# 吴贤铭智能工程学院

# Shien-Ming Wu School of Intelligent Engineering

# 机器人工程

# Robotics Engineering

**专业代码：080803T　　学　制：4 年**

**Program Code: 080803T　　Duration：4 years**

## 培养目标（Educational Objectives）：

机器人工程专业响应国家建设重大需求、顺应最新国际发展趋势、紧密契合华工特色一流人才培养体系，培养家国情怀与全球视野兼备、“三力三创”（学习力、思想力、行动力，创新、创造、创业）型新工科人才，培养学生在知识能力素质、德智体美诸方面全面发展，培养具有坚实的数学、物理、机械工程、电子工程、控制技术、计算机和信息处理的基础知识以及心理生理等认知和生命科学的多学科交叉知识，掌握机器人工程及相关交叉学科专业的基础理论和方法技术，具备突出的科学素养、 实践能力与国际视野，有社会责任感和国际胜任力，未来能在我国机器人产业发展中发挥领军作用，并有潜力成为机器人工程及其相关领域的高层次复合型卓越人才。

本专业学生毕业 5 年左右预期达到的具体目标：

1.拥有积极的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卓越人才，在工程实践中注重人文关怀和伦理意识；

2.掌握扎实的机器人工程基础理论和核心技术，熟悉机器人系统的设计、控制和感知技术，具备深入理解和应用人工智能、机器学习、计算机视觉等相关技术的能力；

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，能够高效地与团队成员交流合作，积极参与跨学科、跨领域的团队项目，实现机器人系统的综合设计与开发；

5.具备职业规划和自我发展能力，持续关注机器人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，在机器人领域取得长足的职业发展。

Robotics Engineering program closely responds to the significant national demands, aligns with the latest international development trends, and fits into SCUT's distinctive first-class talent cultivation system. It aims to cultivate talents who possess both a strong sense of patriotism and a global perspective, encompass the "Three Abilities and Three Creativities" framework (learning, thinking, action; innovation, creation, entrepreneurship), and are well-equipped with comprehensive

competencies in terms of knowledge, abilities, qualities, ethics, intellect, physique, and aesthetics.e program aims to provide interdisciplinary knowledge encompassing solid foundations in mathematics, physics, mechanical engineering, electronic engineering, control technology, computer science, information processing, as well as cognitive and life sciences such as psychology and physiology. Students are expected to master the fundamental theories, methods, and techniques relating to robotics engineering the relevant interdisciplinary subjects, and demonstrate prominent scientific literacy, practical skills, and international perspective. They should also possess a sense of social responsibility and international competence, and have the potential to play a leading role in the development of the robotics industry in our country, with the potential to become highly skilled and exceptional professionals in the field of robotics engineering and related areas.

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

1. Possessing a positive socialist core value, 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.
2. Mastering solid foundational theories and core technologies in Robotics Engineering, familiarizing themselves with the design, control, and perception technologies of robotic systems, and possessing in-depth understanding and application abilities in related fields such as artificial intelligence, machine learning, and computer vision.
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, and accomplishing integrated design and development of robotic systems.
5. Demonstrating career planning and self-development capabilities, maintaining awareness of the latest developments in the field of Robotics Engineering, pursuing academic or engineering technical certifications, continuously expanding their knowledge and skill levels, and continuously achieving major career developments in the broad field of robotics engineering.

## 毕业要求（Student Outcomes）：

№1. 工程知识：能够将扎实的数学、自然科学、工程基础和机器人工程专业知识运用于解决机器人设计和控制等领域的复杂工程问题。

№1.1 掌握数学、自然科学、工程基础和机器人工程专业知识，并能够运用这些知识对机器人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 能够应用机器人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机器人工程专业工程问题解决方案的比较与综合。

№2. 问题分析：利用数学、自然科学和工程科学的第一原理，识别、制定、研究并分析复杂的工程问题，得出有根据的结论，对可持续发展进行整体考虑。

№2.1 能够应用数学、自然科学和工程科学的第一原理，识别和判断机器人工程专业的复杂工程问题的关键环节，表述机器人工程专业的复杂工程问题；

№2.2 能够基于数学、自然科学和工程科学的第一原理和数学模型，并借助文献研究分析机器人工程专业复杂工程问题的特性；

№2.3 能认识到解决复杂工程问题有多种方案可选择，并能通过文献寻求可能的解决方案，对可持续发展进行整体考虑。

№3. 设计/开发解决方案：为复杂的工程问题设计创造性的解决方案，并设计系统、部件或流程，以满足确定的需求，同时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。

№3.1 能够设计满足机器人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：使用研究方法对复杂的工程问题和系统进行研究，包括基于研究的知识、设计实验、分析和解释数据，以及综合信息以提供有效结论。

№4.1 能够使用研究方法，研究和分析机器人复杂工程问题的解决方案；

№4.2 能够针对机器人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. 工具的使用：创造、选择、应用适当的技术、资源以及现代工程和信息技术工具，包括预测和建模，认识其局限性，以解决复杂的工程问题。

№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，分析机器人工程系统规律、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、编程算法等工具对机器人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，仿真和模拟机器人工程问题，并能够分析其局限性。

№6. 工程师与世界：分析和评估可持续发展的成果，社会、经济、可持续性和健康与安全、

法律和环境在解决复杂工程问题中的影响。

№6.1 了解机器人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，评估机器人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. 伦理：运用伦理原则，致力于职业伦理工程实践和规范；并遵守相关的国家和国际法律。表现出理解多元化和包容性的必要性。

№7.1 能够在机器人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 能够在机器人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. 个人和协作的团队工作：在多元化和包容性的团队中，以及多学科、远程和分布式的环境中，作为个人、成员或领导有效地发挥作用。

№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：在复杂的工程活动中与工程界和整个社会进行有效和包容的沟通， 包括撰写和理解有效的报告和设计文件，并进行有效的介绍；考虑到文化、 语言和学习差异。

№9.1 能够对机器人复杂工程、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. 项目管理和财务：应用对工程管理原则和经济决策的知识和理解，并将其应用于自己的工作，作为团队的成员和领导者，管理项目和多学科环境。

№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、经济决策应用于机器人系统的开发、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. 持续的终身学习：认识到需要并有准备和能力从事：i)独立和终身学习 ii) 适应新技术和新兴技术，以及 iii) 在最广泛的技术变革背景下进行批判性思考。

№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，能适应机器人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: Being able to apply solid knowledge of mathematics, natural sciences, engineering fundamentals, and robotics engineering to solve complex engineering

problems in the field of robotics design and control.

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

№1.2. Being able to apply the fundamentals and professional knowledge of robotics 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 robotics engineering.

№2. Problem Analysis: Identifying, formulating, researching, and analyzing complex engineering problems in the field of robotics using the first principles of mathematics, natural sciences, and engineering sciences, drawing well-founded conclusions, and considering sustainability as a whole.

№2.1. Being able to apply the first principles of mathematics, natural sciences, and engineering sciences to identify and determine the key aspects of complex engineering problems in the field of robotics engineering, and describe these problems.

№2.2. Being able to analyze the characteristics of complex engineering problems in the field of robotics engineering based on the first principles of mathematics, natural sciences, engineering sciences, and mathematical models, and through literature research.

№2.3. Recognizing that there are multiple options for solving complex engineering problems and being able to seek potential solutions through literature, while considering sustainability as a whole.

№3. Design/Development of Solutions: Designing creative solutions for complex engineering problems and designing systems, components, or processes to meet specific requirements, while appropriately considering public health and safety, the life-cycle cost, net-zero carbon, as well as resource, cultural, social, and environmental factors.

№3.1. Being able to design systems, components, and processes that meet the specific requirements of complex engineering problems in the field of robotics 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: Conducting research on complex engineering problems related to robotics using scientific principles and scientific methods, including designing experiments, analyzing and interpreting data, and drawing reasonable and effective conclusions through information synthesis.

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

№4.2. Being able to design and implement experimental plans for various control laws, processes, and systems related to robotics 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 Tools: Creating, selecting, and applying appropriate technologies, resources, as well as modern engineering and information technology tools, including prediction and modeling, understanding their limitations, to solve complex engineering problems.

№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 robotics 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 robotics.

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

№6. Engineer and the World: Analyzing and evaluating the achievements of sustainable development, as well as the impact of social, economic, sustainability, health and safety, legal, and environmental factors on solving complex engineering problems.

№6.1. Understanding technical standards, intellectual property rights, industrial policies, and laws and regulations related to the field of robotics 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 robotics 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. Ethics: Applying ethical principles to professional engineering practices and standards, and complying with relevant national and international laws. Demonstrating the necessity of understanding diversity and inclusiveness.

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

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

№8. Individual and Teamwork: Effectively contributing as an individual, member, or leader in diverse and inclusive teams, as well as in multidisciplinary, remote, and distributed environments.

№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: Engaging in effective and inclusive communication with the engineering community and society as a whole in complex engineering activities, including writing and understanding effective reports and design documents, and delivering effective presentations, considering cultural, linguistic, and learning 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 robotics, 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 and Finance: Applying knowledge and understanding of engineering management principles and economic decision-making, and applying them to one's own work as a member and leader of a team, managing projects and multidisciplinary environments.

№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 robotics systems.

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

№11. Continuous Lifelong Learning: Recognize the need and be prepared and capable to engage in: i) independent and lifelong learning ii) adapting to new technologies and emerging technologies, and iii) critical thinking in the broadest context of technological change.

№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 robotics 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 | | | ● | ● | ● |

| 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 11.2 | | | ● | ● | ● |
| 毕业要求 11.3 | | | ● | ● | ● |

## Relationship Matrix between Educational Objectives and Student Outcomes：

| Educational Objective / Student Outcome | 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 | | | ● | ● | |
| Student Outcome 9.1 | ● | | ● | ● | |
| Student Outcome 9.2 | ● | | ● | ● | |
| Student Outcome 10.1 | ● | ● | ● | | |

| Educational Objective / Student Outcome | Educational Objective 1 | Educational Objective 2 | Educational Objective 3 | Educational Objective 4 | Educational Objective 5 |
|---|---|---|---|---|---|
| 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）：

机器人工程是一门新兴的工科专业，应国家战略需求和企业对机器人技术的需求而设立。此专业涵盖工业、医疗、服务等多个应用领域，并融合了机械工程、电子工程、自动控制、人工智能等诸多学科知识，旨在培养高层次应用型工程技术人才和技术型工程管理人才。

该专业着重理论与实践技能结合，学生将建立清晰的基础知识体系，具备解决复杂机器人工程问题的能力。他们将学习设计满足特定需求的控制系统、部件或智能化处理流程，并在设计过程中展现创新意识。同时，他们将通过科学方法研究复杂的机器人工程理论和工程问题，并开发、选择和使用适当的技术、资源、现代工程工具和信息技术工具。

在实践中，学生将理解并遵守工程职业道德和规范，承担责任，并能在多学科背景下的团队中承担各种角色，有效地与业界同行和社会公众就复杂工程问题进行沟通和交流。他们不仅能发现问题、分析问题、解决问题，还具备跨领域、跨文化、跨国界的沟通能力，以及全局观、协调力、包容心和执行力等团队领导能力。他们拥有自主学习和终身学习的意识，具有不断学习和适应发展的能力。他们在未来的机器人产业发展中发挥领导作用，掌握关键核心技术、引领未来的机器人工程行业领军人才和产业领袖，成为具有学习力、思想力、行动力的新工科“三力”卓越人才。

Robotics Engineering is an emerging engineering specialty established in response to national strategic needs and corporate demand for robotic technology. This program covers various application fields such as industry, healthcare, and services, and integrates knowledge from many disciplines including mechanical engineering, electronic engineering, automatic control, and artificial intelligence. It aims to cultivate high-level application-oriented engineering talents and technical engineering management talents.

Emphasizing the combination of theoretical knowledge and practical skills, students will establish a clear foundational knowledge system and acquire the ability to solve complex robotics engineering problems. They will learn to design control systems, components, or intelligent processing procedures to meet specific needs, demonstrating innovation in the design process. They will also research complex robotics engineering theories and engineering problems using scientific methods,

and develop, select, and use suitable technology, resources, modern engineering tools, and IT tools.

In practice, students will understand and abide by engineering professional ethics and standards, take on responsibilities, and play various roles in multidisciplinary teams, effectively communicating and engaging with industry peers and the public on complex engineering issues. Not only can they identify, analyze, and solve problems, they also have cross-disciplinary, cross-cultural, and cross-border communication skills, as well as a global perspective, coordination skills, inclusiveness, and execution abilities for team leadership. They possess the awareness for autonomous and lifelong learning and the ability to continuously learn and adapt to development. They are expected to play a leading role in the future development of the robotics industry, becoming high-level composite talents in robotics engineering and related fields.

## 专业特色（Program Features）：

机器人工程专业整合了多学科知识，注重理论与实践结合，培养学生解决复杂问题、创新思维及跨领域沟通能力。致力于培养具全局观、协调力、团队领导潜力的高层次卓越人才，为大湾区机器人产业发展提供重要支持。

The Robotics Engineering program integrates knowledge from multiple disciplines, emphasizing the combination of theory and practice, and fosters students' abilities to solve complex problems, innovative thinking, and cross-disciplinary communication skills. It is committed to cultivating high-level outstanding talents with a global perspective, coordination skills, and potential for team leadership, providing crucial support for the development of the robotics industry in the Greater Bay Area.

## 授予学位（Degree Conferred）：

工学学士学位 Bachelor of Engineering

## 核心课程（Core Courses）：

电工电子技术基础、人工智能Ⅲ：人工智能技术及应用、机器视觉及传感系统、机器人理论及技术

Fundamentals of Electronics and Electrical Technologies, Artificial Intelligence Ⅲ:Artificial Intelligence Technology and Application, Machine Vision and Sensing System, Theory and Technology of Robotics

大学分专业核心课：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、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 II、控制工程：信号与系统、控制工程：反馈控制理论

Integrated Core Courses: Intelligence Engineering: Introduction to Intelligent Engineering, Intelligence Engineering: Design and Manufacturing I, Intelligence Engineering: Design and Manufacturing II; Intelligence Engineering: Practice of Introduction to Intelligent Engineering, Intelligence Engineering: Engineering Innovation Training III, Intelligence Engineering: Design and Manufacturing II; Control Engineering: Signals and Systems, Control Engineering: Feedback Control Theory

## 特色课程（Featured Courses）：

新生研讨课：机器人工程研讨课

基于项目（设计、案例）的课程：智能工程：智能工程导论实践、电工电子技术基础实践、智能工程：工程创新训练 III、智能工程：设计与制造实践 II

国际化特色课程：机器人智能

学科前沿课：机器人工程前沿技术

跨学科交叉课程：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、GPT 机器人

校企合作课：机器人工程研讨课、机器人工程前沿技术、产品开发

创新实践课：工程创新、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 II（“三个一”）

创业教育课：工程管理导论、产品开发、工程创新

专题设计课：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 II

竞教结合课：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 II

劳动教育课：智能工程：设计与制造 II、毕业实习

Freshmen Seminars: Robotics Engineering Seminar

Project-based Courses: Intelligence Engineering: Practice of Introduction to Intelligent Engineering, Practice of Fundamentals of Electronics and Electrical Technologies, Intelligence Engineering: Engineering Innovation Training III, Intelligence Engineering: Design and Manufacturing II

Global Education Courses：Robotic Intelligence

Subject Frontiers Courses: Cutting-edge Robotics Engineering Technology

Interdisciplinary Courses: Intelligence Engineering: Introduction to Intelligent Engineering, Intelligence Engineering: Design and Manufacturing I, Intelligence Engineering: Design and Manufacturing II, GPT Robotics

Cooperative Courses with Enterprises: Robotics Engineering Seminar, Cutting-Edge Robotics

Engineering Technology, Product Development

Innovation Practice: Innovation in Engineering, Intelligence Engineering: Practice of Introduction to Intelligent Engineering (Three “ones”), Intelligence Engineering: Engineering Innovation Training III (Three “ones”), Intelligence Engineering: Design and Manufacturing II (Three “ones”)

Entrepreneurship Courses: Introduction to Engineering Management, Product Development, Innovation in Engineering

Special Designs: Intelligence Engineering: Practice of Introduction to Intelligent Engineering, Intelligence Engineering: Engineering Innovation Training III, Intelligence Engineering: Design and Manufacturing II

Contest-Teaching Integrated Courses: Intelligence Engineering: Practice of Introduction to Intelligent Engineering, Intelligence Engineering: Engineering Innovation Training III, Intelligence Engineering: Design and Manufacturing II

Education on The Hard-Working Spirit: Intelligence Engineering: Design and Manufacturing II, 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<br>Course Category | 课程要求<br>Requirement | 学分<br>Credits | 学时<br>Academic Hours | 备注<br>Remarks |
|---|---|---|---|---|
| 公共基础课<br>General Basic Courses | 必修<br>Compulsory | 56 | 1092 | |
| | 通识<br>General Education | 10 | 160 | |
| 专业基础课<br>Specialty Basic Courses | 必修<br>Compulsory | 50 | 830 | |
| 选修课<br>Elective Courses | 选修<br>Elective | 14 | 312 | |
| 合　计<br>Total | | 130 | 2394 | |
| 集中实践教学环节<br>Practice Training | 必修<br>Compulsory | 32.5 | 40.5 周<br>Weeks | |
| 毕业学分要求<br>Credits Required for Graduation | 130 + 32.5 = 162.5 | | | |

| 建议每学期修读学分<br>Suggested Credits for Each Semester | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| | 26.5 | 25 | 24 | 21 | 17 | 18 | 19 | 12 |

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 5 个人文素质教育学分和 4 个创新能力培养学分。

**2.类别统计表（Category Registration Form）**

| 学时<br>Academic Hours | | | | | 学分<br>Credits | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 总学时数<br>Total | 其中<br>Include | | 其中<br>Include | | 总学分数<br>Total | 其中<br>Include | | 其中<br>Include | | | 其中<br>Include |
| | 必修学时<br>Compulsory | 选修学时<br>Elective | 理论教学学时<br>Theory Course | 实验教学学时<br>Lab | | 必修学分<br>Compulsory | 选修学分<br>Elective | 集中实践教学环节学分<br>Practice | 理论教学学分<br>Theory Course | 实验教学学分<br>Lab | 创新创业教育学分<br>Innovation and Entrepreneurship Education |
| 2394 | 1922 | 472 | 1840 | 554 | 162.5 | 138.5 | 24 | 32.5 | 113 | 17 | 16 |

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 Analysis of the Situation & Policy | | 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 (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 (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: Fundamentals of Compute | | 32 | | | | 32 | 0 | 1 |
| | AIP045100021 | 人工智能 II：C++编程基础 Artificial Intelligence II: Fundamentals of C++ Programming | | 48 | 32 | | | 16 | 2.5 | 1 |
| | 041101155 | 大学物理III（一） General Physics (1) | | 64 | 64 | | | | 4.0 | 2 |
| | 041100344 | 大学物理III（二） General Physics (2) | | 64 | 64 | | | | 4.0 | 3 |
| | 041100671 | 大学物理实验（一） Physics Experiment (1) | | 32 | | 32 | | | 1.0 | 2 |
| | 041101051 | 大学物理实验（二） Physics Experiment (2) | | 32 | | 32 | | | 1.0 | 3 |
| | 037102786 | 大学化学 General Chemistry | | 32 | 32 | | | | 2.0 | 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）<br>EAP and Technical Communication (1) | | 32 | 32 | | | | 2.0 | 1 |
| | 044104192 | 学术英语与科技交流（二）<br>EAP and Technical Communication (2) | | 32 | 32 | | | | 2.0 | 2 |
| | 052100332 | 体育（一）<br>Physical Education (1) | | 36 | | | | 36 | 1.0 | 1 |
| | 052100012 | 体育（二）<br>Physical Education (2) | | 36 | | | | 36 | 1.0 | 2 |
| | 052100842 | 体育（三）<br>Physical Education (3) | | 36 | | | | 36 | 1.0 | 3 |
| | 052100062 | 体育（四）<br>Physical Education (4) | | 36 | | | | 36 | 1.0 | 4 |
| | 006100112 | 军事理论<br>Military Principle | | 36 | 18 | | | 18 | 2.0 | 2 |
| | | 人文科学、社会科学领域<br>Humanities, Social Science | 通识/E | 128 | 128 | | | | 8.0 | |
| | | 科学技术领域<br>Science and Technology | | 32 | 32 | | | | 2.0 | |
| | 合　计<br>**Total** | | | 1252 | 934 | 80 | | 238 | 66 | |

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。

## 二、课程设置表（续）（Courses Schedule）

| 类别<br>Course Category | 课程代码<br>Course No. | 课程名称<br>Course Title | 是否必修<br>C/E | 学时数<br>Total Curriculum Hours | | | | | 学分数<br>Credits | 开课学期<br>Semester |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 总学时<br>Class Hours | 理论<br>Theoretical class hours | 实验<br>Lab Hours | 实习<br>Practice Hours | 其它<br>Other Hours | | |
| 专业基础课 Specialty Basic Courses | IES082100011 | 智能工程：智能工程导论<br>Intelligence Engineering: Introduction to Intelligent Engineering | 必/C | 64 | 64 | | | | 4.0 | 1 |
| | 082100851 | 机器人工程研讨课<br>Robotics Engineering Seminar | 必/C | 16 | 16 | | | | 1.0 | 2 |
| | AIS082100011 | 人工智能Ⅲ：人工智能技术及应用<br>Artificial Intelligence Ⅲ: Artificial Intelligence Technology and Application | 必/C | 54 | 42 | 12 | | | 3.0 | 2 |
| | 082100602 | 工程力学<br>Engineering Mechanics | 必/C | 64 | 48 | 16 | | | 3.5 | 3 |
| | 082100871 | 智能工程数学基础 | 必/C | 48 | 48 | | | | 3.0 | 3 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mathematical Foundations for Intelligent Engineering | | | | | | | | |
| | 082101022 | 数据结构与算法<br>Data Structures and Algorithms | 必/C | 40 | 40 | | | | 2.5 | 3 |
| | 082100801 | 电工电子技术基础<br>Fundamentals of Electronics and Electrical Technologies | 必/C | 48 | 48 | | | | 3.0 | 3 |
| | CES082100011 | 控制工程：信号与系统<br>Control Engineering: Signals and Systems | 必/C | 48 | 48 | | | | 3.0 | 4 |
| | 082100811 | 动力学与振动导论<br>Introduction to Dynamics and Vibration | 必/C | 48 | 48 | | | | 3.0 | 4 |
| | IES082100021 | 智能工程: 设计与制造 I<br>Intelligence Engineering: Design and Manufacturing I | 必/C | 48 | 48 | | | | 3.0 | 4 |
| | IES082100022 | 智能工程: 设计与制造 II<br>Intelligence Engineering: Design and Manufacturing II | 必/C | 48 | 48 | | | | 3.0 | 5 |
| | CES082100021 | 控制工程：反馈控制理论<br>Control Engineering: Feedback Control Theory | 必/C | 48 | 48 | | | | 3.0 | 5 |
| | 082100831 | 工程管理导论<br>Introduction to Engineering Management | 必/C | 32 | 32 | | | | 2.0 | 5 |
| | 082100711 | 嵌入式系统与设计<br>Embedded Systems and Design | 必/C | 48 | 48 | | | | 3.0 | 5 |
| | 082100841 | 机器人工程前沿技术<br>Cutting-Edge Robotics Engineering Technology | 必/C | 16 | 16 | | | | 1.0 | 5 |
| | 082100151 | 人机交互<br>Human-Machine Interaction | 必/C | 48 | 48 | | | | 3.0 | 6 |
| | 082100192 | 机器人理论及技术<br>Theory and Technology of Robotics | 必/C | 56 | 40 | 16 | | | 3.0 | 6 |
| | 082100182 | 机器视觉及传感系统<br>Machine Vision and Sensing System | 必/C | 56 | 40 | 16 | | | 3.0 | 6 |
| | **合 计<br>Total** | | 必/C | 830 | 770 | 60 | | | **50** | |
| **选修课 Elective Courses** | 082100961 | 面向智能工程的 Python 编程技术<br>Python Programming for Intelligent Engineering | 选/E | 48 | 48 | | | | 3.0 | 2/4/6 |
| | 082100971 | 热的解析与应用<br>Analysis and Applications of Heat | 选/E | 48 | 48 | | | | 3.0 | 2/4/6 |
| | 082100931 | 工程创新<br>Innovation In Engineering | 选/E | 34 | 30 | 4 | | | 2.0 | 2/4/6/8 |
| | 082100292 | 动力系统建模、分析与控制<br>Modeling, Analysis, and Control of Dynamic System | 选/E | 48 | 48 | | | | 3.0 | 3/5 |
| | 082100612 | 计算机网络<br>Computer Networking | 选/E | 48 | 48 | | | | 3.0 | 4 |
| | 082100092 | 数据分析建模<br>Data Analysis and Modeling | 选/E | 56 | 40 | 16 | | | 3.0 | 4/ 6 |
| | 082100222 | 机电一体化<br>Mechatronics | 选/E | 64 | 32 | 32 | | | 3.0 | 4/6 |
| | 082100951 | 计算机辅助工程与机器人优化设计<br>CAE and Robot Design Optimization | 选/E | 48 | 16 | 32 | | | 2.0 | 4/6 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 082100991 | 深度学习<br>Deep Learning | 选/E | 48 | 48 | | | | 3.0 | 4/6/8 |
| | 082101071 | GPT 机器人<br>GPT Robotics | 选/E | 80 | 16 | | 64 | | 3.0 | 4/6/8 |
| | 082100551 | 自动驾驶系统<br>Autonomous Driving Systems | 选/E | 48 | 48 | | | | 3.0 | 4/6/8 |
| | 082100631 | 产品开发<br>Product Development | 选/E | 48 | 48 | | | | 3.0 | 5 |
| | 082100941 | 机器人智能<br>Robotic Intelligence | 选/E | 32 | 32 | | | | 2.0 | 5/6/7/8 |
| | 082100481 | 传感器技术及应用<br>Sensor and its Applications | 选/E | 48 | 48 | | | | 3.0 | 5/7 |
| | 082100981 | 人形与四足机器人<br>Humanoid and Quadruped Robot | 选/E | 64 | 32 | 32 | | | 3.0 | 5/7 |
| | 082100582 | 工业机器人及应用<br>Industrial Robot and its Applications | 选/E | 32 | 32 | | | | 2.0 | 5/7 |
| | 082100541 | 经典控制理论<br>Classical Control Theory | 选/E | 48 | 48 | | | | 3.0 | 5/7 |
| | 082101011 | 智能控制<br>Intelligent Control | 选/E | 48 | 48 | | | | 3.0 | 8 |
| | 084101121 | Machine Learning and Data Analysis | 选/E | 32 | | | | | 2.0 | 4/6 |
| | 020100051 | 创新研究训练<br>Innovation Research Training | 选/E | 32 | | | | | 2.0 | 7 |
| | 020100041 | 创新研究实践 I<br>Innovation Research Practice I | 选/E | 32 | | | | | 2.0 | 7 |
| | 020100031 | 创新研究实践 II<br>Innovation Research Practice II | 选/E | 32 | | | | | 2.0 | 7 |
| | 020100061 | 创业实践<br>Entrepreneurial Practice | 选/E | 32 | | | | | 2.0 | 7 |
| | 082101081 | 跨学院选修课 I<br>Interdisciplinary Elective Courses I | 选/E | 32 | | | | | 2.0 | 1-8 |
| | **合 计<br>Total** | | 选/E | 选修课修读最低要求 14 学分<br>Minimum elective course credits required: 14.0 | | | | | | |

备注：学时中其它可以为上机和实践学时。

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。

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。

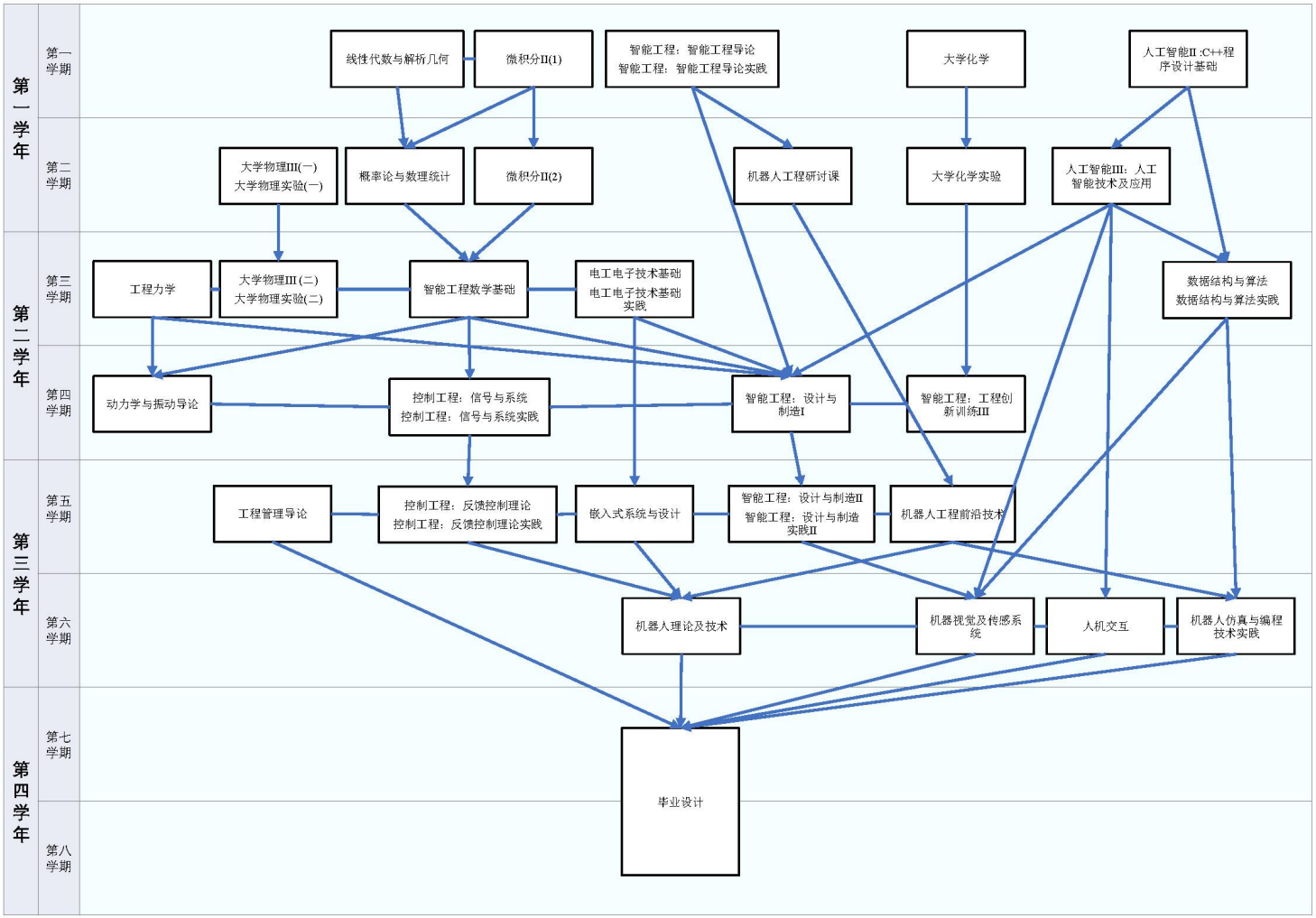
## 三、集中实践教学环节（Practice-concentrated Training）

| 课 程 代 码<br>Course No. | 课 程 名 称<br>Course Title | 是否必修<br>C/E | 学 时 数<br>Total Curriculum Hours | | 学分数<br>Credits | 开课学期<br>Semester |
|---|---|---|---|---|---|---|
| | | | 实践<br>Practice weeks | 授课<br>Lecture Hours | | |
| 006100151 | 军事技能<br>Military Training | 必/C | 2 周<br>2 weeks | | 2.0 | 1 |
| 031101551 | 马克思主义理论与实践 | 必/C | 2 周 | | 2.0 | 3 |

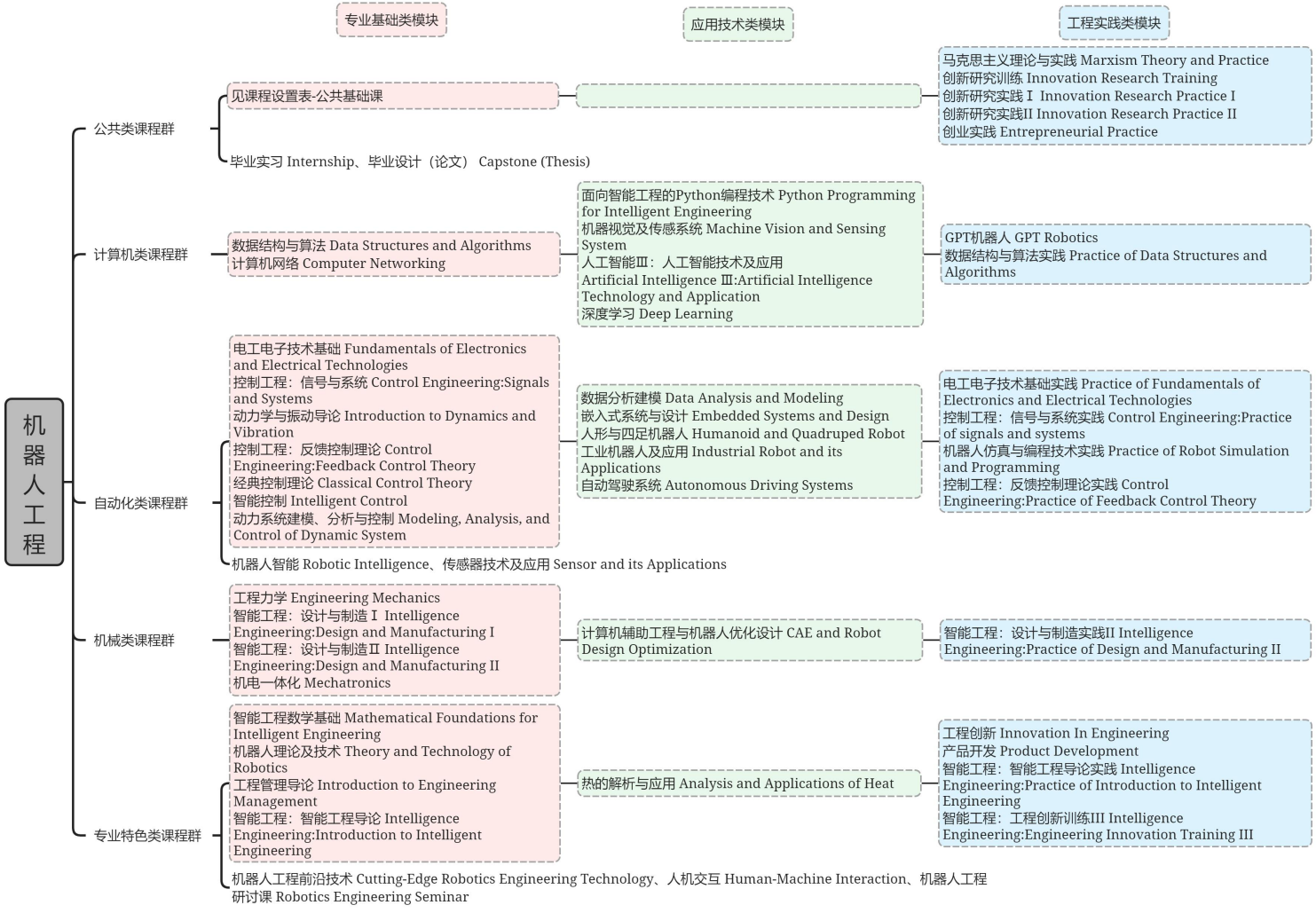
| | | | | | | |
|---|---|---|---|---|---|---|
| | Marxism Theory and Practice | | 2 weeks | | | |
| IES082100012 | 智能工程：智能工程导论实践<br>Intelligence Engineering: Practice of Introduction to Intelligent Engineering | 必/C | 2 周<br>2 weeks | | 2.0 | 1 |
| 082101021 | 数据结构与算法实践<br>Practice of Data Structures and Algorithms | 必/C | 0.5 周<br>0.5 week | | 0.5 | 3 |
| 082101031 | 电工电子技术基础实践 Practice of Fundamentals of Electronics and Electrical Technologies | 必/C | 1 周<br>1 week | | 1.0 | 3 |
| CES082100012 | 控制工程：信号与系统实践<br>Control Engineering: Practice of Signals and Systems | 必/C | 1 周<br>1 week | | 1.0 | 4 |
| IES067100011 | 智能工程：工程创新训练 III<br>Intelligence Engineering: Engineering Innovation Training III | 必/C | 5 周<br>5weeks | | 5.0 | 4 |
| CES082100022 | 控制工程：反馈控制理论实践<br>Control Engineering: Practice of Feedback Control Theory | 必/C | 1 周<br>1 week | | 1.0 | 5 |
| IES082100023 | 智能工程：设计与制造实践 II<br>Intelligence Engineering: Practice of Design and Manufacturing II | 必/C | 2 周<br>2 weeks | | 2.0 | 5 |
| 082101051 | 机器人仿真与编程技术实践<br>Practice of Robot Simulation and Programming | 必/C | 2 周<br>2 weeks | | 2.0 | 6 |
| 082101061 | 毕业实习<br>Internship | 必/C | 4 周<br>4 weeks | | 4.0 | 7 |
| 082100501 | 毕业设计（论文）<br>Capstone (Thesis) | 必/C | 18 周<br>18 weeks | | 10.0 | 7,8 |
| 合 计<br>**Total** | | 必/C | 40.5 周<br>40.5 weeks | | **32.5** | |

# 四、课程地图（Curriculum Mapping）

## 1.课程修读进程表



## 2.课程类别模块图


机器人工程
专业基础类模块
应用技术类模块
工程实践类模块
公共类课程群
见课程设置表-公共基础课
马克思主义理论与实践 Marxism Theory and Practice
创新研究训练 Innovation Research Training
创新研究实践Ⅰ Innovation Research Practice I
创新研究实践II Innovation Research Practice II
创业实践 Entrepreneurial Practice
毕业实习 Internship、毕业设计（论文） Capstone (Thesis)
计算机类课程群
数据结构与算法 Data Structures and Algorithms
计算机网络 Computer Networking
面向智能工程的Python编程技术 Python Programming for Intelligent Engineering
机器视觉及传感系统 Machine Vision and Sensing System
人工智能Ⅲ：人工智能技术及应用 Artificial Intelligence Ⅲ:Artificial Intelligence Technology and Application
深度学习 Deep Learning
GPT机器人 GPT Robotics
数据结构与算法实践 Practice of Data Structures and Algorithms
自动化类课程群
电工电子技术基础 Fundamentals of Electronics and Electrical Technologies
控制工程：信号与系统 Control Engineering:Signals and Systems
动力学与振动导论 Introduction to Dynamics and Vibration
控制工程：反馈控制理论 Control Engineering:Feedback Control Theory
经典控制理论 Classical Control Theory
智能控制 Intelligent Control
动力系统建模、分析与控制 Modeling, Analysis, and Control of Dynamic System
数据分析建模 Data Analysis and Modeling
嵌入式系统与设计 Embedded Systems and Design
人形与四足机器人 Humanoid and Quadruped Robot
工业机器人及应用 Industrial Robot and its Applications
自动驾驶系统 Autonomous Driving Systems
电工电子技术基础实践 Practice of Fundamentals of Electronics and Electrical Technologies
控制工程：信号与系统实践 Control Engineering:Practice of signals and systems
机器人仿真与编程技术实践 Practice of Robot Simulation and Programming
控制工程：反馈控制理论实践 Control Engineering:Practice of Feedback Control Theory
机器人智能 Robotic Intelligence、传感器技术及应用 Sensor and its Applications
机械类课程群
工程力学 Engineering Mechanics
智能工程：设计与制造Ⅰ Intelligence Engineering:Design and Manufacturing I
智能工程：设计与制造Ⅱ Intelligence Engineering:Design and Manufacturing II
机电一体化 Mechatronics
计算机辅助工程与机器人优化设计 CAE and Robot Design Optimization
智能工程：设计与制造实践II Intelligence Engineering:Practice of Design and Manufacturing II
专业特色类课程群
智能工程数学基础 Mathematical Foundations for Intelligent Engineering
机器人理论及技术 Theory and Technology of Robotics
工程管理导论 Introduction to Engineering Management
智能工程：智能工程导论 Intelligence Engineering:Introduction to Intelligent Engineering
热的解析与应用 Analysis and Applications of Heat
工程创新 Innovation In Engineering
产品开发 Product Development
智能工程：智能工程导论实践 Intelligence Engineering:Practice of Introduction to Intelligent Engineering
智能工程：工程创新训练III Intelligence Engineering:Engineering Innovation Training III
机器人工程前沿技术 Cutting-Edge Robotics Engineering Technology、人机交互 Human-Machine Interaction、机器人工程研讨课 Robotics Engineering Seminar

## 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 | 机器人工程专业毕业要求 Robotics 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 | | | | | | | | | | | | | | | | | ● | ● | | | | ● | | | | | | |
| 5 | 马克思主义基本原理 Fundamentals of Marxism Principle | | | | | | | | | | | | | | | | | ● | ● | | | | | | | | | | |
| 6 | 形势与政策 Analysis of the Situation & | | | | | | | | | | | | | | | | | ● | ● | | | | | | | | ● | | ● |

| 序号<br>No | 课程名<br>Course Title | 机器人工程专业毕业要求<br>Robotics 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 |
| | Policy | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 工程数学：微积分 II (一)<br>Engineering Math: Calculus (1) | ● | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 工程数学：线性代数与解析几何<br>Engineering Math:Linear Algebra & Analytic Geometry | ● | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 工程数学：微积分 II (二)<br>Engineering Math: Calculus (2) | ● | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 工程数学：概率论与数理统计<br>Engineering Math: Probability & Mathematical Statistics | ● | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 人工智能 I：大学计算机基础<br>Artificial Intelligence I: Fundamentals of Compute | | | ● | | | | ● | | | | | ● | | | | | | | | | | | | | | | | |
| 12 | 人工智能 II：C++编程基础 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| 序号 No | 课程名 Course Title | 机器人工程专业毕业要求 Robotics 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 |
| | Artificial Intelligence II: Fundamentals of C++ Programming | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | 大学物理III（一） General Physics (1) | ● | | | ● | | | | | | | | ● | | | | | | | | | | | | | | | | |
| 14 | 大学物理III（二） General Physics (2) | ● | | | ● | | | | | | | | ● | | | | | | | | | | | | | | | | |
| 15 | 大学物理实验（一） Physics Experiment (1) | ● | | | ● | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | 大学物理实验（二） Physics Experiment (2) | ● | | | ● | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 大学化学 General Chemistry | ● | | | ● | | | | | | | | | | | | | | | | | | | | | | ● | | |
| 18 | 大学化学实验 General Chemistry Experiment | ● | | | ● | | | | | | | | | | | | | | | | | | | | | | ● | | |
| 19 | 学术英语与科技交流（一） EAP and Technical Communication (1) | | | | | | | | | | | | | | | | | | | | | | ● | | | | | | |
| 20. | 学术英语与科技交流（二） EAP and Technical Communication (2) | | | | | | | | | | | | | | | | | | | | | | ● | | | | | | |

| 序号<br>No | 课程名<br>Course Title | 机器人工程专业毕业要求<br>Robotics 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 |
| 21 | 体育（一）<br>Physical Education (1) | | | | | | | | | | | | | | | | | | | ● | ● | | | | | | ● | | |
| 22 | 体育（二）<br>Physical Education (2) | | | | | | | | | | | | | | | | | | | ● | ● | | | | | | ● | | |
| 23 | 体育（三）<br>Physical Education (3) | | | | | | | | | | | | | | | | | | | ● | ● | | | | | | ● | | |
| 24 | 体育（四）<br>Physical Education (4) | | | | | | | | | | | | | | | | | | | ● | ● | | | | | | ● | | |
| 25 | 军事理论<br>Military Principle | | | | | | | | | | | | | | | | | ● | ● | ● | ● | | | | | | | | |
| 26 | 智能工程：智能工程导论<br>Intelligence Engineering: Introduction to Intelligent Engineering | ● | | | | | | ● | | | | | | | | ● | | ● | | ● | | | | | | | ● | | |
| 27 | 机器人工程研讨课<br>Robotics Engineering Seminar | | | | | | ● | | ● | | | | | | | | | | | | | ● | | | | | | | |
| 28 | 人工智能III：人工智能技术及应用<br>Artificial Intelligence Ⅲ: Artificial Intelligence Technology and Application | | | | | | ● | | | ● | | | | ● | | | | | ● | | | | | | | | | | |
| 29 | 工程力学 Engineering | ● | ● | | ● | ● | | | | ● | | ● | | | | | | | | | | | | | | | | | |

| 序号 No | 课程名 Course Title | 机器人工程专业毕业要求 Robotics 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 |
| | Mechanics | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | 智能工程数学基础 Mathematical Foundations for Intelligent Engineering | ● | | | ● | | | | | | | ● | | ● | | | | | | | | | | | | | ● | | ● |
| 31 | 数据结构与算法 Data Structures and Algorithms | ● | | | ● | | | | | | | | | ● | | | | | | | | | | | | | | ● | |
| 32 | 电工电子技术基础 Fundamentals of Electronics and Electrical Technologies | ● | ● | | | | | ● | ● | | | | | | | ● | | | | ● | | | | | | | | | |
| 33 | 控制工程：信号与系统 Control Engineering: Signals and Systems | ● | | | ● | | | | | ● | | | | | | ● | | ● | | | | | | | | | | | |
| 34 | 动力学与振动导论 Introduction to Dynamics and Vibration | ● | | | | ● | | | | ● | | | | ● | | | | | | ● | | ● | | | | | | | |
| 35 | 智能工程：设计与制造 I Intelligence Engineering: Design and Manufacturing I | | | ● | | | | ● | | | | | | ● | | | | | ● | | | ● | | | | | | | |
| 36 | 智能工程：设计与制造 II Intelligence Engineering: Design and Manufacturing II | ● | | | ● | | | | | | | | ● | | | | | | | | | | | | | | ● | | |

| 序号 No | 课程名 Course Title | 机器人工程专业毕业要求 Robotics 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 |
| 37 | 控制工程：反馈控制理论 Control Engineering: Feedback Control Theory | ● | | | ● | | | | | ● | | | | | | ● | | ● | | | | | | | | | | | |
| 38 | 工程管理导论 Introduction to Engineering Management | | | | | | | | | | | | | | | | | | | | | ● | | ● | ● | ● | | | |
| 39 | 嵌入式系统与设计 Embedded Systems and Design | | ● | | | ● | | | | | | ● | | ● | | | | | | | | | | | | | | | |
| 40 | 机器人工程前沿技术 Cutting-Edge Robotics Engineering Technology | | | | | | | | | | | | | | | | | ● | ● | | | | ● | | | | | | ● |
| 41 | 人机交互 Human-Machine Interaction | | | | | | | ● | ● | | | | ● | ● | ● | | | | | | | | | | | | | | |
| 42 | 机器人理论及技术 Theory and Technology of Robotics | ● | | | | ● | | | | | ● | | ● | | | | | | | ● | | | | | | | | | |
| 43 | 机器视觉及传感系统 Machine Vision and Sensing System | ● | | | | ● | | | | | ● | | ● | | | | | | | ● | | | | | | | | | |
| 44 | 面向智能工程的 Python 编程技术 Python Programming for Intelligent Engineering | ● | | | | | | | | | | | ● | | | | | | | ● | | | | | | | | | |

| 序号 No | 课程名 Course Title | 机器人工程专业毕业要求 Robotics 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 |
| 45 | 热的解析与应用 Analysis and Applications of Heat | | ● | | ● | | | | | ● | | | ● | | | | | | | | | | ● | | | | | ● | |
| 46 | 工程创新 Innovation In Engineering | | | | | | | | | | | | | | | | | | | | | | ● | ● | ● | ● | | | |
| 47 | 动力系统建模、分析与控制 Modeling, Analysis, and Control of Dynamic System | ● | | | | ● | | | | | | | | | ● | | | | | | | | | | | | | | |
| 48 | 计算机网络 Computer Networking | | | ● | | | ● | | | | | ● | | | | | | | | | | | | | | | ● | | ● |
| 49 | 数据分析建模 Data Analysis and Modeling | | | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |
| 50 | 机电一体化 Mechatronics | ● | ● | | | | | | | ● | | ● | ● | | | | | | | ● | | ● | | | | | ● | | |
| 51 | 计算机辅助工程与机器人优化设计 CAE and Robot Design Optimization | | | | ● | | | | | ● | | | ● | | | | | | | ● | | | | | | | ● | | |
| 52 | 深度学习 Deep Learning | ● | | | | | | | | | | | ● | | | | | | | ● | | | | | | | | | |
| 53 | GPT 机器人 GPT Robotics | | | | | | | ● | | | | | ● | | | | | | | ● | | ● | | | | | | | |
| 54 | 自动驾驶系统 | ● | | | | ● | | ● | | | ● | | | | ● | | | | | | | | | | | | | | |

| 序号 No | 课程名 Course Title | 机器人工程专业毕业要求 Robotics 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 |
| | Autonomous Driving Systems | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 55 | 产品开发 Product Development | ● | | | ● | | | ● | ● | | | | | | | ● | ● | | | | | | | | | | | | |
| 56 | 机器人智能 Robotic Intelligence | ● | | | | ● | | | | | | | | | | | ● | | | | | | | | | | | | |
| 57 | 传感器技术及应用 Sensor and its Applications | ● | ● | | | | | ● | | | | | | | | | | | | | | | | | | | | | ● |
| 58 | 人形与四足机器人 Humanoid and Quadruped Robot | ● | ● | | ● | ● | | | | ● | | | | | | | | | | ● | | | | | | | ● | | ● |
| 59 | 工业机器人及应用 Industrial Robot and its Applications | | | ● | | | ● | ● | | ● | | | | | | | ● | ● | | | | ● | | | | | | ● | |
| 60 | 经典控制理论 Classical Control Theory | ● | | | ● | | | | | | | | ● | | | | | ● | | ● | | | | | | | ● | | |
| 61 | 智能控制 Intelligent Control | | ● | ● | | ● | | | | | ● | ● | | ● | | | | | | | | | | | | | | | |
| 62 | 创新研究训练 Innovation Research Training | | | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | | | |
| 63 | 创新研究实践 I Innovation Research Practice I | | | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | | | |

| 序号 No | 课程名 Course Title | 机器人工程专业毕业要求 Robotics 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 |
| 64 | 创新研究实践 II Innovation Research Practice II | | | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | | | |
| 65 | 创业实践 Entrepreneurial Practice | | | | | | | ● | ● | | | | | | | | | | | | | ● | ● | | | | ● | ● | ● |
| 66 | 军事技能 Military Training | | | | | | | | | | | | | | | | | ● | ● | ● | ● | | | | | | | | |
| 67 | 马克思主义理论与实践 Marxism Theory and Practice | | | | | | | | | | | | | | | | | ● | ● | | | | ● | | | | | | |
| 68 | 智能工程：智能工程导论实践 Intelligence Engineering: Practice of Introduction to Intelligent Engineering | ● | | | ● | | | | | ● | | | | | ● | | | | | | | ● | | | | | ● | | |
| 69 | 数据结构与算法实践 Practice of Data Structures and Algorithms | | ● | | ● | | | | | | | | | ● | | | | | | | ● | | | | | | | | |
| 70 | 电工电子技术基础实践 Practice of Fundamentals of Electronics and Electrical Technologies | ● | ● | | ● | | | ● | ● | | | | | | | | | | | | | | | | | | | | |
| 71 | 控制工程：信号与系统实践 Control Engineering: Practice of Signals and | | | | | | ● | | | | | ● | | | ● | | | | | ● | | ● | | | | | | | |

| 序号<br>No | 课程名<br>Course Title | 机器人工程专业毕业要求<br>Robotics 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 |
| | Systems | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 72 | 智能工程：工程创新训练 III<br>Intelligence Engineering: Engineering Innovation Training III | | | | | | | | | | | ● | ● | | | | | | | ● | ● | | | | | | ● | | |
| 73 | 控制工程：反馈控制理论实践<br>Control Engineering: Practice of Feedback Control Theory | | | ● | | | ● | ● | | | | ● | | | ● | | | | | | ● | | | | | | | | |
| 74 | 智能工程：设计与制造实践 II<br>Intelligence Engineering: Practice of Design and Manufacturing II | | | | | | ● | ● | | | | | | | | | | | | ● | | ● | | | | ● | | | |
| 75 | 机器人仿真与编程技术实践<br>Practice of Robot Simulation and Programming | | | ● | | | ● | ● | | | | | | | ● | | | | | ● | | | | | | | ● | ● | |
| 76 | 毕业实习<br>Internship | | | | | | | | | | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 77 | 毕业设计（论文）<br>Capstone (Thesis) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | ● | ● | | ● | | ● | ● | ● |

# 六、第二课堂 (“Second Classroom” Activities)

第二课堂由人文素质教育和创新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 5 个学分。其中，大学体育教学团队开设课外体育课程，高年级本科生必修，72 学时，1 学分，纳入第二课堂人文素质教育学分。大学生心理健康教育，2 学分，虚拟第三学期开设，纳入第二课堂人文素质教育学分。

**2.创新能力培养基本要求**

学生在取得本专业教学计划规定学分的同时，至少参加一项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）、百步梯攀登计划或各类课外创新能力培养活动（如学科竞赛等）。学生参加上述活动及创新能力培养相关学术讲座所获学分累计不少于 4 个学分。

“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 five credits. The advanced undergraduates must complete one of courses of Humanities Quality Education which has seventy-two class hours (it's equivalent to one credit which belongs to Humanities Quality Education Credit of Extracurricular Class) offered by the College Physical Education Teaching Group. Mental Health Education for College Students (2 credits) is opened in virtual third semester which belongs to Humanities Quality Education Credit of Extracurricular Class.

(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.

# 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。培养在知识、能力、素质和德、智、体、美诸方面全面发展，具有坚实的数学、物理、计算机和信息处理等基础知识，掌握机械工程、电子工程、自动化控制工程、计算机技术等多学科交叉知识，掌握智能工程基础理论、方法和应用技术，具备突出的科学素养、创新能力与国际视野，兼具社会责任感和国际胜任力，未来能在我国智能制造工程技术与产业发展中发挥领军作用，并有潜力成为国际一流科学家、工程师和企业家的优秀拔尖人才。

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卓越人才，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 knowledge, abilities, qualities, ethics, intellect, physique, and aesthetics. They will acquire a solid foundation in mathematics, physics, computer science, and information processing, as well as gain interdisciplinary knowledge in fields such as mechanical engineering, electronic engineering, automation control engineering, and computer technology. Additionally, they will master the fundamental theories, methods, 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 engineering technology and industry 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 a 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：能够将扎实的数学、自然科学、工程基础和智能制造工程专业知识运用于解决智能制造设计和控制等领域的复杂工程问题。

№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：利用数学、自然科学和工程科学的第一原理，识别、制定、研究并分析复杂的工程问题，得出有根据的结论，对可持续发展进行整体考虑。

№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，表述智能制造工程专业的复杂工程问题；

№2.2 能够基于数学、自然科学和工程科学的第一原理和数学模型，并借助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 能认识到解决复杂工程问题有多种方案可选择，并能通过文献寻求可能的解决方案，对可持续发展进行整体考虑。

№3. 设计/开发解决方案：为复杂的工程问题设计创造性的解决方案，并设计系统、部件或流程，以满足确定的需求，同时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。

№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与智能制造相关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. 工具的使用：创造、选择、应用适当的技术、资源以及现代工程和信息技术工具，包括预测和建模，认识其局限性，以解决复杂的工程问题。

№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. 工程师与世界：分析和评估可持续发展的成果，社会、经济、可持续性和健康与安全、法律和环境在解决复杂工程问题中的影响。

№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. 伦理：运用伦理原则，致力于职业伦理工程实践和规范；并遵守相关的国家和国际法律。表现出理解多元化和包容性的必要性。

№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. 个人和协作的团队工作：在多元化和包容性的团队中，以及多学科、远程和分布式的环境中，作为个人、成员或领导有效地发挥作用。

№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：在复杂的工程活动中与工程界和整个社会进行有效和包容的沟通， 包括撰写和理解有效的报告和设计文件，并进行有效的介绍；考虑到文化、 语言和学习差异。

№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. 项目管理和财务：应用对工程管理原则和经济决策的知识和理解，并将其应用于自己的工作，作为团队的成员和领导者，管理项目和多学科环境。

№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. 持续的终身学习：认识到需要并有准备和能力从事：i)独立和终身学习 ii) 适应新技术和新兴技术，以及 iii) 在最广泛的技术变革背景下进行批判性思考。

№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: Being able to apply solid knowledge of mathematics, natural sciences, engineering fundamentals, and intelligent manufacturing engineering to solve complex engineering problems in the field of intelligent manufacturing design and control.

№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: Identifying, formulating, researching, and analyzing complex engineering problems in the field of intelligent manufacturing using the first principles of mathematics, natural sciences, and engineering sciences, drawing well-founded conclusions, and considering sustainability as a whole.

№2.1. Being able to apply the first principles of mathematics, natural sciences, and engineering sciences to identify and determine the key aspects of complex engineering problems in the field of intelligent manufacturing engineering, and describe these problems.

№2.2. Being able to analyze the characteristics of complex engineering problems in the field of intelligent manufacturing engineering based on the first principles of mathematics, natural sciences, engineering sciences, and mathematical models, and through literature research.

№2.3. Recognizing that there are multiple options for solving complex engineering problems and being able to seek potential solutions through literature, while considering sustainability as a whole.

№3. Design/Development of Solutions: Designing creative solutions for complex engineering problems and designing systems, components, or processes to meet specific requirements, while appropriately considering public health and safety, the life-cycle cost, net-zero carbon, as well as resource, cultural, social, and environmental factors.

№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: Conducting research on complex engineering problems related to intelligent manufacturing. using scientific principles and scientific methods, including designing experiments, analyzing and interpreting data, and drawing reasonable and effective conclusions through information synthesis.

№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 Tools: Creating, selecting, and applying appropriate technologies, resources, as well as modern engineering and information technology tools, including prediction and modeling, understanding their limitations, to solve complex engineering problems.

№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. Engineer and the World: Analyzing and evaluating the achievements of sustainable development, as well as the impact of social, economic, sustainability, health and safety, legal, and environmental factors on solving complex engineering problems.

№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. Ethics: Applying ethical principles to professional engineering practices and standards, and

complying with relevant national and international laws. Demonstrating the necessity of understanding diversity and inclusiveness.

№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 Teamwork: Effectively contributing as an individual, member, or leader in diverse and inclusive teams, as well as in multidisciplinary, remote, and distributed environments.

№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: Engaging in effective and inclusive communication with the engineering community and society as a whole in complex engineering activities, including writing and understanding effective reports and design documents, and delivering effective presentations, considering cultural, linguistic, and learning 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 and Finance: Applying knowledge and understanding of engineering management principles and economic decision-making, and applying them to one's own work as a member and leader of a team, managing projects and multidisciplinary environments.

№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. Continuous Lifelong Learning: Recognize the need and be prepared and capable to engage in: i) independent and lifelong learning ii) adapting to new technologies and emerging technologies, and iii) critical thinking in the broadest context of technological change.

№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 | ● | | ● | | |

| 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 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:

| Educational Objective / Student Outcome | 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 | ● | | ● | ● | ● |

| Educational Objective / Student Outcome | Educational Objective 1 | Educational Objective 2 | Educational Objective 3 | Educational Objective 4 | Educational Objective 5 |
|---|---|---|---|---|---|
| Student Outcome 6.2 | ● | | ● | ● | ● |
| Student Outcome 7.1 | ● | | ● | | |
| Student Outcome 7.2 | ● | | ● | | |
| Student Outcome 8.1 | | | ● | ● | |
| Student Outcome 8.2 | | | ● | ● | |
| 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）：

智能制造工程是新兴的工科专业，随着国家战略需求和智能制造的快速发展，对该专业人才的需求将更加迫切。该专业旨在培养创新型、综合型的顶尖人才，满足国家制造业转型升级和人工智能相关技术与产业发展的需求。旨在培养创新型、综合型的顶尖人才，以满足国家制造业转型升级和人工智能相关技术与产业发展的需求。

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。着重理论与实践技能结合，学生将建立清晰的基础知识体系，具备解决复杂智能制造工程问题的能力。学生将通过科学方法研究复杂的智能制造工程理论和工程问题，并开发、选择和使用适当的技术、资源、现代工程工具和信息技术工具。

在实践中，学生将遵守工程职业道德和规范，承担责任，在多学科团队中与业界和社会进行有效沟通。他们具备解决复杂工程问题的能力，跨领域、跨文化、跨国界的沟通能力，以及全局观、协调力、包容心和执行力等团队领导能力。他们具备自主学习和终身学习的意识，能够不断适应发展变化。智能制造工程专业毕业生在未来的智能制造产业中发挥领导作用，掌握智能制造行业关键核心技术、能够发挥引领作用，成为具有学习力、思想力、行动力的新工科“三力”卓越行业领军人才。

Intelligent Manufacturing Engineering is an emerging discipline in the field of engineering. With the rapid development of intelligent manufacturing and the strategic demands of the country, the

demand for professionals in this field is becoming increasingly urgent. The program aims to cultivate innovative and well-rounded top talents to meet the needs of the national manufacturing industry's transformation, upgrading, and the development of artificial intelligence-related technologies and industries.

The program encompasses advanced manufacturing technology, intelligent systems, system modeling and optimization, information integration, perception, automation control, and robotics. It emphasizes the integration of theoretical knowledge and practical skills, enabling students to establish a solid foundation and develop the ability to solve complex problems in intelligent manufacturing engineering. Through scientific methods, students will conduct research on complex theoretical and engineering problems in intelligent manufacturing, and utilize appropriate technologies, resources, modern engineering tools, and information technology tools.

In practice, students will adhere to engineering professional ethics and standards, take responsibility, and effectively communicate with industry and society within multidisciplinary teams. They will possess problem-solving capabilities in complex engineering issues, cross-disciplinary, cross-cultural, and international communication skills, as well as team leadership abilities such as a global perspective, coordination, inclusiveness, and execution. They will also have a strong awareness of independent learning and lifelong learning, enabling them to adapt to continuous development and change. Graduates of the Intelligent Manufacturing Engineering program will play leadership roles in the future intelligent manufacturing industry, becoming high-level, multidisciplinary outstanding talents and driving the development of intelligent manufacturing engineering and related fields.

## 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。

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.

## 授予学位（Degree Conferred）：

工学学士学位 Bachelor of Engineering

## 核心课程（Core Courses）：

电工电子技术基础、人工智能III：人工智能技术及应用、智能装备与工业物联网、生产计划

Fundamentals of Electronics and Electrical Technologies, Artificial Intelligence Ⅲ: Artificial Intelligence Technology and Application, Intelligent Equipment and Industrial Internet of Things, Production Planning

大学分专业核心课：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、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 II、控制工程：信号与系统、控制工程：反馈控制理论

Integrated Core Courses: Intelligence Engineering: Introduction to Intelligent Engineering, Intelligence Engineering: Design and Manufacturing I, Intelligence Engineering: Design and Manufacturing II; Intelligence Engineering: Practice of Introduction to Intelligent Engineering, Intelligence Engineering: Engineering Innovation Training III, Intelligence Engineering: Design and Manufacturing II; Control Engineering: Signals and Systems, Control Engineering: Feedback Control Theory

## 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、电工电子技术基础实践、智能工程：工程创新训练 III、智能工程：设计与制造实践 II

国际化特色课程：数字孪生

学科前沿课：智能制造工程前沿技术

跨学科交叉课程：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、GPT 机器人

校企合作课：智能制造工程研讨课、智能制造工程前沿技术、产品开发

创新实践课：工程创新、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 II（“三个一”）

创业教育课：工程管理导论、产品开发、工程创新

专题设计课：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 II

竞教结合课：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 II

劳动教育课：智能工程：设计与制造 II、毕业实习

Freshmen Seminars：Intelligent Manufacturing Engineering Seminar

Project-based Courses: Intelligence Engineering: Practice of Introduction to Intelligent Engineering, Practice of Fundamentals of Electronics and Electrical Technologies, Intelligence Engineering: Engineering Innovation Training III, Intelligence Engineering: Design and Manufacturing II

Global Education Courses：Digital Twin

Subject Frontiers Courses: Cutting-edge Intelligent Manufacturing Engineering Technology

Interdisciplinary Courses: Intelligence Engineering: Introduction to Intelligent Engineering, Intelligence Engineering: Design and Manufacturing I, Intelligence Engineering: Design and Manufacturing II, GPT Robotics

Cooperative Courses with Enterprises: Intelligent Manufacturing Engineering Seminar, Cutting-Edge Intelligent Manufacturing Engineering Technology, Product Development

Innovation Practice: Innovation in Engineering, Intelligence Engineering: Practice of Introduction to Intelligent Engineering (Three “ones”), Intelligence Engineering: Engineering Innovation Training III (Three “ones”), Intelligence Engineering: Design and Manufacturing II (Three “ones”)

Entrepreneurship Courses: Introduction to Engineering Management, Product Development, Innovation in Engineering

Special Designs: Intelligence Engineering: Practice of Introduction to Intelligent Engineering, Intelligence Engineering: Engineering Innovation Training III, Intelligence Engineering: Design and Manufacturing II

Contest-Teaching Integrated Courses: Intelligence Engineering: Practice of Introduction to Intelligent Engineering, Intelligence Engineering: Engineering Innovation Training III, Intelligence Engineering: Design and Manufacturing II

Education on The Hard-Working Spirit: Intelligence Engineering: Design and Manufacturing II, 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<br>Course Category | 课程要求<br>Requirement | 学分<br>Credits | 学时<br>Academic Hours | 备注<br>Remarks |
|---|---|---|---|---|
| 公共基础课<br>General Basic Courses | 必修<br>Compulsory | 56 | 1092 | |
| | 通识<br>General Education | 10 | 160 | |
| 专业基础课<br>Specialty Basic Courses | 必修<br>Compulsory | 50 | 814 | |
| 选修课<br>Elective Courses | 选修<br>Elective | 16 | 338 | |
| 合　计<br>Total | | 132 | 2404 | |
| 集中实践教学环节<br>Practice Training | 必修<br>Compulsory | 30.5 | 38.5 周<br>38.5 Weeks | |
| 毕业学分要求<br>Credits Required for Graduation | 132+ 30.5 =162.5 | | | |

| 建议每学期修读学分<br>Suggested Credits for Each Semester | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| | 26.5 | 25 | 24 | 21 | 17 | 19 | 18 | 12 |

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 5 个人文素质教育学分和 4 个创新能力培养学分。

**2.类别统计表（Category Registration Form）**

| 学时<br>Academic Hours | | | | | 学分<br>Credits | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 总学时数<br>Total | 其中<br>Include | | 其中<br>Include | | 总学分数<br>Total | 其中<br>Include | | 其中<br>Include | | | 其中<br>Include |
| | 必修学时<br>Compulsory | 选修学时<br>Elective | 理论教学学时<br>Theory Course | 实验教学学时<br>Lab | | 必修学分<br>Compulsory | 选修学分<br>Elective | 集中实践教学环节学分<br>Practice | 理论教学学分<br>Theory Course | 实验教学学分<br>Lab | 创新创业教育学分<br>Innovation and Entrepreneurship Education |
| 2404 | 1906 | 498 | 1894 | 510 | 162.5 | 136.5 | 26 | 30.5 | 116 | 16 | 16 |

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<br>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<br>Ethics and Rule of Law | | 40 | 36 | | | 4 | 2.5 | 2 |
| | 031101371 | 中国近现代史纲要<br>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<br>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<br>Analysis of the Situation & Policy | | 40 | 36 | | | 4 | 2.5 | 4 |
| | 031101331 | 形势与政策<br>Analysis of the Situation & Policy | | 64 | 64 | | | | 2.0 | 1-8 |
| | EMP040100011 | 工程数学：微积分 II (一)<br>Engineering Math: Calculus (1) | | 80 | 80 | | | | 5.0 | 1 |
| | EMP040100021 | 工程数学：线性代数与解析几何<br>Engineering Math: Linear Algebra & Analytic Geometry | | 48 | 48 | | | | 3.0 | 1 |
| | EMP040100012 | 工程数学：微积分 II (二)<br>Engineering Math: Calculus (2) | | 80 | 80 | | | | 5.0 | 2 |
| | EMP040100031 | 工程数学：概率论与数理统计<br>Engineering Math: Probability & Mathematical Statistics | | 48 | 48 | | | | 3.0 | 2 |
| | AIP045100011 | 人工智能 I：大学计算机基础<br>Artificial Intelligence I: Fundamentals of Computer | | 32 | | | | 32 | | 1 |
| | AIP045100021 | 人工智能 II：C++编程基础<br>Artificial Intelligence II: Fundamentals of C++ Programming | | 48 | 32 | | | 16 | 2.5 | 1 |
| | 041101155 | 大学物理III（一）<br>General Physics (1) | | 64 | 64 | | | | 4.0 | 2 |
| | 041100344 | 大学物理III（二）<br>General Physics (2) | | 64 | 64 | | | | 4.0 | 3 |
| | 041100671 | 大学物理实验（一）<br>Physics Experiment (1) | | 32 | | 32 | | | 1.0 | 2 |
| | 041101051 | 大学物理实验（二）<br>Physics Experiment (2) | | 32 | | 32 | | | 1.0 | 3 |
| | 037102786 | 大学化学<br>General Chemistry | | 32 | 32 | | | | 2.0 | 1 |
| | 037101943 | 大学化学实验 | | 16 | | 16 | | | 0.5 | 2 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | General Chemistry Experiment | | | | | | | | |
| | 044104182 | 学术英语与科技交流（一）<br>EAP and Technical Communication (1) | | 32 | 32 | | | | 2.0 | 1 |
| | 044104192 | 学术英语与科技交流（二）<br>EAP and Technical Communication (2) | | 32 | 32 | | | | 2.0 | 2 |
| | 052100332 | 体育（一）<br>Physical Education (1) | | 36 | | | | 36 | 1.0 | 1 |
| | 052100012 | 体育（二）<br>Physical Education (2) | | 36 | | | | 36 | 1.0 | 2 |
| | 052100842 | 体育（三）<br>Physical Education (3) | | 36 | | | | 36 | 1.0 | 3 |
| | 052100062 | 体育（四）<br>Physical Education (4) | | 36 | | | | 36 | 1.0 | 4 |
| | 006100112 | 军事理论<br>Military Principle | | 36 | 18 | | | 18 | 2.0 | 2 |
| | | 人文科学、社会科学领域<br>Humanities, Social Science | 通识/E | 128 | 128 | | | | 8.0 | |
| | | 科学技术领域<br>Science and Technology | | 32 | 32 | | | | 2.0 | |
| | 合　计<br>**Total** | | | 1252 | 934 | 80 | | 238 | 66 | |

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。

## 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 | IES082100011 | 智能工程：智能工程导论<br>Intelligence Engineering: Introduction to Intelligent Engineering | 必/C | 64 | 64 | | | | 4.0 | 1 |
| | 082100901 | 智能制造工程研讨课<br>Intelligent Manufacturing Engineering Seminar | 必/C | 16 | 16 | | | | 1.0 | 2 |
| | AIS082100011 | 人工智能Ⅲ：人工智能技术及应用<br>Artificial IntelligenceⅢ: Artificial Intelligence Technology and Application | 必/C | 54 | 42 | 12 | | | 3.0 | 2 |
| | 082100602 | 工程力学<br>Engineering Mechanics | 必/C | 64 | 48 | 16 | | | 3.5 | 3 |
| | 082100871 | 智能工程数学基础<br>Mathematical Foundations for Intelligent Engineering | 必/C | 48 | 48 | | | | 3.0 | 3 |
| | 082101022 | 数据结构与算法<br>Data Structures and Algorithms | 必/C | 40 | 40 | | | | 2.5 | 3 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 082100801 | 电工电子技术基础<br>Fundamentals of Electronics and Electrical Technologies | 必/C | 48 | 48 | | | | 3.0 | 3 |
| | CES082100011 | 控制工程：信号与系统<br>Control Engineering: Signals and Systems | 必/C | 48 | 48 | | | | 3.0 | 4 |
| | 082100811 | 动力学与振动导论<br>Introduction to Dynamics and Vibration | 必/C | 48 | 48 | | | | 3.0 | 4 |
| | IES082100021 | 智能工程：设计与制造 I<br>Intelligence Engineering: Design and Manufacturing I | 必/C | 48 | 48 | | | | 3.0 | 4 |
| | IES082100022 | 智能工程：设计与制造 II<br>Intelligence Engineering: Design and Manufacturing II | 必/C | 48 | 48 | | | | 3.0 | 5 |
| | CES082100021 | 控制工程：反馈控制理论<br>Control Engineering: Feedback Control Theory | 必/C | 48 | 48 | | | | 3.0 | 5 |
| | 082100831 | 工程管理导论<br>Introduction to Engineering Management | 必/C | 32 | 32 | | | | 2.0 | 5 |
| | 082100911 | 智能制造工程前沿技术<br>Cutting-Edge Intelligent Manufacturing Engineering Technology | 必/C | 16 | 16 | | | | 1.0 | 5 |
| | 082100921 | 智能装备与工业物联网<br>Intelligent Equipment and Industrial Internet of Things | 必/C | 48 | 48 | | | | 3.0 | 5 |
| | 082100151 | 人机交互<br>Human-Machine Interaction | 必/C | 48 | 48 | | | | 3.0 | 6 |
| | 082100881 | 热流科学导论<br>Introduction to Thermodynamics and Fluid Mechanics | 必/C | 48 | 48 | | | | 3.0 | 6 |
| | 082100891 | 生产计划<br>Production Planning | 必/C | 48 | 48 | | | | 3.0 | 6 |
| | **合 计<br>Total** | | 必/C | **814** | **786** | **28** | | | **50** | |
| **选修课 Elective Courses** | 082100961 | 面向智能工程的 Python 编程技术<br>Python Programming for Intelligent Engineering | 选/E | 48 | 48 | | | | 3.0 | 2/4/6 |
| | 082100971 | 热的解析与应用<br>Analysis and Applications of Heat | 选/E | 48 | 48 | | | | 3.0 | 2/4/6 |
| | 082100022 | 制造系统分析及设计<br>Analytics and Design of Manufacturing Systems | 选/E | 32 | 32 | | | | 2.0 | 2/4/6 |
| | 082100931 | 工程创新<br>Innovation in Engineering | 选/E | 34 | 30 | 4 | | | 2.0 | 2/4/6/8 |
| | 082100242 | 工业大数据分析及应用<br>Big Data Analytics and Applications in Industry | 选/E | 56 | 40 | 16 | | | 3.0 | 3/4/5/6/7/8 |
| | 082100292 | 动力系统建模、分析与控制<br>Modeling, Analysis, and Control of Dynamic System | 选/E | 48 | 48 | | | | 3.0 | 3/5 |
| | 082100612 | 计算机网络<br>Computer Networking | 选/E | 48 | 48 | | | | 3.0 | 4 |
| | 082100092 | 数据分析建模 | 选/E | 56 | 40 | 16 | | | 3.0 | 4/6 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Data Analysis and Modeling | | | | | | | | |
| | 082100222 | 机电一体化<br>Mechatronics | 选/E | 64 | 32 | 32 | | | 3.0 | 4/6 |
| | 082100951 | 计算机辅助工程与机器人优化设计<br>CAE and Robot Design Optimization | 选/E | 48 | 16 | 32 | | | 2.0 | 4/6 |
| | 082100991 | 深度学习<br>Deep Learning | 选/E | 48 | 48 | | | | 3.0 | 4/6/8 |
| | 082101071 | GPT 机器人<br>GPT Robotics | 选/E | 80 | 16 | | 64 | | 3.0 | 4/6/8 |
| | 082100551 | 自动驾驶系统<br>Autonomous Driving Systems | 选/E | 48 | 48 | | | | 3.0 | 4/6/8 |
| | 082100631 | 产品开发<br>Product Development | 选/E | 48 | 48 | | | | 3.0 | 5 |
| | 082101001 | 数字孪生<br>Digital Twin | 选/E | 32 | 32 | | | | 2.0 | 5/6/7/8 |
| | 082100481 | 传感器技术及应用<br>Sensor and its Applications | 选/E | 48 | 48 | | | | 3.0 | 5/7 |
| | 082100541 | 经典控制理论<br>Classical Control Theory | 选/E | 48 | 48 | | | | 3.0 | 5/7 |
| | 082100511 | 智能工厂<br>Smart Factory | 选/E | 48 | 48 | | | | 3.0 | 6 |
| | 082100521 | 先进制造技术<br>Advanced Manufacturing Technology | 选/E | 48 | 48 | | | | 3.0 | 8 |
| | 082101011 | 智能控制<br>Intelligent Control | 选/E | 48 | 48 | | | | 3.0 | 8 |
| | 084101121 | Machine Learning and Data Analysis | 选/E | 32 | | | | | 2.0 | 4/6 |
| | 020100051 | 创新研究训练<br>Innovation Research Training | 选/E | 32 | | | | | 2.0 | 7 |
| | 020100041 | 创新研究实践 I<br>Innovation Research Practice I | 选/E | 32 | | | | | 2.0 | 7 |
| | 020100031 | 创新研究实践 II<br>Innovation Research Practice II | 选/E | 32 | | | | | 2.0 | 7 |
| | 020100061 | 创业实践<br>Entrepreneurial Practice | 选/E | 32 | | | | | 2.0 | 7 |
| | 082101081 | 跨学院选修课 I<br>Interdisciplinary Elective Courses I | 选/E | 32 | | | | | 2.0 | 1-8 |
| 备注：学时中其它可以为讨论和实践学时。 | | **Total** | 选/E | 选修课修读最低要求 **16** 学分<br>Minimum elective course credits required: 16.0 | | | | | | |

1.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。

2.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。

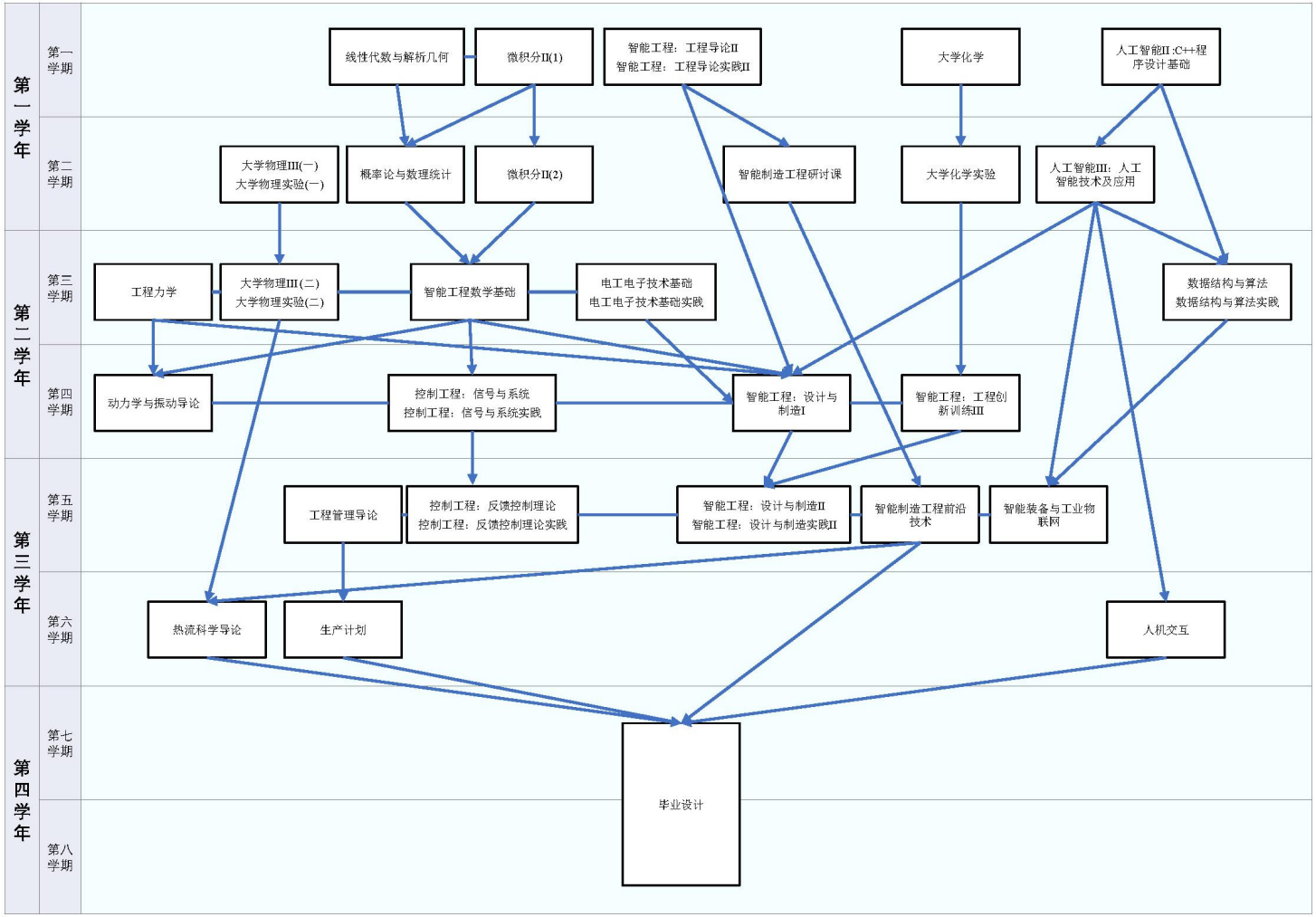
## 三、集中实践教学环节（Practice-concentrated Training）

| 课 程 代 码<br>Course No. | 课 程 名 称<br>Course Title | 是否必修<br>C/E | 学 时 数<br>Total Curriculum Hours | | 学分数<br>Credits | 开课学期<br>Semester |
|---|---|---|---|---|---|---|
| | | | 实践<br>Practice weeks | 授课<br>Lecture Hours | | |
| 006100151 | 军事技能 | 必/C | 2 周 | | 2.0 | 1 |

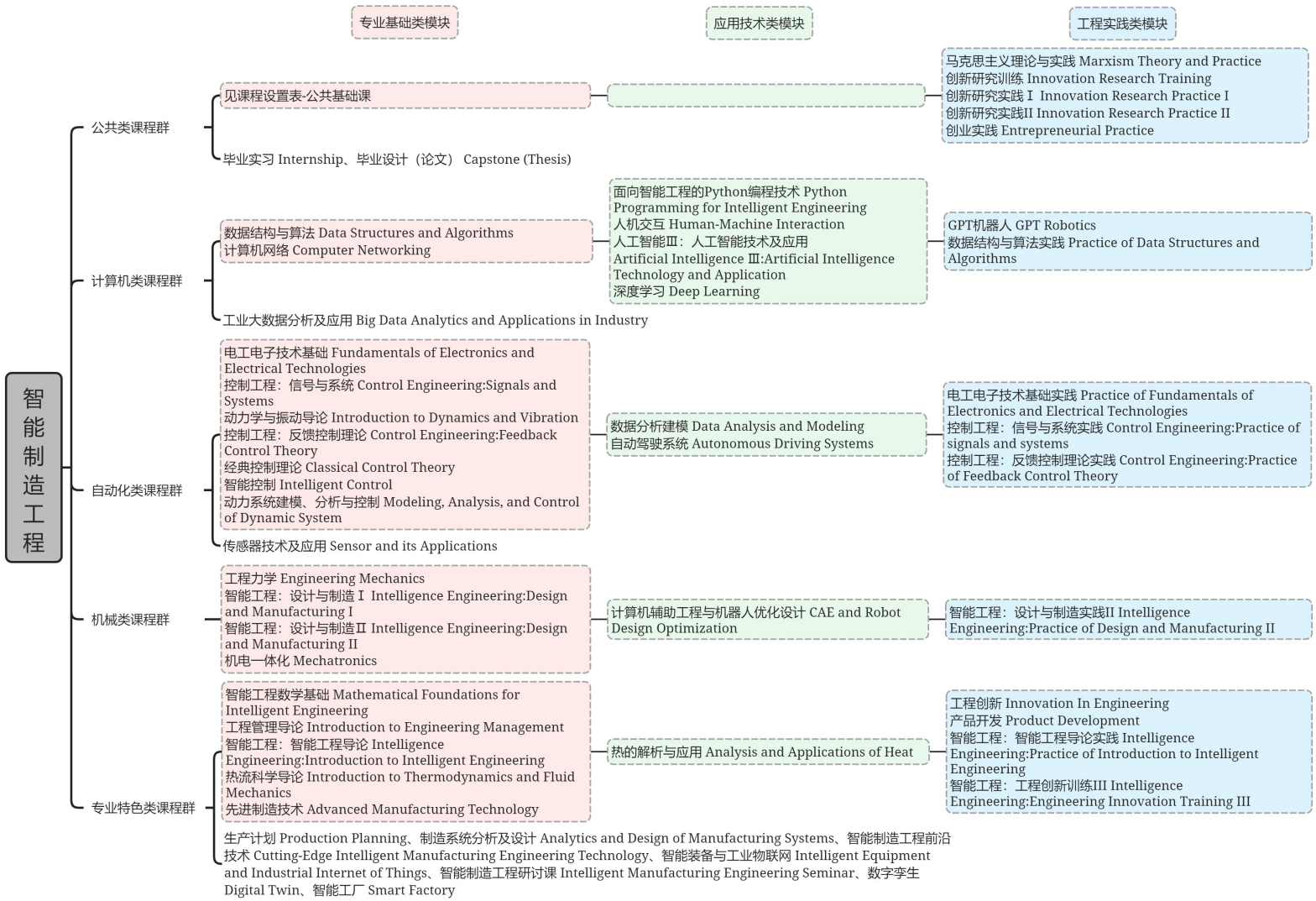
| | | | | | | |
|---|---|---|---|---|---|---|
| | Military Training | | 2 weeks | | | |
| 031101551 | 马克思主义理论与实践<br>Marxism Theory and Practice | 必/C | 2 周<br>2 weeks | | 2.0 | 3 |
| IES082100012 | 智能工程：智能工程导论实践<br>Intelligence Engineering: Practice of Introduction to Intelligent Engineering | 必/C | 2 周<br>2 weeks | | 2.0 | 1 |
| 082101021 | 数据结构与算法实践<br>Practice of Data Structures and Algorithms | 必/C | 0.5 周<br>0.5 week | | 0.5 | 3 |
| 082101031 | 电工电子技术基础实践<br>Practice of Fundamentals of Electronics and Electrical Technologies | 必/C | 1 周<br>1 week | | 1.0 | 3 |
| CES082100012 | 控制工程：信号与系统实践<br>Control Engineering: Practice of Signals and Systems | 必/C | 1 周<br>1 week | | 1.0 | 4 |
| IES067100011 | 智能工程：工程创新训练 III<br>Intelligence Engineering: Engineering Innovation Training III | 必/C | 5 周<br>5 weeks | | 5.0 | 4 |
| CES082100022 | 控制工程：反馈控制理论实践<br>Control Engineering: Practice of Feedback Control Theory | 必/C | 1 周<br>1 week | | 1.0 | 5 |
| IES082100023 | 智能工程：设计与制造实践 II<br>Intelligence Engineering: Practice of Design and Manufacturing II | 必/C | 2 周<br>2 weeks | | 2.0 | 5 |
| 082101061 | 毕业实习<br>Internship | 必/C | 4 周<br>4 weeks | | 4.0 | 7 |
| 082100501 | 毕业设计（论文）<br>Capstone (Thesis) | 必/C | 18 周<br>18 weeks | | 10.0 | 7-8 |
| **合 计<br>Total** | | 必/C | 38.5 周<br>38.5 weeks | | **30.5** | |

# 四、课程地图（Curriculum Mapping）

## 1. 课程修读进程表



## 2. 课程类别模块图


专业基础类模块
应用技术类模块
工程实践类模块
智能制造工程
公共类课程群
见课程设置表-公共基础课
马克思主义理论与实践 Marxism Theory and Practice
创新研究训练 Innovation Research Training
创新研究实践Ⅰ Innovation Research Practice I
创新研究实践II Innovation Research Practice II
创业实践 Entrepreneurial Practice
毕业实习 Internship、毕业设计（论文） Capstone (Thesis)
计算机类课程群
数据结构与算法 Data Structures and Algorithms
计算机网络 Computer Networking
面向智能工程的Python编程技术 Python Programming for Intelligent Engineering
人机交互 Human-Machine Interaction
人工智能Ⅲ：人工智能技术及应用 Artificial Intelligence Ⅲ:Artificial Intelligence Technology and Application
深度学习 Deep Learning
GPT机器人 GPT Robotics
数据结构与算法实践 Practice of Data Structures and Algorithms
工业大数据分析及应用 Big Data Analytics and Applications in Industry
自动化类课程群
电工电子技术基础 Fundamentals of Electronics and Electrical Technologies
控制工程：信号与系统 Control Engineering:Signals and Systems
动力学与振动导论 Introduction to Dynamics and Vibration
控制工程：反馈控制理论 Control Engineering:Feedback Control Theory
经典控制理论 Classical Control Theory
智能控制 Intelligent Control
动力系统建模、分析与控制 Modeling, Analysis, and Control of Dynamic System
数据分析建模 Data Analysis and Modeling
自动驾驶系统 Autonomous Driving Systems
电工电子技术基础实践 Practice of Fundamentals of Electronics and Electrical Technologies
控制工程：信号与系统实践 Control Engineering:Practice of signals and systems
控制工程：反馈控制理论实践 Control Engineering:Practice of Feedback Control Theory
传感器技术及应用 Sensor and its Applications
机械类课程群
工程力学 Engineering Mechanics
智能工程：设计与制造Ⅰ Intelligence Engineering:Design and Manufacturing I
智能工程：设计与制造Ⅱ Intelligence Engineering:Design and Manufacturing II
机电一体化 Mechatronics
计算机辅助工程与机器人优化设计 CAE and Robot Design Optimization
智能工程：设计与制造实践II Intelligence Engineering:Practice of Design and Manufacturing II
专业特色类课程群
智能工程数学基础 Mathematical Foundations for Intelligent Engineering
工程管理导论 Introduction to Engineering Management
智能工程：智能工程导论 Intelligence Engineering:Introduction to Intelligent Engineering
热流科学导论 Introduction to Thermodynamics and Fluid Mechanics
先进制造技术 Advanced Manufacturing Technology
热的解析与应用 Analysis and Applications of Heat
工程创新 Innovation In Engineering
产品开发 Product Development
智能工程：智能工程导论实践 Intelligence Engineering:Practice of Introduction to Intelligent Engineering
智能工程：工程创新训练III Intelligence Engineering:Engineering Innovation Training III
生产计划 Production Planning、制造系统分析及设计 Analytics and Design of Manufacturing Systems、智能制造工程前沿技术 Cutting-Edge Intelligent Manufacturing Engineering Technology、智能装备与工业物联网 Intelligent Equipment and Industrial Internet of Things、智能制造工程研讨课 Intelligent Manufacturing Engineering Seminar、数字孪生 Digital Twin、智能工厂 Smart Factory

## 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 | | | | | | | | | | | | | | | | | ● | ● | | | | ● | | | | | | |
| 5 | 马克思主义基本原理 Fundamentals of Marxism Principle | | | | | | | | | | | | | | | | | ● | ● | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 形势与政策<br>Analysis of the Situation & Policy | | | | | | | | | | | | | | | | | ● | ● | | | | | | | | ● | | ● |
| 7 | 工程数学：微积分 II (一)<br>Engineering Math: Calculus (1) | ● | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 工程数学：线性代数与解析几何<br>Engineering Math: Linear Algebra & Analytic Geometry | ● | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 工程数学：微积分 II (二)<br>Engineering Math: Calculus (2) | ● | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 工程数学：概率论与数理统计<br>Engineering Math: Probability & Mathematical Statistics | ● | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 人工智能 I：大学计算机基础<br>Artificial Intelligence I: Fundamentals of Compute | | | ● | | | | ● | | | | | ● | | | | | | | | | | | | | | | | |
| 12 | 人工智能 II：C++编程基础<br>Artificial Intelligence II: Fundamentals of C++ Programming | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 大学物理III（一）<br>General Physics (1) | ● | | | ● | | | | | | | | ● | | | | | | | | | | | | | | | |
| 14 | 大学物理III（二）<br>General Physics (2) | ● | | | ● | | | | | | | | ● | | | | | | | | | | | | | | | |
| 15 | 大学物理实验（一）<br>Physics Experiment (1) | ● | | | ● | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | 大学物理实验（二）<br>Physics Experiment (2) | ● | | | ● | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 大学化学<br>General Chemistry | ● | | | ● | | | | | | | | | | | | | | | | | | | | | ● | | |
| 18 | 大学化学实验<br>General Chemistry Experiment | ● | | | ● | | | | | | | | | | | | | | | | | | | | | ● | | |
| 19 | 学术英语与科技交流(一)<br>EAP and Technical Communication (1) | | | | | | | | | | | | | | | | | | | | ● | | | | | | | |
| 20. | 学术英语与科技交流(二)<br>EAP and Technical Communication (2) | | | | | | | | | | | | | | | | | | | | ● | | | | | | | |
| 21 | 体育（一）<br>Physical Education (1) | | | | | | | | | | | | | | | | | | ● | ● | | | | | | ● | | |
| 22 | 体育（二）<br>Physical Education (2) | | | | | | | | | | | | | | | | | | ● | ● | | | | | | ● | | |
| 23 | 体育（三）<br>Physical Education (3) | | | | | | | | | | | | | | | | | | ● | ● | | | | | | ● | | |
| 24 | 体育（四）<br>Physical Education (4) | | | | | | | | | | | | | | | | | | ● | ● | | | | | | ● | | |
| 25 | 军事理论 | | | | | | | | | | | | | | | | | ● | ● | ● | ● | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Military Principle | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26 | 智能工程：智能工程导论<br>Intelligence Engineering: Introduction to Intelligent Engineering | ● | | | | | | ● | | | | | | | | ● | | ● | | ● | | | | | | | ● | | |
| 27 | 人工智能III：人工智能技术及应用<br>Artificial Intelligence Ⅲ: Artificial Intelligence Technology and Application | | | | | | ● | | | ● | | | | ● | | | | | | ● | | | | | | | | | |
| 28 | 智能制造工程研讨课<br>Intelligent Manufacturing Engineering Seminar | ● | | | | | | | | | | | | | | ● | | | | ● | | | | | | | | ● | |
| 29 | 工程力学 Engineering Mechanics | ● | ● | | ● | ● | | | | ● | | ● | | | | | | | | | | | | | | | | | |
| 30 | 智能工程数学基础<br>Mathematical Foundations for Intelligent Engineering | ● | | | ● | | | | | | | ● | | ● | | | | | | | | | | | | | ● | | ● |
| 31 | 数据结构与算法 Data Structures and Algorithms | ● | | | ● | | | | | | | | | ● | | | | | | | | | | | | | | ● | |
| 32 | 电工电子技术基础<br>Fundamentals of Electronics and Electrical Technologies | ● | ● | | | | | ● | ● | | | | | | | ● | | | | ● | | | | | | | | | |
| 33 | 控制工程：信号与系统<br>Control Engineering: Signals and Systems | ● | | | ● | | | | | ● | | | | | | ● | | ● | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | 动力学与振动导论 Introduction to Dynamics and Vibration | ● | | | | ● | | | | ● | | | | ● | | | | | | ● | | ● | | | | | | |
| 35 | 智能工程：设计与制造 I Intelligence Engineering: Design and Manufacturing I | | | ● | | | | ● | | | | | | ● | | | | | | ● | | | | | | | | |
| 36 | 智能工程：设计与制造 II Intelligence Engineering: Design and Manufacturing II | ● | | | ● | | | | | | | | ● | | | | | | | | | | | | | | ● | | |
| 37 | 控制工程：反馈控制理论 Control Engineering: Feedback Control Theory | ● | | | ● | | | | | ● | | | | | | ● | | ● | | | | | | | | | | | |
| 38 | 工程管理导论 Introduction to Engineering Management | | | | | | | | | | | | | | | | | | | | | ● | | ● | ● | ● | | | |
| 39 | 智能制造工程前沿技术 Cutting-Edge Intelligent Manufacturing Engineering Technology | | | | | | | | | | | | | | | | ● | | ● | | | | | | | | ● | ● | |
| 40 | 智能装备与工业物联网 Intelligent Equipment and Industrial Internet of Things | | ● | ● | | | ● | | | | | ● | | | | | | | | | | | | | | | ● | | |
| 41 | 人机交互 Human-Machine Interaction | | | | | | | ● | ● | | | | ● | ● | ● | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 热流科学导论<br>Introduction to Thermodynamics and Fluid Mechanics | ● | | | ● | | | | | ● | | | ● | | | | ● | | | | | | | | | | | ● | | |
| 43 | 生产计划<br>Production Planning | ● | ● | ● | | | | | | | | | | ● | | | | | | ● | | | | | | | | | | |
| 44 | 面向智能工程的Python编程技术 Python Programming for Intelligent Engineering | ● | | | | | | | | | | | ● | | | | | | | ● | | | | | | | | | | |
| 45 | 热的解析与应用<br>Analysis and Applications of Heat | | ● | | ● | | | | | ● | | | ● | | | | | | | | | | ● | | | | | ● | | |
| 46 | 制造系统分析及设计<br>Analytics and Design of Manufacturing Systems | ● | | | ● | | | | | | | | | | | ● | | | | ● | | | | | | | | ● | | |
| 47 | 工程创新 Innovation In Engineering | | | | | | | | | | | | | | | | | | | | | | ● | ● | ● | ● | | | | |
| 48 | 工业大数据分析及应用<br>Big Data Analytics and Applications in Industry | ● | | | | ● | | | | | ● | | ● | | | | | | | ● | | | | | | | | | | ● |
| 49 | 动力系统建模、分析与控制<br>Modeling, Analysis, and Control of Dynamic System | ● | | | | ● | | | | | | | | | ● | | | | | | | | | | | | | | | |
| 50 | 计算机网络<br>Computer Networking | | | ● | | | ● | | | | | ● | | | | | | | | | | | | | | | ● | | ● | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | 数据分析建模<br>Data Analysis and Modeling | | | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| 52 | 机电一体化<br>Mechatronics | ● | ● | | | | | | | ● | | ● | ● | | | | | | | ● | | ● | | | | | ● | | |
| 53 | 计算机辅助工程与机器人优化设计<br>CAE and Robot Design Optimization | | | | ● | | | | | ● | | | ● | | | | | | | ● | | | | | | | ● | | |
| 54 | 深度学习<br>Deep Learning | ● | | | | | | | | | | | ● | | | | | | | ● | | | | | | | | | |
| 55 | GPT 机器人<br>GPT Robotics | | | | | | | ● | | | | | ● | | | | | | | ● | | ● | | | | | | | |
| 56 | 自动驾驶系统<br>Autonomous Driving Systems | ● | | | | ● | | ● | | | ● | | | | ● | | | | | | | | | | | | | | |
| 57 | 产品开发<br>Product Development | ● | | | ● | | | ● | ● | | | | | | | ● | ● | | | | | | | | | | | | |
| 58 | 数字孪生<br>Digital Twin | ● | | | | ● | | | | | | | | | | | ● | | | | | | | | | | | | |
| 59 | 传感器技术及应用 Sensor and its Applications | ● | ● | | | | | ● | | | | | | | | | | | | | | | | | | | | | ● |
| 60 | 经典控制理论<br>Classical Control Theory | ● | | | ● | | | | | | | | ● | | | | | ● | | ● | | | | | | | ● | | |
| 61 | 智能工厂<br>Smart Factory | | | | | | ● | | ● | | | | | ● | | | ● | | ● | | | | | | | | | ● | | |
| 62 | 先进制造技术<br>Advanced Manufacturing | | | ● | | | ● | | | | | | | ● | | | | | | | | ● | | | | | | ● | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Technology | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 63 | 智能控制<br>Intelligent Control | | ● | ● | | ● | | | | | ● | ● | | ● | | | | | | | | | | | | | | |
| 64 | 创新研究训练<br>Innovation Research Training | | | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | | |
| 65 | 创新研究实践 I<br>Innovation Research Practice I | | | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | | |
| 66 | 创新研究实践 II<br>Innovation Research Practice II | | | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | | |
| 67 | 创业实践<br>Entrepreneurial Practice | | | | | | | ● | ● | | | | | | | | | | | | ● | ● | | | | ● | ● | ● |
| 68 | 军事技能<br>Military Training | | | | | | | | | | | | | | | | ● | ● | ● | ● | | | | | | | | |
| 69 | 马克思主义理论与实践<br>Marxism Theory and Practice | | | | | | | | | | | | | | | | ● | ● | | | | ● | | | | | | |
| 70 | 智能工程：智能工程导论实践<br>Intelligence Engineering: Practice of Introduction to Intelligent Engineering | ● | | | ● | | | | | ● | | | | ● | | | | | | | ● | | | | | ● | | |
| 71 | 数据结构与算法实践<br>Practice of Data Structures and Algorithms | | ● | | ● | | | | | | | | | ● | | | | | | ● | | | | | | | | |
| 72 | 电工电子技术基础实践 | ● | ● | | ● | | | ● | ● | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Practice of Fundamentals of Electronics and Electrical Technologies | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 73 | 控制工程：信号与系统实践<br>Control Engineering: Practice of Signals and Systems | | | | | | ● | | | | | ● | | | ● | | | | | ● | | ● | | | | | | | |
| 74 | 智能工程：工程创新训练 III<br>Intelligence Engineering: Engineering Innovation Training III | | | | | | | | | | | ● | ● | | | | | | | ● | ● | | | | | | ● | | |
| 75 | 控制工程：反馈控制理论实践<br>Control Engineering: Practice of Feedback Control Theory | | | ● | | | ● | ● | | | | ● | | | ● | | | | | | ● | | | | | | | |
| 76 | 智能工程：设计与制造实践 II<br>Intelligence Engineering: Practice of Design and Manufacturing II | | | | | | ● | ● | | | | | | | | | | | | ● | | ● | | | | ● | | | |
| 77 | 毕业实习<br>Internship | | | | | | | | | | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 78 | 毕业设计（论文）<br>Capstone (Thesis) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | ● | ● | | ● | | ● | ● | ● |

# 六、第二课堂（“Second Classroom” Activities)

第二课堂由人文素质教育和创新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 5 个学分。其中，大学体育教学团队开设课外体育课程，高年级本科生必修，72 学时，1 学分，纳入第二课堂人文素质教育学分。大学生心理健康教育，2 学分，虚拟第三学期开设，纳入第二课堂人文素质教育学分。

**2.创新能力培养基本要求**

学生在取得本专业教学计划规定学分的同时，至少参加一项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）、百步梯攀登计划或各类课外创新能力培养活动（如学科竞赛等）。学生参加上述活动及创新能力培养相关学术讲座所获学分累计不少于 4 个学分。

“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 five credits. The advanced undergraduates must complete one of courses of Humanities Quality Education which has seventy-two class hours (it's equivalent to one credit which belongs to Humanities Quality Education Credit of Extracurricular Class) offered by the College Physical Education Teaching Group. Mental Health Education for College Students (2 credits) is opened in virtual third semester which belongs to Humanities Quality Education Credit of Extracurricular Class.

(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.