**自动化创新班（本硕连读）**

**Automation (Innovation Class)**

**专业代码：**080801 **学 制：**4年

**Program Code:** 080801 **Duration：**4 years

**培养目标：**

本专业坚持社会主义道路，培养能适应社会发展需要，在知识、能力、素质和德、智、体、美诸方面全面发展，掌握自动化领域的基本理论、专门知识和技能，并能在国民经济、国防和科研各部门中从事运动控制、过程控制、制造系统自动化、人工智能与机器人控制、自动化仪表和设备、新型传感器、信息处理、智能建筑、复杂网络与计算机应用系统等领域的科学研究、技术开发、工程设计、系统运行管理与维护、教育和管理决策等宽口径、高素质、复合型的自动化研究型人才。作为自动化本硕连读创新班，要求具有继续读研深造的潜质、更高的科学素质和创新实践能力，为继续读研深造打下良好的专业基础。

**Educational Objectives:**

This specialty nurtures wide-coverage, high-quality, inter-disciplinary students who adhere to the socialist road, can meet the requirements of social development, have knowledge, ability, quality and all-round development of moral, intellectual, physical and aesthetic aspects, master the basic theories, specialized knowledge and skills in the field of automation, and can be engaged in scientific research, technology development, engineering design, system operation and maintenance, education and managerial decision and so on in the fields of motion control, process control, automatic manufacturing system, artificial intelligence and robot control, automatic instrument and equipment, new sensor, information processing, intelligent buildings, complex network and computer application system in the departments of national economy, national defense and scientific research. As the innovation class, the students are required to have potential for further study in graduate school, higher scientific quality and innovative practice ability, which lay good professional foundation for further study in graduate school.

**毕业要求：**

№1.基础知识：掌握扎实的基础知识、专业基本原理、方法和手段，构建清晰的数学、自然科学、工程基础和专业知识体系，用于解决自动化领域的复杂工程问题，并接触和掌握自动化相关行业部分营运知识，为解决实际企业自动化工程实际复杂问题打下知识基础。

№2.问题分析：能够应用数学、自然科学、本专业基本原理、方法和手段和自动化相关行业的营运知识，识别、表达、并通过文献研究分析和提炼出复杂理论与工程问题，获得有效结论。

№3.设计/开发解决方案：能够设计针对自动化复杂理论与工程问题的解决方案，设计满足特定需求的控制系统、单元（部件）或自动化工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

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

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

№6.工程与社会：能够基于自动化相关背景知识进行合理分析，评价专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

№7.环境和可持续发展：能够理解和评价针对自动化复杂工程问题的专业工程实践对环境、社会可持续发展的影响。

№8.职业规范：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。

№9.个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。

№10.沟通：能够就复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

№11.项目管理：理解并掌握工程管理原理与经济决策方法，并能在多学科环境中应用。

№12.终身学习：具有较好的自主学习和终身学习的意识，有不断学习和适应发展的能力。

**Student Outcomes:**

№1. Basic Knowledge: Mastering solid basic knowledge, primary theories, methods and solutions of the major; an ability to apply knowledge about mathematics, science and engineering fundamentals and industry knowledge in automation fields to solve the complex engineering problems, contacting with and mastering the knowledge related to operation management in the automation industry, building a good foundation of basic knowledge about practical complex problems in automation engineering.

№2. Problem Analysis: An ability to apply mathematic, natural science knowledge, the basic knowledge, primary theories, methods and solutions of automation major to identify, formulate and analyze complex engineering problems, reaching to substantiated conclusions using basic principles of mathematics, science and engineering, and industry knowledge in automation fields .

№3. Design / Development Solutions: An ability to design solutions for complex engineering problems, innovatively design systems, components or automation process that meet specific needs with societal, public health, safety, legal, cultural and environmental considerations.

№4. Research: An ability to conduct investigations of complex automation engineering problems based on scientific theories and to adopt scientific methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

№5. Applying Modern Tools: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex theoretical automation problems and engineering activities, with an understanding of the limitations.

№6. Engineering and Society: An ability to evaluate the influences of solutions to engineering practice and complex engineering problems on society, health, safety, law and culture according to contextual knowledge, and to take the consequent responsibilities.

№7. Environment and Sustainable Development: An ability to understand and evaluate the impact of professional automation engineering solutions on environmental and societal sustainable development.

№8. Professional Standards: An understanding of humanity science and social responsibility, being able to understand and abide by professional ethics and standards responsibly in engineering practice.

№9. Individual and Teams: An ability to function effectively as an individual, a member or a leader in diverse teams and in multi-disciplinary settings.

№10. Communication: An ability to communicate effectively on complex engineering problems with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions, and communicate in cross-cultural contexts with international perspective.

№11. Project Management: Demonstrate knowledge and understanding of engineering management principles and methods of economic decision-making, to function in multidisciplinary environments.

№12. Lifelong Learning: A good cognition of the need for, and a good ability to engage in independent and life-long learning with the ability to learn continuously and adapt to new developments.

**专业简介：**

华南理工大学自动化专业设置可追溯到1958年，已有近60年的办学历史，是由原有的四个本科专业（自动控制、船舶船厂电气自动化、工业企业电气自动化、化工自动化及仪表）经两次调整合并的宽口径专业，具有深厚的专业基础，为了培养自动化学术型人才，2010年设置自动化创新班（本硕连读）。2001年被评为广东省首批本科名牌专业，2009年获教育部批准为国家级特色专业，2010年获广东省特色专业，2011年通过教育部“工程教育专业认证”。

专业拥有一支年龄学历结构合理、学术水平高的教学科研队伍，拥有包括长江学者、国家杰青在内的一批在国内外享有较高声望的著名学者。在科研教学基地方面，现有自主系统与网络控制教育部重点实验室、精密电子制造装备教育部工程研究中心、国家实验教学示范中心——电气信息及控制实验教学中心、广州市脑机交互关键技术及应用重点实验室、自动化与智能技术大学生创新创业训练基地等，为本科生科技创新创造了良好的氛围。

**Program Profile：**

With a history of nearly 60 years, Automation in South China University of Technology is a wide-coverage specialty that has a strong foundation with two merging process of 4 original undergraduate majors (Automatic Control, Marine and shipyard Electric Automation, Industrial Enterprise Electric Automation and Chemical Automation and Instrument). It was honored as one of Famous-brand Undergraduate Specialties of Guangdong province in the first election in 2001, National Characteristic Specialties of the Ministry of Education of the People's Republic of China (MOE) in 2009 and Characteristic Specialties of Guangdong province in 2010. Besides that, the Specialty of Automation achieved Engineering Education Professional Certification by MOE in 2011.

The Specialty of Automation is with 4-year educational system, which confers the Bachelor degree of Engineering. This major nurtures wide-coverage, high-quality, inter-disciplinary students who can be engaged in scientific research, technology development, engineering design, system operation and maintenance, education and managerial decision and so on in the fields related to Automation in the departments of national economy, national defense and scientific research.

The faculty of Automation is with high academic level, rational age and educational background structure, which has 64 professional teachers, consisting of 20 professors, 27 associated professors and 3 senior engineers, including a group of high-reputation scholars, such as the Yangtze scholar, National Outstanding Youth, etc. The scientific research and teaching laboratories provide a good technical innovation environment for undergraduates, including Key Laboratory of Autonomous Systems and Network Control of Ministry of Education, Engineering Research Center for Precision Electronic Manufacturing Equipments of Ministry of Education, National Experimental Teaching Demonstrating Center—Electric Information and Control Experiment Teaching Center, Guangzhou Key Laboratory of Key Technology and Application on brain-computer interaction, College Students' Innovation and Entrepreneurial Training base of Automation and Intelligent Technology, etc.

**专业特色：**

本专业面向自动化学科前沿和应用构建了模块化、实践导向式综合培养体系，在基础扎实的前提下注重综合素质、创新实践能力和研究潜力的培养。培养的学生具有知识面广、基础厚实、创新实践能力强、有研究潜力等特色。

**Program Features:**

As a specialty of engineering, Automation engaged in training the students’ comprehensive quality, innovative practical ability and potential for further study based on solid basic knowledge, which is implemented by the modularized, practice-oriented comprehensive cultivating system towards the frontier and application of Automation. Students has the characteristics of wide-coverage knowledge, solid foundation, good innovative and practical ability, potential for further study.

**授予学位：**工学学士学位

**Degree Conferred:** Bachelor of Engineering

**主干课程：**

电路、模拟电子技术、数字电子技术、自动控制原理、现代控制理论、信号分析与处理、微型计算机原理、自动检测技术、电机及拖动基础、电力电子技术、运动控制系统、过程控制仪表及装置、过程控制工程。

**Core Courses:**

Electric Circuits, Analog Electronic Technology, Digital Electronics Technology, Principles of Automatic Control, Modern Control Theory, Signal Analysis and Processing, Microcomputer Principle, Automatic Detection and Measurement Technology, Motor and Drive Foundation, Power Electronics Technology, Motion Control System, Process Control Instrumentation Technology, Process Control Engineering.

**特色课程：**

双语教学课程：C++编程语言（I）、C++编程语言（II）、信号分析与处理、过程控制仪表及装置、软件技术基础

创新实践课程：自动化前沿探索、学科基础创新实践、学科专业创新实践（I）、学科专业创新实践（II）、自动控制系统综合创新实践、智能机器人创新实践、模式识别与机器视觉创新实践、嵌入式系统创新实践、PLC与工厂自动化创新实践、楼宇自动化创新实践

竞教结合课程：自动控制系统综合创新实践、智能机器人创新实践

创业教育课程：自动化行业产业发展模式与职业规划

**Featured Courses:**

Bilingual Courses: C++ Programming Language（Part I）、C++ Programming Language（Part II）、Signals Analysis and Processing、Process Control Instrumentation Technology、Fundamentals of Computer Software

Innovation Practice Courses: Automation Frontier Exploration、Discipline Innovation Practice、Professional Disciplines Innovation Practice（I）、Professional Disciplines Innovation Practice（II）、 Innovation Practice on Automatic Control System、Innovation practice on Intelligent Robot、Innovation Practice on Pattern Recognition and Machine Vision、Innovation Practice on Embedded Systems、Innovation Practice on PLC and Factory Automation、Innovation Practice on Building Automation

Entrepreneurship Education Courses: Industrial Development Model and Career Planning of Automation Industry

Competition and Education Combination Courses: Innovation Practice on Automatic Control System、Innovation practice on Intelligent Robot

**一、教学计划总体安排表（General Teaching Schedule）**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 学年 | 学期 | 教　学　进　度　安　排　（周） | 理论教学 | 考　　试 | 入学教育 | 军训 | 课程设计 | 大作业 | 工程训练 | 电子实习 | 综合实验 | 社会实践 | 生产实习 | 毕业实习 | 其它实习 | 中外合作项目 | 毕业设计 | 就业安排 | 机动 | 假期 | 小计 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |  |
| 一 | 1 |  | C | A | A | A | A | A | A | A | A | A | A | A | A | A | A | B | D | D | D | 14 | 1 | 1 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 19 |
| 2 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Q | B | B | 17 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  | 20 |
| 二 | 3 | G | G | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Q | B | B | 15 | 2 |  |  |  |  | 2 |  |  |  |  |  |  |  |  |  | 1 |  | 20 |
| 4 | H | H | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | E | B | B | 15 | 2 |  |  | 1 |  |  | 2 |  |  |  |  |  |  |  |  |  |  | 20 |
| 三 | 5 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | E | E | B | B | 16 | 2 |  |  | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  | 20 |
| 6 | A | A | A | A | A | A | A | A | A | A | A | E | E | E | E | E | E | E | B | B | 11 | 2 |  |  | 7 |  |  |  |  |  |  |  |  |  |  |  |  |  | 20 |
| 四 | 7 | 研究生阶段学习，并完成本科毕业设计（论文） | 14 | 2 |  |  |  |  |  |  |  |  |  | 4 |  |  |  |  |  |  | 20 |
| 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 15 |  | 5 |  | 20 |
| 合　计（周） | 99 | 13 | 1 | 3 | 10 |  | 2 | 2 |  |  |  | 4 |  |  | 15 |  | 7 |  | 159 |

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

**1.学分统计表（Credits Registration Form）**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 课程类别Course Category | 课程要求Requirement | 学分Credits | 学时Academic Hours | 备注Remarks |
| 公共基础课General Basic Courses | 必修Compulsory | 61.0 | 940 |  |
| 通识General Education | 10.0 | 160 |  |
| 学科基础课Disciplinary Basic Courses | 必修Compulsory | 45.5 | 792 |  |
| 选修Elective | 0 | 0 |  |
| 专业领域课Specialty- related Courses | 必修Compulsory | 14.5 | 260 |  |
| 选修Elective | 12.0 | 192 |  |
| 合计Total | 143.0 | 2344 |  |
| 集中实践教学环节（周）Practice Training (Weeks) | 必修Compulsory | 38.0 | 38周 |  |
| 毕业学分要求Credits Required for Graduation | 143.0＋38.0＝181.0 |

备注：硕士阶段课程修读要求及毕业资格按照学生修读的研究生专业培养方案执行，第四年在导师的指导下修读相关课程；学生本科阶段在取得专业教学计划规定学分的同时，还必须第二课堂取得2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Academic Hours | 学分Credits |
| 总学时数Total | 其中Include | 其中Include | 总学分数Total | 其中Include | 其中Include | 其中Include |
| 必修学时Compulsory | 选修学时Elective | 理论教学学时Theory Course | 实验教学学时Lab | 必修学分Compulsory | 选修学分Elective | 集中实践教学环节学分Practice-concentrated Training | 理论教学学分Theory Course Credits | 实验教学学分Lab | 创新创业教育学分Innovation and Entrepreneurship Education |
| 2344 | 1992 | 352 | 1962 | 382 | 181 | 159 | 22 | 38 | 131 | 12 | 16 |

**三、专业教学计划表（Teaching 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 | **毕业****要求**Student Outcomes |
| **总学时**Class Hours | **上机**Computer-aided Class Hours | **实验**Lab Hours | **实践**Practice Hours |
| **公 共 基 础 课General Basic Courses** | 143093 | 思想道德修养与法律基础Cultivation of Thought and Morals & Fundamental of Law | 必修课C | (40)(36) |  |  |  | 2.5 | 3 | №8 |
| 143091 | 中国近现代史纲要Skeleton of Chinese Modern History | (32)24 |  |  |  | 2.0 | 4 | №8 |
| 143106 | 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 | (80)48 |  |  |  | 5.0 | 5 | №8 |
| 143090 | 马克思主义基本原理Fundamentals of Marxism Principle | (40)36 |  |  |  | 2.5 | 6 | №8 |
| 143094 | 形势与政策Analysis of the Situation & Policy | (128) |  |  |  | 2.0 | 1-8 | №8 |
| 144001 | 大学英语（一）College English(1) | 64 |  |  |  | 4.0 | 1 | №10 |
| 144002 | 大学英语（二）College English(2) | 64 |  |  |  | 4.0 | 2 | №10 |
| 152001 | 体育（一）Physical Education (1) | 32 |  |  | 32 | 1.0 | 1 | №12 |
| 152002 | 体育（二）Physical Education (2) | 32 |  |  | 32 | 1.0 | 2 | №12 |
| 152003 | 体育（三）Physical Education (3) | 32 |  |  | 32 | 1.0 | 3 | №12 |
| 152004 | 体育（四）Physical Education (4) | 32 |  |  | 32 | 1.0 | 4 | №12 |
| 106001 | 军事理论Military Principle | (16) |  |  |  | 1.0 | 2 | №9 |
| 140195 | 数学分析（一）Mathematics Analysis(1) |  | 80 |  |  |  | 5.0 | 1 | №1 |
| 140196 | 数学分析（二）Mathematics Analysis(2) | 112 |  |  |  | 7.0 | 2 | №1 |
| 141005 | 大学物理Ⅲ（一）General Physics (1) | 64 |  |  |  | 4.0 | 2 | №1 |
| 141006 | 大学物理Ⅲ（二）General Physics (2) | 64 |  |  |  | 4.0 | 3 | №1 |
| 141007 | 大学物理实验（一）Physics Experiment(1) | 32 |  | 32 |  | 1.0 | 2 | №1 |
| 141008 | 大学物理实验（二）Physics Experiment(2) | 32 |  | 32 |  | 1.0 | 3 | №1 |
| 130009 | 工程制图Engineering Drawing | 48 |  |  |  | 3.0 | 1 | №1 |
| 140197 | 线性代数与解析几何Linear Algebra & Analytic Geometry | 48 |  |  |  | 3.0 | 1 | №1 |
| 140019 | 概率论与数理统计Probability & Mathematical Statistics | 48 |  |  |  | 3.0 | 2 | №1 |
| 140015 | 复变函数ⅠComplex Variable | 32 |  |  |  | 2.0 | 3 | №1 |
| 140016 | 积分变换Integral Transformation | 16 |  |  |  | 1.0 | 3 | №1 |
|  | 人文科学领域Humanities | 通识课E | 96 |  |  |  | 6.0 |  | №8 |
|  | 社会科学领域Social Science | 64 |  |  |  | 4.0 |  | №8 |
| **合计****Total** | 1100 |  | 64 | 128 | 71.0 |  |  |

**三、专业教学计划表（续）（Teaching 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 | **毕业****要求**Student Outcomes |
| **总学时**Class Hours | **上机**Computer-aided Class Hours | **实验**Lab Hours | **实践**Practice |
| **学科基础课Disciplinary Basic Courses** | 146105 | 自动化(专业)概论Introduction to Automation | 必C | 16 |  |  |  | 1.0 | 1 | №1,8,12 |
| 146063 | 脑信号处理与脑机接口初步Brain Signal Processing And Brain-Computer Interfaces | 必C | 16 |  |  |  | 1.0 | 1 | №1,8,9,10,11,12 |
| 146064 | 机器智能探索Machine Intelligence Exploration | 必C | 16 |  |  |  | 1.0 | 2 | №1,8,9,10,11,12 |
| 135020 | 电路ⅡElectric Circuits | 必C | 64 |  |  |  | 4.0 | 2 | №1,2,3,4,5 |
| 146114 | C++编程语言（一）C++ Programming Language（1） | 必C | 40 |  | 8 |  | 2.5 | 2 | №1,2,3,4,5,8,12 |
| 146115 | C++编程语言（二）C++ Programming Language（2） | 必C | 40 |  | 8 |  | 2.5 | 3 | №1,2,3,4,5,8,12 |
| 135005 | 电路实验Experiment of Circuit | 必C | 16 |  | 16 |  | 0.5 | 3 | №2,3,4,5 |
| 146062 | 计算机网络与通信技术Computer Network and Communication Technology | 必C | 32 |  |  |  | 2.0 | 3 | №1,2,3 |
| 135034 | 模拟电子技术ⅡAnalog Electronics | 必C | 64 |  |  |  | 4.0 | 3 | №1,2,3,4,5 |
| 135043 | 模拟电子技术实验Experiment of Analog Circuits | 必C | 16 |  | 16 |  | 0.5 | 4 | №2,3,4,5 |
| 155081 | 数字电子技术ⅡDigital Electronics | 必C | 64 |  |  |  | 4.0 | 4 | №1,2,3,4,5 |
| 135045 | 数字电子技术实验Experiment of Digital Electronics | 必C | 16 |  | 16 |  | 0.5 | 4 | №2,3,4,5 |
| 146002 | 自动控制原理Principles of Automatic Control | 必C | 72 |  |  |  | 4.5 | 4 | №1,2,3,4,5,6,7,12 |
| 146008 | 自动控制原理实验Principles of Automatic Control Experiment | 必C | 28 |  | 28 |  | 1.0 | 4 | №3,4,5,9,10 |
| 146005 | 电机及拖动基础Motor and Drive Foundation | 必C | 44 |  |  |  | 2.5 | 4 | №1,2,3,4,5 |
| 146075 | 电机及拖动基础实验Experiment of Motor and Drive Foundation | 必C | 16 |  | 16 |  | 0.5 | 4 | №3,4,5,9,10 |
| 146007 | 现代控制理论Modern Control Theory | 必C | 48 |  |  |  | 3.0 | 5 | №1,2,3,4,5,6,7,12 |
| 146003 | 微型计算机原理Microcomputer Principle | 必C | 44 |  |  |  | 2.5 | 5 | №1,2,3,4,5 |
| 146043 | 微型计算机原理实验Experiment of Microcomputer Principle | 必C | 12 |  | 12 |  | 0.5 | 5 | №3,4,5,9,10 |
| 146060 | 信号分析与处理Signal Analysis and Processing | 必C | 32 |  |  |  | 2.0 | 4 | №1,2,4 |
| 146073 | 电力电子技术Power Electronics Technology | 必C | 44 |  | 8 |  | 2.5 | 5 | №1,2,3,4,5,6,7,12 |
| 146006 | 自动检测技术Automatic Detection and Measurement Technology | 必C | 40 |  |  |  | 2.5 | 4 | №1,2,3,4,5 |
| 146011 | 自动检测技术实验Experiment of Automatic Detection and Measurement Technology | 必C | 12 |  | 12 |  | 0.5 | 5 | №3,4,5,9,10 |
| 146116 | 控制系统Matlab仿真MATLAB Simulation for Control System | 选 | 32 |  |  |  | 2.0 | 3 | №1,2,4,5 |
| **合　计****Total** | 必C | 792 |  | 140 |  | 45.5 |  |  |
| **专业领域课Specialty- related Courses** | 146031 | 单片机原理及应用Principle & Application of Single-chip Microcomputer | 必C | 44 |  | 12 |  | 2.5 | 6 | №1,2,3,5 |
| 146017 | 运动控制系统Motion Control System | 必C | 44 |  |  |  | 2.5 | 6 | №1,2,3,6 |
| 146021 | 运动控制系统实验Experiment of Motion Control System  | 必C | 16 |  | 16 |  | 0.5 | 6 | №3,4,5,9,10 |
| 146018 | 过程控制仪表及装置Process Control Instrumentation Technology | 必C | 32 |  |  |  | 2.0 | 5 | №1,3,6,10,12 |
| 146016 | 过程控制工程Process Control Engineering | 必C | 32 |  |  |  | 2.0 | 6 | №1,2,3,6 |
| 146117 | 过程控制系统实验Experiment of Process Control System | 必C | 16 |  | 16 |  | 0.5 | 6 | №3,4,5,9,10 |
| 146118 | 机器人系统Robotics System | 必C | 32 |  |  |  | 2.0 | 6 | №1,2,3,4,5,6,7 |
| 146024 | 计算机控制技术Computer Control Technology | 必C | 44 |  | 6 |  | 2.5 | 6 | №1,2,3,6 |
| 146089 | 模式识别基础Fundamentals of Pattern Recognition | 选E | 32 |  |  |  | 2.0 | 5 | №1,2,3,4,5,6,7,12 |
| 146071 | 自动化行业产业发展模式与职业规划Industrial Development Model and Career Planning of Automation Industry | 选E | 16 |  |  |  | 1.0 | 3 | №6,7,8,9,10 |
| 146081 | 图像处理与机器视觉Image Processing and Machine Vision | 选E | 48 |  |  |  | 3.0 | 4 | №1,2,3,4,5,6 |
| 146027 | 嵌入式系统及应用Embedded System and Applications | 选E | 32 |  | 8 |  | 2.0 | 5 | №1,2,3,5,9,10 |
| 146001 | 系统工程导论General for System Engineering | 选E | 32 |  |  |  | 2.0 | 4 | №1,2,3,6,7,11 |
| 146070 | 企业经济管理Enterprise Economic Management | 选E | 32 |  |  |  | 2.0 | 5 | №1,2,3,6,7,11 |
| 146106 | 电气控制与PLCElectrical Control and PLC | 选E | 48 |  | 8 |  | 3.0 | 6 | №1,2,3,5,9,10 |
| 146019 | 楼宇自动化Building Automation System | 选E | 32 |  |  |  | 2.0 | 5 | №2,3,5,6,8,9,10,11 |
| 创新实践模块（最低修读7.5学分） |
| 146065 | \*自动化前沿探索Frontier Exploration Related to Automation | 选E | (16) |  |  | (16) | 1.0 | 2 | №3,6,7,8,9,10,11,12 |
| 146066 | \*学科基础创新实践Innovation Practice on Fundamentals of Automation | 选E | (32) |  |  | (16) | 1.5 | 4 | №2,3,4,5,6,8,9,10,11,12 |
| 146068 | \*学科专业创新实践（I）Advanced Innovation Practice Related to Automation(I)  | 选E | (32) |  |  | (16) | 1.5 | 5 |
| 146069 | \*学科专业创新实践（II）Advanced Innovation Practice Related to Automation(II) | 选E | (32) |  |  | (16) | 1.5 | 6 |
| 146119 | 自动控制系统综合创新实践Innovation Practice on Automatic Control System | 选E | （32） |  |  | （32） | 1.0 | 5 |
| 146049 | 智能机器人创新实践Innovation Practice on Intelligent Robot | 选E | (32) |  |  | (32) | 1.0 | 6 |
| 146126 | 模式识别与机器视觉创新实践Innovation Practice on Pattern Recognition and Machine Vision | 选E | (32) |  |  | (32) | 1.0 | 5 |
| 146121 | 嵌入式系统创新实践Innovation Practice on Embedded Systems | 选E | (32) |  |  | (32) | 1.0 | 5 |
| 146056 | PLC及运动控制系统创新实践Innovation Practice on PLC and Factory Automation | 选E | (32) |  |  | (32) | 1.0 | 5 |
| 146059 | 楼宇自动化创新实践Innovation Practice on Building Automation | 选E | (32) |  |  | (32) | 1.0 | 5 |
| 120003 | 创新研究训练Innovation Research Training | 选E | 32 |  |  |  | 2.0 |  | №4,12 |
| 120004 | 创新研究实践IInnovation Research Practice 1 | 选E | 32 |  |  |  | 2.0 |  | №4,12 |
| 120005 | 创新研究实践IIInnovation Research Practice 2 | 选E | 32 |  |  |  | 2.0 |  | №4,12 |
| 120006 | 创业实践Entrepreneurial Practice | 选E | 32 |  |  |  | 2.0 |  | №4,12 |
| **合　计****Total** | 必C | 260 |  | 50 |  | 14.5 |  |  |
| 选E | 选修课修读最低要求12.0学分minimum elective course credits required: 12 |

备注：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.学科基础课和专业领域选修课最低修读12学分，其中创新实践类课程最低修读7.5学分。自动控制系统综合创新实践为必选。创新实践课程与专业理论课的先修关系如下：

运动控制系统，过程控制过程-----自动控制系统综合创新实践；

电气控制与PLC----PLC与工厂自动化创新实践；

嵌入式系统及应用----嵌入式系统创新实践；

图像处理与机器视觉-----模式识别与机器视觉创新实践；

机器人系统----智能机器人创新实践；

楼宇自动化----楼宇自动化创新实践。

3.带“\*”的课程在导师制下由导师负责指导，自学与创新实践相结合。

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **课 程****代 码**Course No | **课程名称**Course Title | **是否必修**C/E | **学时数**Total Curriculum Hours | **学分数**Credits | **开课****学期**Semester | **毕业要求**Student Outcomes |
| **实践**Practiceweeks | **授课**Lecture Hours |
| 106002 | 军训Military Training | 必C | 3周 |  | 3.0 | 1 | №9 |
| 143197 | 马克思主义理论与实践Marxism Theory and Practice | 必C | 2周 |  | 2.0 | 假期 | №8 |
| 130356 | 工程训练ⅠEngineering Training | 必C | 2周 |  | 2.0 | 3 | №2,3,5,6 №9 №10 |
| 141073 | 电子工艺实习ⅡPractice of Electronic | 必C | 2周 |  | 2.0 | 4 | №2,3,5,6 №9 №10 |
| 135070 | 数字电路课程设计Curriculum Design on Digital Electronics Technique | 必C | 1周 |  | 1.0 | 4 | №1,2,3,4,5,9,10,11,12 |
| 146122 | 模式识别基础课程设计Curriculum Design on Fundamentals of Pattern Recognition | 必C | 1周 |  | 1.0 | 5 | №3,4,5,6,8,9,10,11,12 |
| 146123 | 电力电子技术课程设计Curriculum Design on Power Electronics Technology | 必C | 1周 |  | 1.0 | 5 | №3,4,5,6,8,9,10,11,12 |
| 146124 | 单片机原理及应用课程设计Curriculum Design on Principle & Application of Single-chip Microcomputer | 必C | 2周 |  | 2.0 | 6 | №3,4,5,6,8,9,10,11,12 |
| 146125 | 机器人系统课程设计Curriculum Design on Robotics System | 必C | 2周 |  | 2.0 | 6 | №3,4,5,6,8,9,10,11,12 |
| 146041 | 自动控制系统课程设计Curriculum Design on Automatic Control System | 必C | 2周 |  | 2.0 | 6 | №3,4,5,6,8,9,10,11,12 |
| 146042 | 计算机控制技术课程设计Curriculum Design on Computer Control Technology | 必C | 1周 |  | 1.0 | 6 | №3,4,5,6,8,9,10,11,12 |
| 146054 | 毕业实习Graduation Practice | 必C | 4周 |  | 4.0 | 6-7 | №3,6,7,8,9,10 |
| 146055 | 毕业设计Graduation Project | 必C | 15周 |  | 15.0 | 8 | №2,3,4,5,6,7,8,9,10,11,12 |
| **合　计****Total** | 必C | 38周 |  | 38.0 |  |  |

**五、第二课堂**

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2个学分。

**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，还必须参加国家创新创业训练计划或广东省创新创业训练计划或SRP（学生研究计划）或百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于4个学分。

**5.“Second Classroom” Activities**

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

1)Basic Requirements of Humanities Quality Education

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one’s interest, acquiring no less than two credits.

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.

**自动化**

**Automation**

**专业代码：**080801**学制：**4 年

**Program Code:**080801**Duration：**4 years

**培养目标：**

本专业坚持社会主义道路，培养能适应社会发展需要，在知识、能力、素质和德、智、体、美诸方面全面发展，掌握自动化领域的基本理论、专门知识和技能，并能在国民经济、国防和科研各部门中从事运动控制、过程控制、制造系统自动化、人工智能与机器人控制、自动化仪表和设备、新型传感器、信息处理、智能建筑、复杂网络与计算机应用系统等领域的科学研究、技术开发、工程设计、系统运行管理与维护、教育和管理决策等宽口径、高素质、复合型的自动化科技、工程人才。

**Educational Objectives:**

This specialty nurtures wide-coverage, high-quality, inter-disciplinary students who adhere to the socialist road, can meet the requirements of social development, have knowledge, ability, quality and all-round development of moral, intellectual, physical and aesthetic aspects, master the basic theories, specialized knowledge and skills in the field of automation, and can be engaged in scientific research, technology development, engineering design, system operation and maintenance, education and managerial decision and so on in the fields of motion control, process control, automatic manufacturing system, artificial intelligence and robot control, automatic instrument and equipment, new sensor, information processing, intelligent buildings, complex network and computer application system in the departments of national economy, national defense and scientific research.

**毕业要求：**

№1.基础知识：掌握扎实的基础知识、专业基本原理、方法和手段，构建清晰的数学、自然科学、工程基础和专业知识体系，用于解决自动化领域的复杂工程问题，并接触和掌握自动化相关行业部分营运知识，为解决实际企业自动化工程实际复杂问题打下知识基础。

№2.问题分析：能够应用数学、自然科学、本专业基本原理、方法和手段和自动化相关行业的营运知识，识别、表达、并通过文献研究分析和提炼出复杂理论与工程问题，获得有效结论。

№3.设计/开发解决方案：能够设计针对自动化复杂理论与工程问题的解决方案，设计满足特定需求的控制系统、单元（部件）或自动化工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

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

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

№6.工程与社会：能够基于自动化相关背景知识进行合理分析，评价专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

№7.环境和可持续发展：能够理解和评价针对自动化复杂工程问题的专业工程实践对环境、社会可持续发展的影响。

№8.职业规范：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。

№9.个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。

№10.沟通：能够就复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

№11.项目管理：理解并掌握工程管理原理与经济决策方法，并能在多学科环境中应用。

№12.终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

**Student Outcomes:**

№1. Basic Knowledge: Mastering solid basic knowledge, primary theories, methods and solutions of the major; an ability to apply knowledge about mathematics, science and engineering fundamentals and industry knowledge in automation fields to solve the complex engineering problems, contacting with and mastering the knowledge related to operation management in the automation industry, building a good foundation of basic knowledge about practical complex problems in automation engineering.

№2. Problem Analysis: An ability to apply mathematic, natural science knowledge, the basic knowledge, primary theories, methods and solutions of automation major to identify, formulate and analyze complex engineering problems, reaching to substantiated conclusions using basic principles of mathematics, science and engineering, and industry knowledge in automation fields .

№3. Design / Development Solutions: An ability to design solutions for complex engineering problems, innovatively design systems, components or automation process that meet specific needs with societal, public health, safety, legal, cultural and environmental considerations.

№4. Research: An ability to conduct investigations of complex automation engineering problems based on scientific theories and to adopt scientific methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

№5. Applying Modern Tools: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex theoretical automation problems and engineering activities, with an understanding of the limitations.

№6. Engineering and Society: An ability to evaluate the influences of solutions to engineering practice and complex engineering problems on society, health, safety, law and culture according to contextual knowledge, and to take the consequent responsibilities.

№7. Environment and Sustainable Development: An ability to understand and evaluate the impact of professional automation engineering solutions on environmental and societal sustainable development.

№8. Professional Standards: An understanding of humanity science and social responsibility, being able to understand and abide by professional ethics and standards responsibly in engineering practice.

№9. Individual and Teams: An ability to function effectively as an individual, a member or a leader in diverse teams and in multi-disciplinary settings.

№10. Communication: An ability to communicate effectively on complex engineering problems with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions, and communicate in cross-cultural contexts with international perspective.

№11. Project Management: Demonstrate knowledge and understanding of engineering management principles and methods of economic decision-making, to function in multidisciplinary environments.

№12. Lifelong Learning: A cognition of the need for, and an ability to engage in independent and life-long learning with the ability to learn continuously and adapt to new developments.

**专业简介：**

华南理工大学自动化专业可追溯到1958年，已有近60年的办学历史，是由原有的四个本科专业（自动控制、船舶船厂电气自动化、工业企业电气自动化、化工自动化及仪表）经两次调整合并的宽口径专业，具有深厚的专业基础。2001年被评为广东省首批本科名牌专业，2009年获教育部批准为国家级特色专业，2010年获广东省特色专业，2011年通过教育部“工程教育专业认证”。

专业拥有一支年龄学历结构合理、学术水平高的教学科研队伍，拥有包括长江学者、国家杰青在内的一批在国内外享有较高声望的著名学者。在科研教学基地方面，现有自主系统与网络控制教育部重点实验室、精密电子制造装备教育部工程研究中心、国家实验教学示范中心——电气信息及控制实验教学中心、广州市脑机交互关键技术及应用重点实验室、自动化与智能技术大学生创新创业训练基地等，为本科生科技创新创造了良好的氛围。

**Program Profile：**

With a history of nearly 60 years, Automation in South China University of Technology is a wide-coverage specialty that has a strong foundation with two merging process of 4 original undergraduate majors (Automatic Control, Marine and shipyard Electric Automation, Industrial Enterprise Electric Automation and Chemical Automation and Instrument). It was honored as one of Famous-brand Undergraduate Specialties of Guangdong province in the first election in 2001, National Characteristic Specialties of the Ministry of Education of the People's Republic of China (MOE) in 2009 and Characteristic Specialties of Guangdong province in 2010. Besides that, the Specialty of Automation achieved Engineering Education Professional Certification by MOE in 2011.

The Specialty of Automation is with 4-year educational system, which confers the Bachelor degree of Engineering. This major nurtures wide-coverage, high-quality, inter-disciplinary students who can be engaged in scientific research, technology development, engineering design, system operation and maintenance, education and managerial decision and so on in the fields related to Automation in the departments of national economy, national defense and scientific research.

The faculty of Automation is with high academic level, rational age and educational background structure, which has 64 professional teachers, consisting of 20 professors, 27 associated professors and 3 senior engineers, including a group of high-reputation scholars, such as the Yangtze scholar, National Outstanding Youth, etc. The scientific research and teaching laboratories provide a good technical innovation environment for undergraduates, including Key Laboratory of Autonomous Systems and Network Control of Ministry of Education, Engineering Research Center for Precision Electronic Manufacturing Equipments of Ministry of Education, National Experimental Teaching Demonstrating Center—Electric Information and Control Experiment Teaching Center, Guangzhou Key Laboratory of Key Technology and Application on brain-computer interaction, College Students' Innovation and Entrepreneurial Training base of Automation and Intelligent Technology, etc.

**专业特色：**

本专业面向自动化学科前沿和应用构建了模块化、实践导向式综合培养体系，在基础扎实的前提下注重综合素质和创新实践能力的培养。培养的学生具有知识面广、基础厚实、创新实践能力强、适应性和就业范围广等特色。

**Program Features:**

As a specialty of engineering, Automation engaged in training the students’ comprehensive quality and innovative practical ability based on solid basic knowledge, which is implemented by the modularized, practice-oriented comprehensive cultivating system towards the frontier and application of Automation. Students has the characteristics of wide-coverage knowledge, solid foundation, good innovative and practical ability, good adaptability and employment.

**授予学位：**工学学士学位

**Degree Conferred:** Bachelor of Engineering

**主干课程：**

电路、模拟电子技术、数字电子技术、自动控制原理、现代控制理论、信号分析与处理、微型计算机原理、自动检测技术、电机及拖动基础、电力电子技术、运动控制系统、过程控制仪表及装置、过程控制工程。

**Core Courses:**

Electric Circuits, Analog Electronic Technology, Digital Electronics Technology, Principles of Automatic Control, Modern Control Theory, Signal Analysis and Processing, Microcomputer Principle, Automatic Detection and Measurement Technology, Motor and Drive Foundation, Power Electronics Technology, Motion Control System, Process Control Instrumentation Technology, Process Control Engineering

**特色课程：**

双语教学课程：C++编程语言（I）、C++编程语言（II）、信号分析与处理、过程控制仪表及装置、软件技术基础

创新实践课程：自动控制系统综合创新实践、智能机器人创新实践、模式识别与机器视觉创新实践、嵌入式系统创新实践、PLC与工厂自动化创新实践、楼宇自动化创新实践

竞教结合课程：自动控制系统综合创新实践、智能机器人创新实践

创业教育课程：自动化行业产业发展模式与职业规划

**Featured Courses:**

Bilingual Courses: C++ Programming Language（Part I）、C++ Programming Language（Part II）、Signals Analysis and Processing、Process Control Instrumentation Technology、Fundamentals of Computer Software

Innovation Practice Courses: Innovation Practice on Automatic Control System、Innovation Practice on Intelligent Robot、Innovation Practice on Pattern Recognition and Machine Vision、Innovation Practice on Embedded Systems、Innovation Practice on PLC and Factory Automation、Innovation Practice on Building Automation

Entrepreneurship Education Courses: Industrial Development Model and Career Planning of Automation Industry

Competition and Education Combination Courses: Innovation Practice on Automatic Control System、Innovation practice on Intelligent Robot

**一、教学计划总体安排表（General Teaching Schedule）**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 学年 | 学期 | 教　学　进　度　安　排　（周） | 理论教学 | 考　　试 | 入学教育 | 军训 | 课程设计 | 大作业 | 工程训练 | 电子实习 | 综合实验 | 社会实践 | 生产实习 | 毕业实习 | 其它实习 | 中外合作项目 | 毕业设计 | 就业安排 | 机动 | 假期 | 小计 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |  |
| 一 | 1 |  | C | A | A | A | A | A | A | A | A | A | A | A | A | A | A | B | D | D | D | 14 | 1 | 1 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 19 |
| 2 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Q | B | B | 17 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  | 20 |
| 二 | 3 | G | G | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Q | B | B | 15 | 2 |  |  |  |  | 2 |  |  |  |  |  |  |  |  |  | 1 |  | 20 |
| 4 | H | H | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | E | B | B | 15 | 2 |  |  | 1 |  |  | 2 |  |  |  |  |  |  |  |  |  |  | 20 |
| 三 | 5 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | E | E | B | B | 16 | 2 |  |  | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  | 20 |
| 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | E | E | E | E | E | B | B | 13 | 2 |  |  | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  | 20 |
| 四 | 7 | L | L | L | L | A | A | A | A | A | A | A | A | A | A | A | I | I | I | B | B | 11 | 2 |  |  |  |  |  |  | 3 |  |  | 4 |  |  |  |  |  |  | 20 |
| 8 | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | Q | Q | Q | Q | P |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 15 | 1 | 4 |  | 20 |
| 合　计（周） | 101 | 13 | 1 | 3 | 8 |  | 2 | 2 | 3 |  |  | 4 |  |  | 15 | 1 | 6 |  | 159 |

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

**1.学分统计表（Credits Registration Form）**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 课程类别Course Category | 课程要求Requirement | 学分Credits | 学时Academic Hours | 备注Remarks |
| 公共基础课General Basic Courses | 必修Compulsory | 61.0 | 940 |  |
| 通识General Education | 10.0 | 160 |  |
| 学科基础课Disciplinary Basic Courses | 必修Compulsory | 43.5 | 760 |  |
| 选修Elective | 0 | 0 |  |
| 专业领域课Specialty- related Courses | 必修Compulsory | 12.5 | 226 |  |
| 选修Elective | 16.0 | 208 |  |
| 合计Total | 143.0 | 2294 |  |
| 集中实践教学环节（周）Practice Training (Weeks) | 必修Compulsory | 36.0 | 36周 |  |
| 毕业学分要求Credits Required for Graduation | 143.0＋36.0＝179.0 |

备注：学生在取得专业教学计划规定学分的同时，还必须取得第二课堂2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Academic Hours | 学分Credits |
| 总学时数Total | 其中Include | 其中Include | 总学分数Total | 其中Include | 其中Include | 其中Include |
| 必修学时Compulsory | 选修学时Elective | 理论教学学时Theory Course | 实验教学学时Lab | 必修学分Compulsory | 选修学分Elective | 集中实践教学环节学分Practice-concentrated Training | 理论教学学分Theory Course Credits | 实验教学学分Lab | 创新创业教育学分Innovation and Entrepreneurship Education |
| 2294 | 1926 | 368 | 1910 | 384 | 179 | 153 | 26 | 36 | 131 | 12 | 14 |

**三、专业教学计划表（Teaching 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 | **毕业****要求**Student Outcomes |
| **总学时**Class Hours | **上机**Computer-aided Class Hours | **实验**Lab Hours | **实践**Practice Hours |
| **公 共 基 础 课General Basic Courses** | 143093 | 思想道德修养与法律基础Cultivation of Thought and Morals & Fundamental of Law | 必修课C | (40)(36) |  |  |  | 2.5 | 1 | №8 |
| 143091 | 中国近现代史纲要Skeleton of Chinese Modern History | (32)24 |  |  |  | 2.0 | 2 | №8 |
| 143106 | 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 | (80)48 |  |  |  | 5.0 | 3 | №8 |
| 143090 | 马克思主义基本原理Fundamentals of Marxism Principle | (40)36 |  |  |  | 2.5 | 4 | №8 |
| 143094 | 形势与政策Analysis of the Situation & Policy | (128) |  |  |  | 2.0 | 1-8 | №8 |
| 144001 | 大学英语（一）College English(1) | 64 |  |  |  | 4.0 | 1 | №10 |
| 144002 | 大学英语（二）College English(2) | 64 |  |  |  | 4.0 | 2 | №10 |
| 145223 | 大学计算机基础Foundations of Computer | 32 |  |  |  | 2.0 | 1 | №5 |
| 152001 | 体育（一）Physical Education (1) | 32 |  |  | 32 | 1.0 | 1 | №12 |
| 152002 | 体育（二）Physical Education (2) | 32 |  |  | 32 | 1.0 | 2 | №12 |
| 152003 | 体育（三）Physical Education (3) | 32 |  |  | 32 | 1.0 | 3 | №12 |
| 152004 | 体育（四）Physical Education (4) | 32 |  |  | 32 | 1.0 | 4 | №12 |
| 106001 | 军事理论Military Principle | (16) |  |  |  | 1.0 | 2 | №9 |
| 140191 | 微积分Ⅱ（一）Calculus(1) | 80 |  |  |  | 5.0 | 1 | №1 |
| 140192 | 微积分Ⅱ（二）Calculus(2) | 80 |  |  |  | 5.0 | 2 | №1 |
| 141005 | 大学物理Ⅲ（一）General Physics (1) | 64 |  |  |  | 4.0 | 2 | №1 |
| 141006 | 大学物理Ⅲ（二）General Physics (2) | 64 |  |  |  | 4.0 | 3 | №1 |
| 141007 | 大学物理实验（一）Physics Experiment(1) | 32 |  | 32 |  | 1.0 | 2 | №1 |
| 141008 | 大学物理实验（二）Physics Experiment(2) | 32 |  | 32 |  | 1.0 | 3 | №1 |
| 130009 | 工程制图Engineering Drawing | 48 |  |  |  | 3.0 | 1 | №1 |
| 140197 | 线性代数与解析几何Linear Algebra & Analytic Geometry | 48 |  |  |  | 3.0 | 1 | №1 |
| 140019 | 概率论与数理统计Probability & Mathematical Statistics | 48 |  |  |  | 3.0 | 2 | №1 |
| 140015 | 复变函数ⅠComplex Variable | 32 |  |  |  | 2.0 | 3 | №1 |
| 140016 | 积分变换Integral Transformation | 16 |  |  |  | 1.0 | 3 | №1 |
|  | 人文科学领域Humanities | 通识课E | 96 |  |  |  | 6.0 |  | №8 |
|  | 社会科学领域Social Science | 64 |  |  |  | 4.0 |  | №8 |
| **合计****Total** | 1100 |  | 64 | 128 | 71.0 |  |  |

**三、专业教学计划表（续）（Teaching 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 | **毕业****要求**Student Outcomes |
| **总学时**Class Hours | **上机**Computer-aided Class Hours | **实验**Lab Hours | **实践**Practice |
| **学科基础课Disciplinary Basic Courses** | 146105 | 自动化(专业)概论Introduction to Automation | 必C | 16 |  |  |  | 1.0 | 1 | №1,8,12 |
| 135020 | 电路ⅡElectric Circuits | 必C | 64 |  |  |  | 4.0 | 2 | №1,2,3,4,5 |
| 146114 | C++编程语言（一）C++ Programming Language（1） | 必C | 40 |  | 8 |  | 2.5 | 2 | №1,2,3,4,5,8,12 |
| 146115 | C++编程语言（二）C++ Programming Language（2） | 必C | 40 |  | 8 |  | 2.5 | 3 | №1,2,3,4,5,8,12 |
| 135005 | 电路实验Experiment of Circuit | 必C | 16 |  | 16 |  | 0.5 | 3 | №2,3,4,5 |
| 146062 | 计算机网络与通信技术Computer Network and Communication Technology | 必C | 32 |  |  |  | 2.0 | 3 | №1,2,3 |
| 135034 | 模拟电子技术ⅡAnalog Electronics | 必C | 64 |  |  |  | 4.0 | 3 | №1,2,3,4,5 |
| 135043 | 模拟电子技术实验Experiment of Analog Circuits | 必C | 16 |  | 16 |  | 0.5 | 4 | №2,3,4,5 |
| 155081 | 数字电子技术ⅡDigital Electronics | 必C | 64 |  |  |  | 4.0 | 4 | №1,2,3,4,5 |
| 135045 | 数字电子技术实验Experiment of Digital Electronics | 必C | 16 |  | 16 |  | 0.5 | 4 | №2,3,4,5 |
| 146002 | 自动控制原理Principles of Automatic Control | 必C | 72 |  |  |  | 4.5 | 4 | №1,2,3,4,5,6,7,12 |
| 146008 | 自动控制原理实验Experiment of Principles of Automatic Control | 必C | 28 |  | 28 |  | 1.0 | 4 | №3,4,5,9,10 |
| 146060 | 信号分析与处理Signal Analysis and Processing | 必C | 32 |  |  |  | 2.0 | 4 | №1,2,4 |
| 146005 | 电机及拖动基础Motor and Drive Foundation | 必C | 44 |  |  |  | 2.5 | 4 | №1,2,3,4,5 |
| 146075 | 电机及拖动基础实验Experiment of Motor and Drive Foundation | 必C | 16 |  | 16 |  | 0.5 | 4 | №3,4,5,9,10 |
| 146006 | 自动检测技术Automatic Detection and Measurement Technology | 必C | 40 |  |  |  | 2.5 | 4 | №1,2,3,4,5 |
| 146011 | 自动检测技术实验Experiment of Automatic Detection and Measurement Technology | 必C | 12 |  | 12 |  | 0.5 | 5 | №3,4,5,9,10 |
| 146007 | 现代控制理论Modern Control Theory | 必C | 48 |  |  |  | 3.0 | 5 | №1,2,3,4,5,6,12 |
| 146003 | 微型计算机原理Microcomputer Principle | 必C | 44 |  |  |  | 2.5 | 5 | №1,2,3,4,5 |
| 146043 | 微型计算机原理实验Experiment of Microcomputer Principle | 必C | 12 |  | 12 |  | 0.5 | 5 | №3,4,5,9,10 |
| 146073 | 电力电子技术Power Electronics Technology | 必C | 44 |  | 8 |  | 2.5 | 5 | №1,2,3,4,5,6,7,12 |
| 146116 | 控制系统Matlab仿真MATLAB Simulation for Control System | 选E | 32 |  |  |  | 2.0 | 3 | №1,2,4,5 |
| **合　计****Total** | 必C | 760 |  | 140 |  | 43.5 |  |  |
| **专业领域课Specialty- related Courses** | 146031 | 单片机原理及应用Principle & Application of Single-chip Microcomputer | 必C | 44 |  | 12 |  | 2.5 | 6 | №1,2,3,5 |
| 146017 | 运动控制系统Motion Control System | 必C | 44 |  |  |  | 2.5 | 6 | №1,2,3,6 |
| 146021 | 运动控制系统实验Experiment of Motion Control System  | 必C | 16 |  | 16 |  | 0.5 | 6 | №3,4,5,9,10 |
| 146018 | 过程控制仪表及装置Process Control Instrumentation Technology | 必C | 32 |  |  |  | 2.0 | 5 | №1,3,6,10,12 |
| 146016 | 过程控制工程Process Control Engineering | 必C | 32 |  |  |  | 2.0 | 6 | №1,2,3,6 |
| 146117 | 过程控制系统实验Experiment of Process Control System | 必C | 16 |  | 16 |  | 0.5 | 6 | №3,4,5,9,10 |
| 146024 | 计算机控制技术Computer Control Technology | 必C | 42 |  | 8 |  | 2.5 | 6 | №1,2,3,6 |
| 146089 | 模式识别基础Fundamentals of Pattern Recognition | 选E | 32 |  |  |  | 2.0 | 5 | №1,2,3,4,5,6,7,12 |
| 146071 | 自动化行业产业发展模式与职业规划Industrial Development Model and Career Planning of Automation Industry | 选E | 16 |  |  |  | 1.0 | 3 | №6,7,8,9,10 |
| 146134 | 机器人技术基础Fundamentals to Robotics | 选E | 48 |  |  |  | 3.0 | 6 | №1,2,3,4,5,6,7 |
| 146081 | 图像处理与机器视觉Image Processing and Machine Vision | 选E | 48 |  |  |  | 3.0 | 6 | №1,2,3,4,5,6 |
| 146027 | 嵌入式系统及应用Embedded System and Applications | 选E | 32 |  | 8 |  | 2.0 | 7 | №1,2,3,5,9,10 |
| 146001 | 系统工程导论General for System Engineering | 选E | 32 |  |  |  | 2.0 | 4 | №1,2,3,6,7,11 |
| 146070 | 企业经济管理Enterprise Economic Management | 选E | 32 |  |  |  | 2.0 | 5 | №1,2,3,6,7,11 |
| 146106 | 电气控制与PLCElectric Control and PLC | 选E | 48 |  | 8 |  | 3.0 | 6 | №1,2,3,5,9,10 |
| 146019 | 楼宇自动化Building Automation System | 选E | 32 |  |  |  | 2.0 | 7 | №2,3,5,6,8,9,10,11 |
| 146107 | 软件技术基础Fundamentals of Software Technology | 选E | 36 |  |  |  | 2.0 | 7 | №1,2 |
| 146029 | 智能控制导论General for Intelligent Control | 选E | 32 |  |  |  | 2.0 | 7 | №1,2,6,10 |
|  | 神经网络与机器学习Neural Networks and Learning Machines | 选E | 40 |  |  |  | 2.5 | 7 | №1,2,3,4,5 |
| 146109 | 电能供给及配送Design of Manufactory Power Supply | 选E | 32 |  |  |  | 2.0 | 7 | №1,2,3,4,5 |
| 146110 | 数字信号处理器(DSP)原理及应用Principles and Application of Digital Signal Processor | 选E | 32 |  |  |  | 2.0 | 7 | №1,2,3,4,5 |
| 146111 | DCS与现场总线DCS and Field bus | 选E | 32 |  |  |  | 2.0 | 7 | №1,2,3,4,5 |
| 146015 | 管理信息系统Management Information Systems | 选E | 32 |  |  |  | 2.0 | 7 | №1,2,3,4,5 |
| 146119 | 自动控制系统综合创新实践Innovation Practice on Automatic Control System | 选E | （32） |  |  | （32） | 1.0 | 7 | №2,3,4,5,6,8,9,10,11,12 |
| 146049 | 智能机器人创新实践Innovation Practice on Intelligent Robot | 选E | (32) |  |  | (32) | 1.0 | 6 |
| 146126 | 模式识别与机器视觉创新实践Innovation Practice on Pattern Recognition and Machine Vision | 选E | (32) |  |  | (32) | 1.0 | 7 |
| 146121 | 嵌入式系统创新实践Innovation Practice on Embedded Systems | 选E | (32) |  |  | (32) | 1.0 | 7 |
|  | PLC及工厂自动化创新实践Innovation Practice on PLC and Factory Automation | 选E | (32) |  |  | (32) | 1.0 | 7 |
| 146059 | 楼宇自动化创新实践Innovation Practice on Building Automation | 选E | (32) |  |  | (32) | 1.0 | 7 |
| 120003 | 创新研究训练Innovation Research Training | 选E | 32 |  |  |  | 2.0 |  |  |
| 120004 | 创新研究实践IInnovation Research Practice 1 | 选E | 32 |  |  |  | 2.0 |  |  |
| 120005 | 创新研究实践IIInnovation Research Practice 2 | 选E | 32 |  |  |  | 2.0 |  |  |
| 120006 | 创业实践Entrepreneurial Practice | 选E | 32 |  |  |  | 2.0 |  |  |
| **合　计****Total** | 必C | 226 |  | 52 |  | 12.5 |  |  |
| 选E | 选修课修读最低要求16.0学分minimum elective course credits required: 16 |

备注：

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.学科基础课和专业领域选修课最低修读 16学分，其中创新实践类课程最低修读3学分，自动控制系统综合创新实践为必选。创新实践课程与专业理论课的先修关系如下：

运动控制系统，过程控制过程-----自动控制系统综合创新实践；

电气控制与PLC----PLC与工厂自动化创新实践；

嵌入式系统及应用----嵌入式系统创新实践；

图像处理与机器视觉-----模式识别与机器视觉创新实践；

楼宇自动化----楼宇自动化创新实践。

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **课 程****代 码**Course No | **课程名称**Course Title | **是否必修**C/E | **学时数**Total Curriculum Hours | **学分数**Credits | **开课****学期**Semester | **毕业要求**Student Outcomes |
| **实践**Practiceweeks | **授课**Lecture Hours |
| 106002 | 军训Military Training | 必C | 3周 |  | 3.0 | 1 | №9 |
| 143197 | 马克思主义理论与实践Marxism Theory and Practice | 必C | 2周 |  | 2.0 | 假期 | №8 |
| 130356 | 工程训练ⅠEngineering Training | 必 | 2周 |  | 2.0 | 3 | №2,3,5,6 №9 №10 |
| 141073 | 电子工艺实习ⅡPractice of Electronic | 必 | 2周 |  | 2.0 | 4 | №2,3,5,6 №9 №10 |
| 135070 | 数字电路课程设计Curriculum Design on Digital Electronics Technique | 必 | 1周 |  | 1.0 | 4 | №1,2,3,4,5,9,10,11,12 |
| 146122 | 模式识别基础课程设计Curriculum Design on Fundamentals of Pattern Recognition | 必 | 1周 |  | 1.0 | 5 | №3,4,5,6,8,9,10,11,12 |
| 146123 | 电力电子技术课程设计Curriculum Design on Power Electronics Technology | 必 | 1周 |  | 1.0 | 5 | №3,4,5,6,8,9,10,11,12 |
| 146124 | 单片机原理及应用课程设计Curriculum Design on Principle & Application of Single-chip Microcomputer | 必 | 2周 |  | 2.0 | 6 | №3,4,5,6,8,9,10,11,12 |
| 146041 | 自动控制系统课程设计Curriculum Design on Automatic Control System | 必 | 2周 |  | 2.0 | 6 | №3,4,5,6,8,9,10,11,12 |
| 146042 | 计算机控制技术课程设计Curriculum Design on Computer Control Technology | 必 | 1周 |  | 1.0 | 6 | №3,4,5,6,8,9,10,11,12 |
| 146054 | 毕业实习Graduation Practice | 必 | 4周 |  | 4.0 | 6-7 | №3,6,7,8,9,10 |
| 146055 | 毕业设计Graduation Project | 必 | 15周 |  | 15.0 | 8 | №2,3,4,5,6,7,8,9,10,11,12 |
| **合　计****Total** | 必C | 36周 |  | 36.0 |  |  |

**五、第二课堂**

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2个学分。

**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，还必须参加国家创新创业训练计划或广东省创新创业训练计划或SRP（学生研究计划）或百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于4个学分。

**5.“Second Classroom” Activities**

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

1)Basic Requirements of Humanities Quality Education

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one’s interest, acquiring no less than two credits.

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.

**智能科学与技术**

**Intelligent Science and Technology**

**专业代码：**080907T**学 制：**4年

**Program Code:**080907T**Duration： 4years**

**培养目标：**

本专业培养坚持社会主义道路，能适应社会发展需要，在知识、能力、素质和德、智、体、美诸方面全面发展，掌握智能科学与技术领域的基本理论、专门知识和技能，并能在国民经济、国防和科研各部门中从事人工智能与机器人控制、新型传感器、信息处理、大数据与计算机应用系统等领域的科学研究、技术开发、工程设计、系统运行管理与维护、教育和管理决策等宽口径、高素质、复合型的智能科学与技术工程人才。

**Educational Objectives:**

This specialty nurtures wide-coverage, high-quality, inter-disciplinary students who can meet the requirements of social development, have knowledge, ability, quality and all-round development of moral, intellectual, physical and aesthetic aspects, master the basic theories, specialized knowledge and skills in the field of intelligent science and technology, and can be engaged in scientific research, technology development, engineering design, system operation and maintenance, education and managerial decision and so on in the fields of artificial intelligence, automatic manufacturing system, artificial intelligence and robot control, new sensor, information processing, intelligent buildings, big data and computer application system in the departments of national economy, national defense and scientific research.

**毕业要求：**

№1.基础知识：掌握扎实的基础知识、专业基本原理、方法和手段，构建清晰的数学、自然科学、工程基础和专业知识体系，用于解决智能科学与技术领域的复杂工程问题，并接触和掌握智能科学与技术相关行业部分营运知识，为解决实际企业智能化工程实际复杂问题打下知识基础。

№2.问题分析：能够应用数学、自然科学、本专业基本原理、方法和手段和智能科学与技术相关行业的营运知识，识别、表达、并通过文献研究分析和提炼出复杂理论与工程问题，获得有效结论。

№3.设计/开发解决方案：能够设计针对智能科学与技术复杂理论与工程问题的解决方案，设计满足特定需求的控制系统、单元（部件）或智能化处理流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

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

№5.使用现代工具：能够针对智能科学与技术复杂理论与工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对智能科学与技术复杂理论与工程问题的预测与模拟，并能够理解其局限性。

№6.工程与社会：能够基于智能科学与技术相关背景知识进行合理分析，评价专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

№7.环境和可持续发展：能够理解和评价针对智能科学与技术复杂工程问题的专业工程实践对环境、社会可持续发展的影响。

№8.职业规范：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。

№9.个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。

№10.沟通：能够就复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

№11.项目管理：理解并掌握工程管理原理与经济决策方法，并能在多学科环境中应用。

№12.终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

**Student Outcomes:**

№1. Basic Knowledge: Mastering solid basic knowledge, primary theories, methods and solutions of the major; an ability to apply knowledge about mathematics, science and engineering fundamentals and industry knowledge in intelligent science and technology fields to solve the complex engineering problems, contacting with and mastering the knowledge related to operation management in the intelligent science and technology industry, building a good foundation of basic knowledge about practical complex problems in intelligent engineering.

№2. Problem Analysis: An ability to apply mathematic, natural science knowledge, the basic knowledge, primary theories, methods and solutions of intelligent science and technology major to identify, formulate and analyze complex engineering problems, reaching to substantiated conclusions using basic principles of mathematics, science and engineering, and industry knowledge in artificial intelligence fields.

№3. Design/Development Solutions: An ability to design solutions for complex engineering problems, innovatively design systems, components or automation process that meet specific needs with societal, public health, safety, legal, cultural and environmental considerations.

№4. Research: An ability to conduct investigations of complex artificial intelligence engineering problems based on scientific theories and to adopt scientific methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

№5. Applying Modern Tools: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex theoretical artificial intelligence problems and engineering activities, with an understanding of the limitations.

№6. Engineering and Society: An ability to evaluate the influences of solutions to engineering practice and complex engineering problems on society, health, safety, law and culture according to contextual knowledge, and to take the consequent responsibilities.

№7. Environment and Sustainable Development: An ability to understand and evaluate the impact of professional artificial intelligence engineering solutions on environmental and societal sustainable development.

№8. Professional Standards: An understanding of humanity science and social responsibility, being able to understand and abide by professional ethics and standards responsibly in engineering practice.

№9. Individual and Teams: An ability to function effectively as an individual, a member or a leader in diverse teams and in multi-disciplinary settings.

№10.Communication: An ability to communicate effectively on complex engineering problems with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions, and communicate in cross-cultural contexts with international perspective.

№11. Project Management: Demonstrate knowledge and understanding of engineering management principles and methods of economic decision-making, to function in multidisciplinary environments.

№12. Lifelong Learning: A recognition of the need for, and an ability to engage in independent and life-long learning with the ability to learn continuously and adapt to new developments.

**专业简介：**

为了解决目前社会急需智能型人才的需求，学校于2014年设置智能科学与技术。该专业是一个面向人工智能前沿高新技术及其应用的基础性本科专业，是计算机，自动化，通信等多学科的交叉专业。目前自动化学院结合智能技术和自动控制技术，已经建立了完备的教师人才体系，实验和实习等锻炼平台，与多家相关企业建立了学生创新实践基地，从软件和硬件层面建立了完善的人才培养体系。

**Program Profile：**

To meet the urgent need of intelligent technology outstanding engineering talents, SCUT set up intelligent science and technology in year 2014. It is a specialty for artificial intelligence and its related applications, as well as a cross subject specialty of computer, control and communication, etc. Now this specialty is set up in the college of automation science and engineering as a cross subject specialty of intelligent and automation technique. We have a strong team for related training, research as well as practice. We also have setup some platforms with industry for student training and internship.

**专业特色：**

本专业定位以工科为主，注重综合素质和创新能力的培养，学生除了具有扎实的智能科学与技术理论、系统、工程知识外，还具有良好的计算机、电子、信息处理、系统综合管理等知识，具有专业口径宽、知识面广，基础厚实、动手能力强、适应性和就业范围广等特色。

本专业以自动化技术为基础，立足于智能技术和自动控制、大数据处理相结合，为智能机器人和智能大数据处理等行业培养人才，具有鲜明的特色。

**Program Features:**

As a specialty of engineering, intelligent science and technology engaged in cultivating the students’ comprehensive quality and innovative ability. Students should master the knowledge of artificial intelligence theory, system and engineering. Besides that, the knowledge of computer, electronics, information processing, and system integrated management is required too. The specialty of Intelligent Science and Technology has the characteristics of wide coverage, broad spectrum of knowledge, solid foundation, good practical ability, good adaptability and employment.

Intelligent science and technology bases on automation technology, intersects with automation and big data, targets to train engineers and researchers for intelligent robots and intelligent data processing.

**授予学位：**工学学士学位

**Degree Conferred:** Bachelor of Engineering

**主干课程：**

信号与系统、微型计算机原理、经典控制理论与应用、机器人技术基础、模式识别原理、人工智能、数据挖掘。

**Core Courses:**

Signals and Systems, Microcomputer Principle, Classical Control Theory and Application, Fundamentals of Robotics, Pattern Recognition Principles, Artificial Intelligence, Data Mining.

**特色课程：**

全英语教学课程：信号与系统

双语教学课程： C++编程语言（I）、C++编程语言（II）

研究型课程：模式识别原理

专题研讨课：脑机接口

创新实践课程：模式识别与智能技术综合创新实践、智能机器人创新实践、信号处理综合创新实践、嵌入式系统创新实践、生物医学信息处理创新实践、图像处理与机器视觉创新实践

竞教结合课程：智能机器人创新实践

创业教育课程：智能科学与技术行业产业发展模式与职业规划

**Featured Courses:**

Courses Taught in English: Signals and Systems

Bilingual Courses: C++ Programming Language（Part I）, C++ Programming Language（Part II）

Research Courses: Pattern Recognition Principles

Special Topics: Brain-Computer Interface

Innovation Practice: Integrated Innovation Practice on Pattern Recognition and Intelligent technology、Innovation Practice on Intelligent Robot、Integrated Innovation Practice on Signal Processing、Innovation Practice on Embedded Systems、Innovation Practice on Biomedical Information Processing、Innovation Practice on Image Processing and Machine Vision

Competition and Education Combination Courses: Innovation practice on Intelligent Robot Entrepreneurship Courses: Industrial Development Mode and Career Planning of Intelligent Science and Technology Industry

**一、教学计划总体安排表（General Teaching Schedule）**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 学年 | 学期 | 教　学　进　度　安　排　（周） | 理论教学 | 考　　试 | 入学教育 | 军训 | 课程设计 | 大作业 | 工程训练 | 电子实习 | 综合实验 | 社会实践 | 生产实习 | 毕业实习 | 其它实习 | 中外合作项目 | 毕业设计 | 就业安排 | 机动 | 假期 | 小计 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |  |
| 一 | 1 |  | C | A | A | A | A | A | A | A | A | A | A | A | A | A | A | B | D | D | D | 14 | 1 | 1 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 19 |
| 2 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Q | B | B | 17 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  | 20 |
| 二 | 3 | G | G | A | A | A | A | A | A | A | A | A | A | A | A | A | E | E | Q | B | B | 13 | 2 |  |  | 2 |  | 2 |  |  |  |  |  |  |  |  |  | 1 |  | 20 |
| 4 | H | H | A | A | A | A | A | A | A | A | A | A | A | A | A | E | E | E | B | B | 13 | 2 |  |  | 3 |  |  | 2 |  |  |  |  |  |  |  |  |  |  | 20 |
| 三 | 5 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Q | B | B | 17 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  | 20 |
| 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | E | E | E | B | B | 15 | 2 |  |  | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  | 20 |
| 四 | 7 | L | L | L | L | A | A | A | A | A | A | A | A | A | A | A | I | I | I | B | B | 11 | 2 |  |  |  |  |  |  | 3 |  |  | 4 |  |  |  |  |  |  | 20 |
| 8 | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | P |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 15 | 1 | 4 |  | 20 |
| 合　计（周） | 100 | 13 | 1 | 3 | 8 |  | 2 | 2 | 3 |  |  | 4 |  |  | 15 | 1 | 7 |  | 159 |

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

**1.学分统计表（Credits Registration Form）**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 课程类别Course Category | 课程要求Requirement | 学分Credits | 学时Academic Hours | 备注Remarks |
| 公共基础课General Basic Courses | 必修Compulsory | 61.0 | 940 |  |
| 通识General Education | 10.0 | 160 |  |
| 学科基础课Disciplinary Basic Courses | 必修Compulsory | 46.0 | 776 |  |
| 选修Elective | 0 | 0 |  |
| 专业领域课Specialty- related Courses | 必修Compulsory | 9.0 | 160 |  |
| 选修Elective | 15.0 | 240 |  |
| 合计Total | 141.0 | 2276 |  |
| 集中实践教学环节（周）Practice Training (Weeks) |  | 36.0 | 36周 |  |
| 毕业学分要求Credits Required for Graduation | 141.0+36.0=177.0 |

备注：学生在取得专业教学计划规定学分的同时，还必须取得第二课堂2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Academic Hours | 学分Credits |
| 总学时数Total | 其中Include | 其中Include | 总学分数Total | 其中Include | 其中Include | 其中Include |
| 必修学时Compulsory | 选修学时Elective | 理论教学学时Theory Course | 实验教学学时Lab | 必修学分Compulsory | 选修学分Elective | 集中实践教学环节学分Practice-concentrated Training | 理论教学学分Theory Course Credits | 实验教学学分Lab | 创新创业教育学分Innovation and Entrepreneurship Education |
| 2276 | 1876 | 400 | 1940 | 336 | 177 | 152 | 25 | 36 | 130.5 | 10.5 | 14 |

**三、专业教学计划表（Teaching 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 | **毕业****要求**Student Outcomes |
| **总学时**Class Hours | **上机**Computer-aided Class Hours | **实验**Lab Hours | **实践**PracticeHours |
| **公 共 基 础 课General Basic Courses** | 143093 | 思想道德修养与法律基础Cultivation of Thought and Morals & Fundamental of Law | 必修课C | (40)(36) |  |  |  | 2.5 | 1 | №8 |
| 143091 | 中国近现代史纲要Skeleton of Chinese Modern History | (32)24 |  |  |  | 2.0 | 2 | №8 |
| 143106 | 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 | (80)48 |  |  |  | 5.0 | 3 | №8 |
| 143090 | 马克思主义基本原理Fundamentals of Marxism Principle | (40)36 |  |  |  | 2.5 | 4 | №8 |
| 143094 | 形势与政策Analysis of the Situation & Policy | (128) |  |  |  | 2.0 | 1-8 | №8 |
| 144001 | 大学英语（一）College English(1) | 64 |  |  |  | 4.0 | 1 | №10 |
| 144002 | 大学英语（二）College English(2) | 64 |  |  |  | 4.0 | 2 | №10 |
| 145223 | 大学计算机基础Foundations of Computer | 32 |  |  |  | 2.0 | 1 | №5 |
| 152001 | 体育（一）Physical Education (1) | 32 |  |  | 32 | 1.0 | 1 | №12 |
| 152002 | 体育（二）Physical Education (2) | 32 |  |  | 32 | 1.0 | 2 | №12 |
| 152003 | 体育（三）Physical Education (3) | 32 |  |  | 32 | 1.0 | 3 | №12 |
| 152004 | 体育（四）Physical Education (4) | 32 |  |  | 32 | 1.0 | 4 | №12 |
| 106001 | 军事理论Military Principle | (16) |  |  |  | 1.0 | 2 | №9 |
| 140191 | 微积分Ⅱ（一）Calculus(1) | 80 |  |  |  | 5.0 | 1 | №1 |
| 140192 | 微积分Ⅱ（二）Calculus(2) | 80 |  |  |  | 5.0 | 2 | №1 |
| 141005 | 大学物理Ⅲ（一）General Physics (1) | 64 |  |  |  | 4.0 | 2 | №1 |
| 141006 | 大学物理Ⅲ（二）General Physics (2) | 64 |  |  |  | 4.0 | 3 | №1 |
| 141007 | 大学物理实验（一）Physics Experiment(1) | 32 |  | 32 |  | 1.0 | 2 | №1 |
| 141008 | 大学物理实验（二）Physics Experiment(2) | 32 |  | 32 |  | 1.0 | 3 | №1 |
| 130009 | 工程制图Engineering Drawing | 48 |  |  |  | 3.0 | 1 | №1 |
| 140197 | 线性代数与解析几何Linear Algebra & Analytic Geometry | 48 |  |  |  | 3.0 | 1 | №1 |
| 140019 | 概率论与数理统计Probability & Mathematical Statistics | 48 |  |  |  | 3.0 | 2 | №1 |
| 140015 | 复变函数ⅠComplex Variable | 32 |  |  |  | 2.0 | 3 | №1 |
| 140016 | 积分变换Integral Transformation | 16 |  |  |  | 1.0 | 3 | №1 |
|  | 人文科学领域Humanities | 通识课E | 96 |  |  |  | 6.0 |  | №8 |
|  | 社会科学领域Social Science | 64 |  |  |  | 4.0 |  | №8 |
| **合计****Total** | 1100 |  | 64 | 128 | 71.0 |  |  |

**三、专业教学计划表（续）（Teaching 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 | **毕业****要求**Student Outcomes |
| **总学时**Class Hours | **上机**Computer-aided Class Hours | **实验**Lab Hours | **实践**Practice |
| **学科基础课Disciplinary Basic Courses** | 135020 | 电路Ⅱ Electric Circuits | 必 | 64 |  |  |  | 4.0 | 2 | №1,2 |
| 135005 | 电路实验The Experiment of Electric Circuits | 必 | 16 |  | 16 |  | 0.5 | 3 | №2 |
| 135034 | 模拟电子技术ⅡAnalog Electronics | 必 | 64 |  |  |  | 4.0 | 3 | №1,2 |
| 135043 | 模拟电子技术实验Experiment of Analog Circuits | 必 | 16 |  | 16 |  | 0.5 | 4 | №2 |
| 155081 | 数字电子技术Ⅱ Digital Electronics | 必 | 64 |  |  |  | 4.0 | 4 | №1,2 |
| 135045 | 数字电子技术实验Experiment of Digital Electronics | 必 | 16 |  | 16 |  | 0.5 | 4 | №2 |
| 146062 | 计算机网络与通信技术Computer Network and Communication Technology | 必 | 32 |  |  |  | 2.0 | 3 | №1,2,3 |
| 146087 | 数值分析Numerical Analysis | 必 | 32 |  |  |  | 2.0 | 3 | №1 |
| 146114 | C++编程语言（一）C++ Programming Language（1） | 必 | 40 |  | 8 |  | 2.5 | 2 | №1,2,3,4,5,8,12 |
| 146115 | C++编程语言（二）C++ Programming Language（2） | 必 | 40 |  | 8 |  | 2.5 | 3 | №1,2,3,4,5,8,12 |
| 146127 | 数据结构与算法Data Structures and Algorithms | 必 | 48 |  | 8 |  | 3.0 | 4 | №1 |
|  | 信号与系统Signals and Systems | 必 | 64 |  |  |  | 4.0 | 4 | №1,2,3,5 |
| 146128 | 智能科学与技术概论Introduction to Intelligent Science and Technology | 必 | 32 |  |  |  | 2.0 | 3 | №1,8,12 |
| 146129 | 模式识别原理Pattern Recognition Principles | 必 | 64 |  |  |  | 4.0 | 5 | №1,2,3,4,5,6,12 |
| 146130 | 人工智能Artificial Intelligence | 必 | 32 |  |  |  | 2.0 | 4 | №1,2,3,4,5,6,12 |
| 146078 | 经典控制理论与应用Classical Control Theory and Application | 必 | 64 |  |  |  | 4.0 | 5 | №1,2,3,4,5,6,12 |
| 146076 | 经典控制理论与应用实验Experiment of Classical Control Theory and Application | 必 | 28 |  | 28 |  | 1.0 | 5 | №3,4,5,9,10 |
| 146003 | 微型计算机原理Microcomputer Principle | 必 | 48 |  |  |  | 3.0 | 5 | №1,2,3,4,5 |
| 146043 | 微型计算机原理实验Experiment of Microcomputer Principle | 必 | 12 |  | 12 |  | 0.5 | 5 | №3,4,5,9,10 |
| 146132 | 最优化理论与方法Optimization Theory and Methods | 选 | 48 |  |  |  | 3.0 | 6 | №1,2,5 |
| **合　计****Total** | 必C | 776 |  | 112 |  | 46.0 |  |  |
| **专业领域课Specialty- related Courses** | 146097 | 数据库技术及应用Database Technologies and Applications | 必 | 48 |  |  |  | 3.0 | 5 | №1,2,3,5 |
| 146133 | 数据挖掘Data Mining | 必 | 32 |  |  |  | 2.0 | 6 | №1,2,3,5 |
| 146134 | 机器人技术基础Fundamentals of Robotics | 必 | 48 |  |  |  | 3.0 | 6 | №1,2,3,4,5,6,7 |
| 146135 | 机器人技术基础实验Experiment of Fundamentals of Robotics | 必 | 32 |  | 32 |  | 1.0 | 6 | №3,4,5,9,10 |
| 146079 | 脑机接口Brain-Computer Interface | 选 | 32 |  |  |  | 2.0 | 6 | №1,2,4,7 |
| 146081 | 图像处理与机器视觉Image Processing and Machine Vision | 选 | 48 |  |  |  | 3.0 | 6 | №1,2,3,4,5,6 |
| 146031 | 单片机原理及应用Principle & Application of Single-chip Microcomputer | 选 | 44 |  | 12 |  | 2.5 | 6 | №1,2,3,5 |
| 146027 | 嵌入式系统及应用Embedded System and Applications | 选 | 32 |  | 8 |  | 2.0 | 6 | №1,2,3,5,9,10 |
|  | 机器学习理论与应用Theory and Applications of Machine Learning | 选 | 32 |  |  |  | 2.0 | 6 | №1,2,3,4,5 |
| 146001 | 系统工程导论General for System Engineering | 选 | 32 |  |  |  | 2.0 | 4 | №1,2,3,6,7,11 |
| 146099 | 生物医学信号处理Biomedical Signal Processing | 选 | 32 |  |  |  | 2.0 | 6 | №1,2,3,4,5,6 |
| 146101 | 生物信息学Bioinformatics | 选 | 32 |  |  |  | 2.0 | 6 | №1,2,3,4,5,6 |
| 146136 | 智能科学与技术行业产业发展模式与职业规划Industrial Development Mode and Career Planning of Intelligent Science and Technology Industry | 选 | 16 |  |  |  | 1.0 | 3 | №6,7,8,9,10 |
| 146140 | 模式识别与智能技术综合创新实践Integrated Innovation Practice on Pattern Recognition and Intelligent Technology | 选 | (32) |  |  | (32) | 1.0 | 7 | №2,3,4,5,6,8,9,10,11,12 |
| 146049 | 智能机器人创新实践Innovation Practice on Intelligent Robot | 选 | (32) |  |  | (32) | 1.0 | 7 |
| 146141 | 信号处理综合创新实践Integrated Innovatory Practice on Signal Processing | 选 | (32) |  |  | (32) | 1.0 | 7 |
| 146121 | 嵌入式系统创新实践Innovation Practice on Embedded Systems | 选 | (32) |  |  | (32) | 1.0 | 7 |
| 146137 | 生物医学信息处理创新实践Innovation Practice on Biomedical Information Processing | 选 | (32) |  |  | (32) | 1.0 | 7 |
| 146142 | 图像处理与机器视觉创新实践Innovation Practice on Image Processing and Machine Vision | 选 | (32) |  |  | (32) | 1.0 | 7 |
| 120003 | 创新研究训练Innovation Research Training | 选E | 32 |  |  |  | 2.0 |  |  |
| 120004 | 创新研究实践IInnovation Research Practice 1 | 选E | 32 |  |  |  | 2.0 |  |
| 120005 | 创新研究实践IIInnovation Research Practice 2 | 选E | 32 |  |  |  | 2.0 |  |
| 120006 | 创业实践Entrepreneurial Practice | 选E | 32 |  |  |  | 2.0 |  |
| **合　计****Total** | 必C | 160 |  | 32 |  | 9.0 |  |  |
| 选E | 选修课修读最低要求15.0学分minimum elective course credits required:15.0 |

备注：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.学科基础课和专业领域选修课最低修读15学分，其中创新实践类课程最低修读4学分。模式识别与智能技术综合创新实践为必选课程。创新实践课程与专业理论课的先修关系如下：

 模式识别原理---模式识别与智能技术综合创新实践；

 机器人技术基础---智能机器人创新实践；

 信号与系统---信号处理综合创新实践；

 嵌入式系统及应用---嵌入式系统创新实践；

 生物医学信号处理---生物医学信息处理创新实践；

 图像处理与机器视觉---图像处理与机器视觉创新实践。

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **课 程****代 码**Course No | **课程名称**Course Title | **是否必修**C/E | **学时数**Total Curriculum Hours | **学分数**Credits | **开课****学期**Semester | **毕业要求**Student Outcomes |
| **实践**Practiceweeks | **授课**Lecture Hours |
| 106002 | 军训Military Training | 必C | 3周 |  | 3.0 | 1 | №9 |
| 143197 | 马克思主义理论与实践Marxism Theory and Practice | 必C | 2周 |  | 2.0 | 假期 | №8 |
| 130356 | 工程训练ⅠEngineering Training | 必 | 2周 |  | 2.0 | 3 | №2,3,5,6 №9 №10 |
| 141073 | 电子工艺实习ⅡPractice of Electronic | 必 | 2周 |  | 2.0 | 4 | №2,3,5,6 №9 №10 |
| 146096 | 高级程序语言设计Curriculum Design on Advanced Programming Language | 必 | 2周 |  | 2.0 | 3 | №2,3,4,5 |
| 146131 | 人工智能课程设计Curriculum Design on Artificial Intelligence | 必 | 1周 |  | 1.0 | 4 | №2,3,4,5 |
| 146138 | 模式识别原理课程设计Curriculum Design on Pattern Recognition Principles | 必 | 2周 |  | 2.0 | 4 | №2,3,4,5 |
| 146139 | 机器人技术基础课程设计Curriculum Design on Fundamentals of Robotics | 必 | 3周 |  | 3.0 | 6 | №2,3,4,5 |
| 146054 | 毕业实习Graduation Practice | 必 | 4周 |  | 4.0 | 6-7 | №2,3,5,6,7,8,9,10,11,12 |
| 146055 | 毕业设计Graduation Project | 必 | 15周 |  | 15.0 | 8 | №2,3,4,5,6,9,10,12 |
| **合　计****Total** | 必C | 36周 |  | 36.0 |  |  |

**五、第二课堂**

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2个学分。

**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，还必须参加国家创新创业训练计划或广东省创新创业训练计划或SRP（学生研究计划）或百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于4个学分。

**5. “Second Classroom” Activities**

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

1. Basic Requirements of Humanities Quality Education

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one’s interest, acquiring no less than two credits.

1. 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.