upgrading of the manufacturing sector and the integration of intelligent industries, this program aims to cultivate high-level, innovative, and interdisciplinary talents with strong systems thinking and engineering practice capabilities, in

service of China's strategy to become a manufacturing power and the development and application of next-generation artificial intelligence technologies.

The program encompasses advanced manufacturing technology, intelligent systems, system modeling and optimization, information integration, perception, automation control, and robotics. By integrating theoretical instruction with engineering practice, students will systematically acquire core competencies in digital modeling, cyber-physical system integration, intelligent decision-making, and manufacturing process optimization, equipping them with the comprehensive skills needed to analyze and solve complex engineering problems.

In terms of talent development, the program emphasizes cultivating students' sense of engineering ethics, professional standards, communication and collaboration skills, and social responsibility. It promotes interdisciplinary cooperation and global perspectives to enhance students' organizational, coordination, and leadership abilities in cross-cultural and cross-industry contexts. master core technologies in the field and play a leading role in the future intelligent manufacturing industry, growing into "Three Abilities" (learning, thinking, and action) outstanding new engineering talents and future industry leaders.

专业特色（Program Features）：

智能制造工程专业面向中国制造业转型升级，把握大湾区发展机遇，围绕人工智能、智能制造等新兴领域，整合多学科知识，将理论与实践相结合，培养具有解决复杂工程问题、创新思维和跨领域沟通能力的高层次卓越人才。

1. 构建智能设计、制造与控制的课程体系，培养学生系统工程能力。
2. 涵盖机器人结构设计、运动控制，人机协作等模块课程，提升机器人装备开发能力。
3. 融合融入机器学习、计算机视觉、智能感知与决策等人工智能技术，构建"智能+"制造的工程创新思维。

The Intelligent Manufacturing Engineering program is aimed at the transformation and upgrading of China's manufacturing industry, seizing the development opportunities in the Greater Bay Area. It focuses on emerging fields such as artificial intelligence and intelligent manufacturing, integrates multidisciplinary knowledge, and combines theory with practice. The program aims to cultivate high-level outstanding talents who have the ability to solve complex engineering problems, think innovatively, and communicate across different disciplines.

1. Establish a curriculum system focused on intelligent design, manufacturing, and control to cultivate students' systems engineering capabilities.
2. Offer modular courses on robotic structure design, motion control, and human–robot

interaction to enhance students' abilities in robotic equipment development.

3. Integrate artificial intelligence technologies such as machine learning, computer vision, intelligent perception, and decision-making to foster innovative "intelligent+" engineering thinking for future manufacturing.

授予学位（**Degree Conferred**）：

工学学士学位 Bachelor of Engineering

核心课程（**Core Courses**）：

智能工程：智能工程导论

智能工程：设计与制造 I

智能工程：设计与制造 II

控制工程：信号与系统

控制工程：反馈控制理论

电工电子技术基础

嵌入式系统与设计

人工智能 III：智能工程中的人工智能

Core Courses

Intelligence Engineering: Introduction to Intelligent Engineering

Intelligence Engineering: Design and Manufacturing I

Intelligence Engineering: Design and Manufacturing II

Control Engineering: Signals and System

Control Engineering: Feedback Control Theory

Fundamentals of Electronics and Electrical Technologies

Embedded Systems and Design

Artificial Intelligence III: Artificial Intelligence for Intelligent Engineering

特色课程（**Featured Courses**）：

新生研讨课：

  智能制造工程研讨课

基于项目（设计、案例）的课程：

  智能工程：智能工程导论实践

  智能工程：工程创新训练 III

  智能工程：设计与制造实践 I

  智能工程：设计与制造实践 II（智能制造工程）

  控制实践

国际化特色课程：

  数字孪生

专题研讨课：

  智能制造工程研讨课

学科前沿课：

  智能控制

  工程创新

跨学科课程：

  智能工程：智能工程导论

  智能工程：设计与制造 I

  智能工程：设计与制造 II

  具身智能

校企合作课：

  智能制造工程研讨课

创新实践课：

  智能工程：智能工程导论实践 （"三个一"）

  智能工程：工程创新训练 III （"三个一"）

  智能工程：设计与制造实践 I （"三个一"）

  智能工程：设计与制造实践 II（智能制造工程）（"三个一"）

工程管理导论 （"三个一"）

工程创新（"三个一"）

专题设计课：

智能工程：智能工程导论实践

智能工程：设计与制造实践 Ⅰ

智能工程：设计与制造实践 Ⅱ（智能制造工程）

控制实践

劳动教育课：

智能工程：设计与制造实践 Ⅱ（智能制造工程）

毕业实习

实践研习：

毕业实习

Featured Courses

Freshmen Seminars:

Intelligent Manufacturing Engineering Seminar

Project-based Courses:

Intelligence Engineering: Practice of Introduction to Intelligent Engineering

Intelligence Engineering: Engineering Innovation Training III

Intelligence Engineering: Practice of Design and Manufacturing I

Intelligence Engineering: Practice of Design and Manufacturing II（IME）

Practice of Control

Global Education Courses:

Digital Twin

Special Topics:

Intelligent Manufacturing Engineering Seminar

Subject Frontiers Courses:

 Intelligent Control

 Innovation in Engineering

Interdisciplinary Courses:

 Intelligence Engineering: Introduction to Intelligent Engineering

 Intelligence Engineering: Design and Manufacturing I

 Intelligence Engineering: Design and Manufacturing II

 Embodied Artificial Intelligence

Cooperative Courses with Enterprises:

 Intelligent Manufacturing Engineering Seminar

Innovation Practice (Three "ones"):

 Intelligence Engineering: Practice of Introduction to Intelligent Engineering (Three "ones")

 Intelligence Engineering: Engineering Innovation Training III (Three "ones")

 Intelligence Engineering: Practice of Design and Manufacturing I (Three "ones")

 Intelligence Engineering: Practice of Design and Manufacturing II(IME) (Three "ones")

 Introduction to Engineering Management (Three "ones")

 Product Development, Innovation in Engineering (Three "ones")

Special Designs:

 Intelligence Engineering: Practice of Introduction to Intelligent Engineering

 Intelligence Engineering: Practice of Design and Manufacturing I

 Intelligence Engineering: Practice of Design and Manufacturing II(IME)

 Practice of Control

Education on The Hard-Working Spirit：

 Intelligence Engineering: Practice of Design and Manufacturing II(IME)

 Internship

Practical Training:

 Internship

一、各类课程学分登记表（Registration Form of Curriculum Credits）

1.学分统计表（Credits Registration Form）

课程类别 Course Category	课程要求 Requirement	学分 Credits	学时 Academic Hours	备注 Remarks
公共基础课 General Basic Courses	必修 Compulsory	53.5	1044	
	通识 General Education	10.0	160	
专业基础课 Specialty Basic Courses	必修 Compulsory	44.5	784	
选修课 Elective Courses	选修 Elective	12.0	218	
合　计 Total		120.0	2206	
集中实践教学环节 Practice Training	必修 Compulsory	32.0	40 周 Weeks	
毕业学分要求 Credits Required for Graduation		120.0+32.0=152.0		
建议每学期修读学分 Suggested Credits for Each Semester	1	2	3	4	5	6	7	8
	24	24	24	24	18	16	12	10

备注：学生毕业时须修满专业教学计划规定学分，并取得第二课堂 7 个人文素质教育学分和 4 个"三创"能力培养学分。

2.类别统计表（Category Registration Form）

学时 Academic Hours						学分 Credits								
总学时数 Total	其中 Include		其中 Include			总学分数 Total	其中 Include			其中 Include			其中 Include	
	必修学时 Compulsory	选修学时 Elective	理论教学学时 Theory Course	实验教学学时 Lab			必修学分 Compulsory	选修学分 Elective	集中实践教学环节 Practice	理论教学学分 Theory Course	实验教学学分 Lab		创新创业教育学分 Innovation and Entrepreneurship Education	
2206	1828	378	1708	498		152.0	130	22.0	32.0	104.5	15.5		4.0	

备注：1.通识课计入选修一项中；

2.实验教学包括"专业教学计划表"中的实验、实习和其它；

3.创新创业教育学分：培养计划中的课程，由各院系教学指导委员会认定，包括竞教结合课程、创新实践课程、创业教育课程等学分；

4.必修学时＋选修学时=总学时数；理论教学学时＋实验教学学时=总学时数；必修学分＋选修学分=总学分数；集中实践教学环节学分＋理论教学学分＋实验教学学分=总学分数。

二、课程设置表（Courses Schedule）

类别 Course Category	课程代码 Course No.	课程名称 Course Title	是否必修 C/E	学 时 数 Total Curriculum Hours					学分数 Credits	开课学期 Semester
				总学时 Class Hours	理论 Theoretical class hours	实验 Lab Hours	实习 Practice Hours	其它 Other Hours		
公共基础课 General Basic Courses	031101761	习近平新时代中国特色社会主义思想概论 The Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	必修/C	48	36			12	3.0	1
	031101661	思想道德与法治 Ethics and Rule of Law		40	36			4	2.5	2
	031101371	中国近现代史纲要 Skeleton of Chinese Modern History		40	36			4	2.5	3
	031101424	毛泽东思想和中国特色社会主义理论体系概论 Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics		40	36			4	2.5	4
	031101522	马克思主义基本原理 Introduction of the Marxism Basic Principle		40	36			4	2.5	4
	031101331	形势与政策 Analysis of the Situation & Policy		64	64				2.0	1-8
	EMP040100011	工程数学：微积分II（一） Engineering Math: Calculus II(1)		80	80				5.0	1
	EMP040100021	工程数学：线性代数与解析几何 Engineering Math:Linear Algebra & Analytic Geometry		48	48				3.0	1
	EMP040100012	工程数学：微积分II（二） Engineering Math: Calculus II(2)		80	80				5.0	2
	EMP040100031	工程数学：概率论与数理统计 Engineering Math:Probability & Mathematical Statistics		48	48				3.0	2
	AIP045100011	人工智能I：大学计算机基础 Artificial Intelligence I: Foundations of Computer		32				32	0	1
	041101155	大学物理III（一） General PhysicsIII(1)		64	64				4	2
	041100344	大学物理III（二） General Physics III(2)		64	64				4	3
	041100671	大学物理实验（一） Physics Experiment (1)		32		32			1	2
	041101051	大学物理实验（二）		32		32			1	3

		Physics Experiment (2)							
037102786	大学化学 General Chemistry		32	32				2	1
037101943	大学化学实验 General Chemistry Experiment		16		16			0.5	2
044104182	学术英语与科技交流（一） EAP and Technical Communication (1)		32	32				2.0	1
044104192	学术英语与科技交流（二） EAP and Technical Communication (2)		32	32				2.0	2
052100332	体育（一） Physical Education (1)		36				36	1.0	1
052100012	体育（二） Physical Education (2)		36				36	1.0	2
052100842	体育（三） Physical Education (3)		36				36	1.0	3
052100062	体育（四） Physical Education (4)		36				36	1.0	4
006100112	军事理论 Military Principle		36	18			18	2.0	2
	人文科学、社会科学领域 Humanities, Social Science	通识/E	128	128				8.0	
	科学技术领域 Science and Technology		32	32				2.0	
合　计 **Total**			1204	902	80		222	63.5	

备注：学时中其它可以为上机和实践学时。

通识课要求：

1.开设党史、新中国史、改革开放史、社会主义发展史等"四史"通识课程，全校本科生从"四史"中选择一门必修；

2.学生不能修读本学院开设的通识课程（除在本学院跨学科修读外）；

3.除艺术类的学生外，每位学生须修满 2 学分的公共艺术通识课程，其中美学和艺术史论类、艺术鉴赏和评论类课程至少取得 1 个学分。

4.学生可在虚拟第三学期修读通识课程，最多可认定 4 学分通识课程学分。

二、课程设置表（续）（Courses Schedule）

类别 Course Category	课程代码 Course No.	课程名称 Course Title	是否必修 C/E	学 时 数 Total Curriculum Hours					学分数 Credits	开课学期 Semester
				总学时 Class Hours	理论 Theoretical class hours	实验 Lab Hours	实习 Practice Hours	其它 Other Hours		
专业基础课 Specialty Basic Courses	IES082100051	智能工程：智能工程导论 Intelligence Engineering: Introduction to Intelligent Engineering	必/C	48	48				3.0	1
	082101551	面向智能工程的 Python 编程技术 Python Programming for Intelligent Engineering	必/C	64	32			32	3.0	1
	082100901	智能制造工程研讨课 Intelligent Manufacturing Engineering Seminar	必/C	16	16				1.0	2
	AIS082100021	人工智能III：智能工程中的人工智能 Artificial IntelligenceIII: Artificial Intelligence for Intelligent Engineering	必/C	56	40			16	3.0	3
	082100602	工程力学 Engineering Mechanics	必/C	64	48	16			3.5	3
	082100871	智能工程数学基础 Mathematical Foundations for Intelligent Engineering	必/C	48	48				3.0	3
	082101541	电工电子技术基础 Fundamentals of Electronics and Electrical Technologies	必/C	80	48			32	4.0	3
	CES082100031	控制工程：信号与系统 Control Engineering: Signals and Systems	必/C	80	48			32	4.0	4
	082100811	动力学与振动导论 Introduction to Dynamics and Vibration	必/C	48	48				3.0	4
	IES082100021	智能工程：设计与制造 I Intelligence Engineering: Design and Manufacturing I	必/C	48	48				3.0	4
	IES082100022	智能工程：设计与制造 II Intelligence Engineering: Design and Manufacturing II	必/C	48	48				3.0	5
	CES082100021	控制工程：反馈控制理论 Control Engineering: Feedback Control Theory	必/C	48	48				3.0	5
	082100711	嵌入式系统与设计 Embedded Systems and Design	必/C	48	48				3.0	5
	082100831	工程管理导论 Introduction to Engineering	必/C	32	32				2.0	5

	课程代码	课程名称		总学时	讲课	实验		实践	学分	学期
		Management								
	082100881	热流科学导论 Introduction to Thermodynamics and Fluid Mechanics	必/C	56	40	16			3.0	6
		合 计 **Total**	必/C	784	640	32		112	44.5	
选修课 Elective Courses		专业核心选修课 (最少选修 5 学分) Major Core Elective Course (A minimum of 5 credits is required)								
	082100971	热的解析与应用 Analysis and Applications of Heat	选/E	48	48				3.0	4
	082100022	制造系统分析及设计 Analytics and Design of Manufacturing Systems	选/E	32	32				2.0	5/7
	082100631	产品开发 Product Development	选/E	48	48				3.0	5/7
	082100511	智能工厂 Smart Factory	选/E	48	48				3.0	6/8
	082101781	生产计划 Production Planning	选/E	32	32				2.0	6/8
	082101001	数字孪生 Digital Twin	选/E	32	32				2.0	5/6/7/8
		专业基础选修课 Major General Elective Course								
	082100092	数据分析建模 Data Analysis and Modeling	选/E	56	40	16			3.0	4
	082100991	深度学习 Deep Learning	选/E	48	48				3.0	4
	082101531	具身智能 Embodied Artificial Intelligence	选/E	48	16	32			2.0	4
	082100292	动力系统建模、分析与控制 Modeling Analysis and Control of Dynamic System	选/E	48	48				3.0	5/7
	082100481	传感器技术及应用 Sensor and its Applications	选/E	48	48				3.0	5/7
	082100541	经典控制理论 Classical Control Theory	选/E	48	48				3.0	5/7
	082101561	数据结构与算法 Data Structures and Algorithms	选/E	56	40	16			3.0	6/8
	082101011	智能控制 Intelligent Control	选/E	48	48				3.0	6/8
	082100931	工程创新 Innovation in Engineering	选/E	34	30	4			2.0	6/8

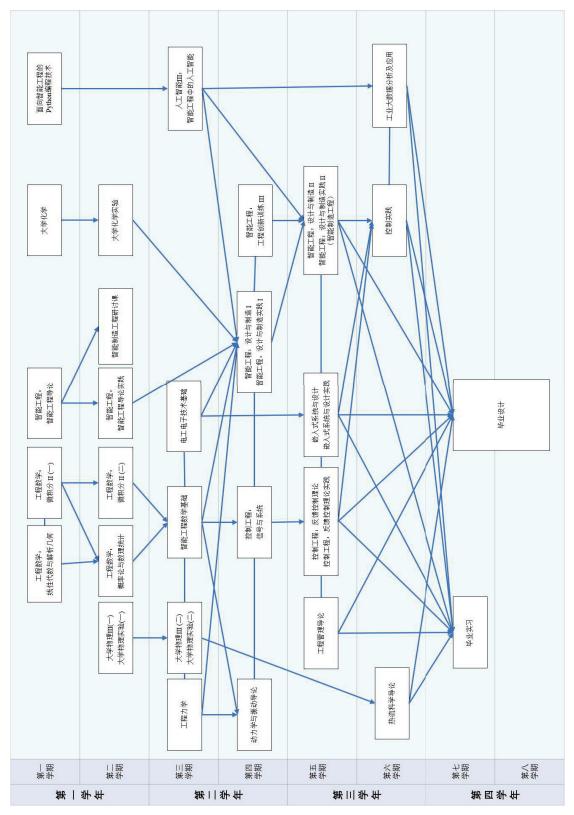|	个性化选修课 Personalized Electives							
082101081	跨学院选修课Ⅰ Interdisciplinary Elective Courses Ⅰ	选/E	32	32			2.0	1-8
020100051	创新研究训练 Innovation Research Training	选/E	32			32	2.0	7
020100041	创新研究实践Ⅰ Innovation Research Practice Ⅰ	选/E	32			32	2.0	7
020100031	创新研究实践Ⅱ Innovation Research Practice Ⅱ	选/E	32			32	2.0	7
020100061	创业实践 Entrepreneurial Practice	选/E	32			32	2.0	7
合 计 Total		选/E	选修课修读最低要求 12 学分 Minimum elective course credits required: 12					

备注：

1.学时中其它可以为上机和实践学时。

2.学生根据自己开展科研训练项目、学科竞赛、发表论文、获得专利和自主创业等情况申请折算为一定的专业选修课学分（创新研究训练、创新研究实践Ⅰ、创新研究实践Ⅱ、创业实践等创新创业课程）。每个学生累计申请为专业选修课总学分不超过 4 个学分。经学校批准认定为选修课学分的项目、竞赛等不再获得对应第二课堂的创新学分。

3.学生修读跨学院课程（以教务处公布名单为准），已修读课程学分等于或高于 2 学分的，可以申请认定为一定的专业选修课学分。每个学生累计申请为专业选修课总学分不超过 2 个学分。

三、集中实践教学环节（Practice-concentrated Training）

课 程 代 码 Course No.	课 程 名 称 Course Title	是否必修 C/E	学 时 数 Total Curriculum Hours		学分数 Credits	开课学期 Semester
			实践 Practice weeks	授课 Lecture Hours		
006100151	军事技能 Military Training	必/C	2 周 2 weeks		2.0	1
031101551	马克思主义理论与实践 Marxism Theory and Practice	必/C	2 周 2 weeks		2.0	3
IES082100012	智能工程：智能工程导论实践 Intelligence Engineering: Practice of Introduction to Intelligent Engineering	必/C	2 周 2 weeks		2.0	2
082101521	嵌入式系统与设计实践 Practice of Embedded Systems and Design	必/C	1 周 1 week		1.0	5

课程代码	课程名称		周数		学分	学期
IES067100011	智能工程：工程创新训练 III Intelligence Engineering: Engineering Innovation Training III	必/C	4 周 4 weeks		4.0	4
IES082100031	智能工程：设计与制造实践 I Intelligence Engineering: Practice of Design and Manufacturing I	必/C	1 周 1 week		1.0	4
CES082100022	控制工程：反馈控制理论实践 Control Engineering: Practice of Feedback Control Theory	必/C	1 周 1 week		1.0	5
IES082100042	智能工程：设计与制造实践 II（智能制造工程） Intelligence Engineering: Practice of Design and Manufacturing II(IME)	必/C	2 周 2 weeks		2.0	5
082101511	控制实践 Practice of Control	必/C	1 周 1 week		1.0	6
082101501	工业大数据分析及应用 Big Data Analytics and Applications in Industry	必/C	2 周 2 weeks		2.0	6
082101061	毕业实习 Internship	必/C	4 周 4 weeks		4.0	7
082100501	毕业设计（论文） Capstone (Thesis)	必/C	18 周 18 weeks		10.0	7-8
合 计		必/C	40 周 40weeks		32	

四、课程地图（Curriculum Mapping）

面向智能工程的Python编程技术

大学化学

大学化学实验

人工智能Ⅱ：智能工程中的人工智能

智能工程：智能工程导论

智能制造工程研讨课

智能工程：智能工程导论实践

工程数学：线性代数与解析几何

工程数学：微积分Ⅱ(一)

工程数学：微积分Ⅱ(二)

工程数学：概率论与数理统计

大学物理Ⅲ(一)/大学物理实验(一)

大学物理Ⅲ(二)/大学物理实验(二)

工程力学

电工电子技术基础

智能工程数学基础

动力学与振动导论

控制工程：信号与系统

智能制造工程训练Ⅲ

智能工程：设计与制造Ⅰ/智能工程：设计与制造实践Ⅰ

智能工程：设计与制造Ⅱ/智能工程：设计与制造实践Ⅱ（智能制造工程）

工业大数据分析及应用

控制实践

嵌入式系统与设计/嵌入式系统与设计实践

控制工程：反馈控制理论/控制工程：反馈控制理论实践

工程管理理论

热流科学导论

毕业设计

毕业实习

第一学期 第二学期 第三学期 第四学期 第五学期 第六学期 第七学期 第八学期

第一学年 第二学年 第三学年 第四学年

五、课程体系与毕业要求关系矩阵（Relation Matrix between Curriculum System and Student Outcomes）

序号 No	课程名 Course Title	智能制造工程专业毕业要求 Intelligent Manufacturing Engineering Major Student Outcomes																											
		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	7.1	7.2	8.1	8.2	9.1	9.2	10.1	10.2	10.3	11.1	11.2	11.3
1	思想道德与法治 Ethics and Rule of Law																●	●	●				●						
2	习近平新时代中国特色社会主义思想概论 The Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era																●						●						
3	中国近现代史纲要 Skeleton of Chinese Modern History																	●					●						
4	毛泽东思想和中国特色社会主义理论体系概论 Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics																	●	●				●						

No.	Course																					
5	马克思主义基本原理 Fundamentals of Marxism Principle										•											
6	形势与政策 Analysis of the Situation & Policy	•				•					•											
7	工程数学：微积分 II（一） Engineering Math: Calculus (1)																	•	•		•		
8	工程数学：线性代数与解析几何 Engineering Math: Linear Algebra & Analytic Geometry																	•	•		•		
9	工程数学：微积分 II（二） Engineering Math: Calculus (2)																	•	•		•		
10	工程数学：概率论与数理统计 Engineering Math: Probability & Mathematical Statistics																	•	•		•		
11	人工智能 I: 大学计算机基础 Artificial Intelligence I: Fundamentals of Compute													•			•			•			
12	大学物理III（一） General Physics (1)													•					•		•		

No.	Course											
13	大学物理III（二）General Physics (2)									●		●
14	大学物理实验（一）Physics Experiment (1)									●		●
15	大学物理实验（二）Physics Experiment (2)									●		●
16	大学化学 General Chemistry	●								●		●
17	大学化学实验 General Chemistry Experiment	●								●		●
18	学术英语与科技交流（一）EAP and Technical Communication (1)				●							
19	学术英语与科技交流（二）EAP and Technical Communication (2)				●							
20	体育（一）Physical Education (1)	●		● ●								
21	体育（二）Physical Education (2)	●		● ●								
22	体育（三）Physical Education (3)	●		● ●								

	课程名称							
							●	
		●		●				
		●	●					
		●	●	●		●		
			●				●	●
			●	●				
				●			●	
								●
						●		
								●
							●	●
				●				
							●	
								●
								●
								●
				●		●	●	●
23	体育（四）Physical Education (4)	24 军事理论 Military Principle	25 智能工程：智能工程导论 Intelligence Engineering: Introduction to Intelligent Engineering	26 面向智能工程的 Python 编程技术 Python Programming for Intelligent Engineering		27 智能制造工程研讨课 Intelligent Manufacturing Engineering Seminar	28 人工智能Ⅲ：智能工程中的人工智能 Artificial IntelligenceⅢ: Artificial Intelligence for Intelligent Engineering	29 工程力学 Engineering Mechanics

Matrix table (courses vs. requirement indicators). Rows are requirement indicators (top to bottom); columns are courses 30–37. ● marks a mapping.

	30 智能工程数学基础 / Mathematical Foundations for Intelligent Engineering	31 电工电子技术基础 / Fundamentals of Electronics and Electrical Technologies	32 控制工程：信号与系统 / Control Engineering: Signals and Systems	33 动力学与振动导论 / Introduction to Dynamics and Vibration	34 智能工程：设计与制造 I / Intelligence Engineering: Design and Manufacturing I	35 智能工程：设计与制造 II / Intelligence Engineering: Design and Manufacturing II	36 控制工程：反馈控制理论 / Control Engineering: Feedback Control Theory	37 嵌入式系统与设计 / Embedded System Design
1	●							
2	●					●		
3								
4								
5								
6								
7				●	●			
8								
9		●		●				
10							●	
11								
12		●	●				●	
13								
14	●			●				●
15			●			●		
16	●							●
17								
18			●	●	●		●	
19		●						
20		●			●			
21					●			
22				●				●
23	●		●			●	●	
24								
25		●						●
26	●	●	●	●		●	●	

No.	课程名称 / Course
	Embedded Systems and Design
38	工程管理导论 Introduction to Engineering Management
39	热流科学导论 Introduction to Thermodynamics and Fluid Mechanics
40	热的解析与应用 Analysis and Applications of Heat
41	制造系统分析及设计 Analytics and Design of Manufacturing Systems
42	产品开发 Product Development
43	智能工厂 Smart Factory
44	生产计划 Production Planning
45	数字孪生 Digital Twin

No.	课程名称 Course Name
46	数据分析建模 Data Analysis and Modeling
47	深度学习 Deep Learning
48	具身智能 Embodied Artificial Intelligence
49	动力系统建模、分析与控制 Modeling Analysis and Control of Dynamic System
50	传感器技术及应用 Sensor and its Applications
51	经典控制理论 Classical Control Theory
52	数据结构与算法 Data Structures and Algorithms
53	智能控制 Intelligent Control
54	工程创新 Innovation in Engineering
55	智能工程：智能工程导论实践 Intelligence Engineering:

No.	Course																												
56	Practice of Introduction to Intelligent Engineering																												
56	嵌入式系统与设计实践 Practice of Embedded Systems and Design																												
57	智能工程：工程创新训练 III Intelligence Engineering: Engineering Innovation Training III																												
58	智能工程：设计与制造实践 I Intelligence Engineering: Practice of Design and Manufacturing I																												
59	控制工程：反馈控制理论实践 Control Engineering: Practice of Feedback Control Theory																												
60	智能工程:设计与制造实践 II （智能制造工程） Intelligence Engineering: Practice of Design and Manufacturing II(IME)																												
61	控制实践																												

No.	课程名称	Course Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
		Practice of Control																												
62	工业大数据分析及应用	Big Data Analytics and Applications in Industry	●				●					●		●							●									●
63	毕业实习	Internship															●	●	●	●	●	●	●	●	●	●	●	●	●	●
64	毕业设计（论文）	Capstone (Thesis)	●	●	●	●	●	●	●	●	●	●	●	●	●	●							●	●		●		●	●	●

六、第二课堂

第二课堂由人文素质教育和"三创"能力培养两部分组成。

1.人文素质教育基本要求

学生在取得专业教学计划规定学分的同时，还应结合自己的兴趣适当参加课外人文素质教育活动，参加活动的学分累计不少于 7 个学分。其中，大学生心理健康教育 2 学分、国家安全教育 1 学分、大学生职业生涯规划 2 学分，纳入人文素质教育学分。

2."三创"能力培养基本要求

学生在取得本专业教学计划规定学分的同时，还必须参加国家创新创业训练计划、广东省创新创业训练计划、SRP（学生研究计划）、百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于 4 个学分。

6."Second Classroom" Activities

"Second Classroom" Activities are comprised of two parts, Humanities Quality Education and Innovative Ability Cultivation.

(1)Basic Requirements of Humanities Quality Education

Besides gaining course credits listed in one's subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one's interest, acquiring no less than seven credits. Mental Health Education for College Students (2 credits), National Security Education (1 credit), and Career Planning for College Students (2 credits) are included in the second-classroom credits for Humanities Quality Education.

(2)Basic Requirements of Innovative Ability Cultivation

Besides gaining course credits listed in one's subject teaching curriculum, a student is required to participate in any one of the following activities: National Undergraduate Training Programs for Innovation and Entrepreneurship, Guangdong Undergraduate Training Programs for Innovation and Entrepreneurship, Student Research Program (SRP), One-hundred-steps Innovative Program, or any other extracurricular activities of Innovative Ability Cultivation that last a certain period of time (e.g. subject contests, academic lectures), acquiring no less than four credits.