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：

　　为积极响应国家创新驱动发展战略与新一代人工智能发展规划战略需求，紧抓粤港澳大湾区重大发展机遇，华南理工大学在广州国际校区吴贤铭智能工程学院开设智能制造工程专业。学院以学生为中心，秉承"全球视野、交叉学科、创新为道、质量为本"的办学理念，全方位融合中美两国教育体系发展特色。通过汇聚全球智能制造领域优秀科研人才，引入全新教学方法，加强数学、物理、计算机、信息处理等基础知识与机械工程、电子工程、自动化控制工程、计算机技术等多学科交叉知识的融合教学。努力培养一批以德为先，德智体美劳全面发展，具有家国情怀、国际视野、跨领域视野和专业前瞻性的新一代国际化、创新型、领袖型人才。吴贤铭智能工程学院的本科毕业生，将掌握扎实的智能工程基础理论、基本方法和应用技术，拥有突出的科学素养、创新能力、系统思维与国际视野，具备发现问题、分析问题、解决问题的批判思维能力，训练跨领域、跨文化、跨国界的书面表达及沟通能力，具有全局观、协调力、包容心及执行力的团队协作领导能力，具备终身学习的技能以及在智能制造领域进一步深耕的能力。我们将努力把学生打造成为具有全球竞争力的复合型智能科学技术人才，具备成为国际一流科学家、新一代智能工程师和企业家的基础与潜力，引领我国智能科学技术与产业蓬勃发展。

Educational Objectives:

In order to respond to the national innovation-driven development strategy and the strategic needs of the new generation of artificial intelligence development planning, the S.M. Wu School of Intelligent Engineering in South China University of Technology seizes the development opportunities of Guangdong – Hong Kong – Macau Bay. Therefore, the school has set up Intelligent Manufacturing Engineering. The school focuses on students and adheres to the concept of 'Global Vison, Interdisciplinary, Innovation, and Quality' so that it can comprehensively integrate the educational systems of China and the United States to develop its own characteristics. Through bringing together the outstanding research talents in the field of worldwide intelligent manufacturing, the school introduces new teaching methods and strengthens the integration of basic knowledge such as mathematics, physics, computer science, information processing, and other fundamental knowledge, as well as cross-disciplinary knowledge of mechanical engineering, electrical engineering, automation and control engineering, computer technology. The school strives to cultivate a group of new generations of international, innovative and leadership talents with patriotism, global vision, interdisciplinary vision, and professional forward-looking to comprehensively develop their morality, intelligence, physical and aesthetic aspects. It has a patriotism, international vision,

interdisciplinary vision and professional forward-looking. The graduates of the S.M. Wu School of Intelligent Engineering will have a solid foundation of intelligent engineering, basic methods, and applied technology, as well as outstanding scientific literacy, innovative ability, systems thinking, and global vision. They also will have an ability of critical thinking that identifying, analyzing, and solving engineering problems; an ability of written expression and communication of interdisciplinary, cross-cultural, and cross-border; an ability of leadership with holistic view, coordination, tolerance, and execution; an ability to engage in life-long learning and further develop in the field of intelligent manufacturing. We will strive to make students to be the compound talents with intelligent science. And they will have the foundation and potential to become world-leading scientists and a new generation of intelligent engineers and entrepreneurs. They will lead the vigorous development of intelligent science, technology, and industry in China.

毕业要求：

№1. 运用数学，科学和工程知识的能力。

№2. 设计和实施实验分析和解释数据的能力。

№3. 考虑经济、环境、社会、政治、伦理、健康、安全、易于加工、可持续性等现实约束条件下设计系统、设备或工艺的能力

№4. 在团队中从不同学科角度发挥作用的能力

№5. 发现、提出和解决工程问题的能力。

№6. 对所学专业的职业责任和职业道德的理解

№7. 有效沟通的能力

№8. 具备足够的知识面并能够在全球化、经济、环境的和社会背景下认识工程解决方案的效果

№9. 对于终身学习的认识和实施能力

№10. 具备从本专业角度理解当代社会和科技热点问题的知识

№11. 综合运用技术、技能和现代工程工具来进行工程实践的能力

Student Outcomes:

№1. An ability to apply knowledge of mathematics, science, and engineering.

№2. An ability to design and conduct experiments, as well as to analyze and interpret data

№3.An ability to design ad system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

№4. An ability to function on multidisciplinary teams.

№5. An ability to identify, formulate, and solve engineering problems

№6. An understanding of professional and ethical responsibility.

№7. An ability to communicate effectively.

№8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

№9. A recognition of the need for, and an ability to engage in life-long learning.

№10. A knowledge of contemporary issues.

№11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

专业简介：（限 500 字以内）

　　智能制造工程专业是面向智能工程前沿高新技术及其应用的专业性本科专业，同时也是计算机工程与应用、机械工程、自动化控制、电子电信等多学科的交叉融合专业。该专业通过汇聚全球智能制造领域优秀科研人才，研究包括人工智能基本理论及科学问题、智能制造、机器人技术、无人驾驶技术、智慧城市、智能医疗等前沿科学技术，培养一批具有全球竞争力的复合型智能科学技术人才，开展世界前沿科学研究。作为智能制造领域最前沿的学科专业，智能制造工程专业的毕业生将具有厚基础、宽口径、重实践、富创新的特点。我们将着重培养学生综合运用所学知识的能力与团队组织协调能力，使其具有融合掌握多学科基础理论的专业优势，打造广阔的就业机会与继续深造前景。学院目前已全面引入美国密西根大学本科生教学体系，拥有最先进的实验室和实习等科研与实操平台，从软件和硬件层面建立了完善的人才培养体系。学生毕业后可到高校科研机构、相关企事业单位、政府机关等从事相关领域的研发、管理工作，也可以继续深造，攻读机器人工程、智能制造及相关学科的研究生，寻求更加广阔的发展机会。

Program Profile：

Intelligent Manufacturing Engineering is a professional undergraduate major that facing the advanced technology and application of intelligent engineering. It is also a cross-integration major of computer engineering, mechanical engineering, automation control, electronic telecommunication. By integrating the outstanding research talents in the field of worldwide intelligent manufacturing, the research consists of basic theory and scientific issues of artificial intelligence, intelligent manufacturing, robotic technology, driverless technology, artificial intelligent healthcare, intelligent cities, and other frontier science and technology so that it aims to cultivate a group of compound intelligent science and technology talents. As the most advanced discipline in the field of intelligent manufacturing, the graduates of Intelligent Manufacturing Engineering will have the characteristics of thick foundation, wide caliber, emphasis on practice and innovation, and they will also have an ability of organizing, coordinating and synthetically applying the knowledge they have learned. With the professional advantage of integrating and mastering the basic theory of multi-discipline, the prospect of employment and further education is very broad. At present, the school has completely brought in the education system of the University of Michigan with the

most advanced laboratory, internship, and other research and practical platforms, and the school has established a complete talent training system in the software and hardware level. After graduation, students can go to university research institutions, related enterprises and institutions, and government agencies to engage in R&D and management in related fields. They can also continue their studies that pursuing graduate studies in Robotics Engineering, Intelligent Manufacturing and related disciplines in order to seek broader development opportunities.

专业特色：（限 100 字以内）

1.以工科为基础，通过将机械工程、自动化、电子电信、计算机等多个学科交叉融合教学培养，形成强交叉新工科的鲜明特色。

2. 专业设置对标密西根大学，并参照美国 ABET 课程认证标准要求。通过引入全新教学方法、让学生获取国际视野与国际竞争力。

Program Features:

1. This major is based on engineering. It will form a new and strong interdiscplinary engineering by integrating Mechanical Engineering, Automation, Electronic Telecommunication, Computer Science and other discplines.

2. Major courses would benchmark against University of Michigan, and also refer to ABET eligibility requirements. By introducing new teaching methods, students will gain international perspective and competitiveness.

授予学位：工学学士学位

Degree Conferred: Bachelor of Engineering

核心课程：工程训练、电路导论、固体力学导论、工程热力及流体力学、传热学、动力学与震动导论、设计与制造、动力系统建模、分析与控制、材料力学、

Core Courses: Engineering Practice Training, Introduction to Circuits, Introduction to Solid Mechanics, Thermodynamics and Fluid Mechanics, Heat Transfer, Introduction to Dynamics and Vibrations, Design and Manufacturing, Modeling, Analysis and Control of Dynamics, Mechnical Behavior of Materials

特色课程：

新生导论课：工程导论
学科前沿课：工业大数据分析及应用、制造系统分析及设计
创新实验课：工程导论、设计与制造 I、设计与制造 II、设计与制造 III
综合研究设计课：设计与制造 I、设计与制造 II、设计与制造 III

Featured Courses:

Freshmen Seminars: Introduction to Engineering - 5 -

Subject Frontiers Courses: Big Data Analytics and Applications in Industry, Analytics and Design of Manufacturing Systems

Innovation Laboratory: Introduction to Engineering, Design and Manufacturing II, Design and Manufacturing III

Comprehensive Research Designs: Design and Manufacturing I, Design and Manufacturing II, Design and Manufacturing III

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

1.学分统计表（Credits Registration Form）

课程类别 Course Category	课程要求 Requirement	学分 Credits	学时 Academic Hours	备注 Remarks
公共基础课 General Basic Courses	必修 Compulsory	61	1105	
	通识 General Education	10	160	
专业基础课 Specialty Basic Courses	必修 Compulsory	79	1283	
选修课 Elective Courses	选修 Elective	10	160	
合 计 Total		160	2708	
集中实践教学环节（周） Practice Training (Weeks)		6	6 周	
毕业学分要求 Credits Required for Graduation	166			

备注：毕业学分要求格式：合计学分+集中实践教学环节学分=毕业学分要求

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
2708	2388	320	2183	525	166	146	20	6	153	7	0

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、实习和其他；

3.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	毕业要求 Student Outcomes
				总学时 Class Hours	实验 Lab Hours	实习 Practice Hours	其他 Other Hours			
公共基础课 General Basic Courses	031101371	中国近现代史纲要 Skeleton of Chinese Modern History	必修课	40			4	2.5	2	№3, №6
	043100413	思想道德修养与法律基础 Cultivation of Thought and Morals & Fundamental of Law		40			4	2.5	2	№3, №4, №6
	031101621	马克思主义基本原理概论 Fundamentals of Marxism Principle		40			4	2.5	4	№3, №6
	031101423	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		72			24	4.5	4	№3, №6, №10
	031101331	形势与政策 Analysis of the Situation & Policy		128				2.0	1-8	№3, №6, №10
	052100332	体育（一） Physical Education (1)		32			32	1.0	1	№9.
	052100012	体育（二） Physical Education (2)		32			32	1.0	2	№9.
	052100842	体育（三） Physical Education (3)		32			32	1.0	3	№9.
	052100062	体育（四） Physical Education (4)		32			32	1.0	4	№9.
	006100112	军事理论 Military Principle		36			18	2.0	2	№3, №9
	082100041	应用微积分Ⅰ Applied Calculus Ⅰ		60				4.0	1	№1, №5, №7, №11
	082100051	应用微积分Ⅱ Applied Calculus Ⅱ		60				4.0	2	№1, №5, №7, №11
	082100271	概率论与数理统计 Probability & Mathematical Statistics		60				4.0	3	№1, №5, №7, №11.
	082100061	线性代数 Linear Algebra		60				4.0	2	№1, №5, №7, №11
	044101381	学术英语（一） English for Academic Purposes Ⅰ		64				4.0	1	№7, №8
	044102452	学术英语（二） College English Ⅱ		32				2.0	2	№7, №8
	082100261	工程导论 Introduction to Engineering		60				4.0	1	№5, №7
	082100331	化学 Chemistry		60				4.0	1	№1, №6, №8, №9, №10
	082100321	化学实验 Chemistry Lab		15	15			1.0	2	№1, №4, №6, №8, №9, №10

课程编号	课程名称	课程类别	学时	实验	上机	其他	学分	学期	备注
082100361	物理Ⅰ Physics Ⅰ		60				4.0	2	№1, №5, №7, №8, №9, №11
082100371	物理Ⅱ Physics Ⅱ		60				4.0	3	№1, №5, №7, №8, №9, №11
082100381	物理实验（一） Physics Lab Ⅰ		15	15			1.0	2	№1, №5, №7, №8, №9, №11
082100391	物理实验（二） Physics Lab Ⅱ		15	15			1.0	3	№1, №5, №7, №8, №9, №11
	人文科学领域 Humanities	通识课E	96				6.0		№6
	社会科学领域 Social Science		32				2.0		№6
043100101	大学生心理健康教育		32				2.0	2	
	合 计 **Total**		1265	45		182	71		

备注：学时中其他可以为上机和实践学时。

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	毕业要求 Student Outcomes
				总学时 Class Hours	实验 Lab Hours	实习 Practice Hours	其他 Other Hours			
专业基础课 Specialty Basic Courses	082100171	计算机与程序设计导论 Introduction to Computer and Programming	必 C	60			28	4.0	4	№1, №3, №4, №11
	082100311	电路导论 Introduction to Circuits	必 C	80	32			4.0	5	№1, №2, №3, №5, №11
	082100231	固体力学导论 Introduction to Solid Mechanics	必 C	60				4.0	3	№1, №11
	082100241	工程热力及流体力学 Thermodynamics and Fluid Mechanics	必 C	60				4.0	4	№1, №3, №5, №8, №11
	082100281	动力学及振动导论 Introduction to Dynamics and Vibration	必 C	60				4.0	4	№1, №3, №5 №11
	082100121	设计与制造 I Design and Manufacturing I	必 C	84	36			4.0	4	№1№2, №3, №4, №5, №7, №11
	082100341	传热学 Heat Transfer	必 C	45				3.0	6	№1, №5
	082100131	设计与制造 II Design and Manufacturing II	必 C	84	36			4.0	6	№1№2, №3, №4, №5, №7, №11
	082100291	动力系统建模、分析与控制 Modeling, Analysis, and Control of Dynamic System	必 C	60				4.0	5	№1, №3, №5, №11
	082100091	数据分析建模 Data Analysis and Modeling	必 C	64			24	4.0	5	№1, №2.
	082100351	材料力学 Mechanical Behavior of Materials	必 C	60				4.0	5	№1, №3, №5, №11
	082100451	数据结构与算法 Data Structure and Algorithm	必 C	64			16	4.0	5	№1, №2, №4, №7, №11

082100141	设计与制造III Design and Manufacturing III	必 C	60	36			4.0	8	№1№2, №3, №4, №5, №7, №11
082100461	嵌入式系统与设计 Embedded Systems and Design	必 C	64			30	4.0	5	№1, №2, №4№5, №11
082100241	工业大数据分析及应用 Big Data Analytics and Applications in Industry	必 C	45			20	3.0	3	№1, №2, №8, №11
082100021	制造系统分析及设计 Analytics and Design of Manufacturing Systems	必 C	48				3.0	7	№1, №2, №3, №5
082100481	传感器技术及应用 Sensor and its Applications	必 C	48				3.0	6	№1, №2, №3, №5, №7
082100541	经典控制理论 Classical Control Theory	必 C	48				3.0	6	№1, №2, №3, №5, №7, №8
082100221	机电一体化 Mechatronics	必 C	48	16			3.0	6	№1, №2, №3, №4, №5, №7, №11
082100071	现代控制理论 Modern Control Theory	必 C	48			12	3.0	7	№1, №5, №9, №11
082100161	人工智能技术及应用 Artificial Intelligence Technology and Applications	必 C	45			12	3.0	2	№1, №3, №6, №8, №9, №10, №11
082100511	智能工厂 Smart Factory	必 C	48				3.0	6	№1, №2, №8, №11
合 计 **Total**			1283	156		142	79		

类别	课程代码	课程名称	课程性质					学分	学期	备注
选修课 Elective Courses	082100301	电气控制及 PLC Electrical Control and PLC	选E	48			8	3.0	7	№1, №2, №3, №4, №5, №11
	082100411	三维建模与 3D 打印 Introduction to 3D Modeling and 3D Printing	选E	45			45	3.0	3	№1№2, №3, №4, №5, №7,
	082100421	机器人入门与实践 Introduction to Robotics	选E	45			27	3.0	3	№1№2, №3, №4, №5, №7,
	082100011	自动驾驶系统 Autonomous Driving Systems	选E	48				3.0	8	№1, №2, №4, №5, №8, №10, №11
	082100621	信号处理 Signal Processing	选E	60			12	4.0	6	№1, №2, №5, №7, №9, №11
	082100631	产品开发 Product Development	选E	48				3.0	5	№1, №2, №5, №7
	082100741	自然语言处理 Natural Language Processing	选E	48			20	3.0	6	№1,№3, №5, №11
	082100491	柔性电子设计及制造 Flexible Electronic Design and Manufacturing	选E	32	10			2.0	7	№1, №2, №5, №7, №9, №11
	082100471	数据库 Databases	选E	32			8	2.0	7	№1, №2, №5, №7, №9, №11
	082100561	软件工程 Software Engineering	选E	48			16	3.0	8	№1, №2, №5, №7, №9, №11

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
082100521	先进制造技术 Advanced Manufacturing Technology	选E	48				3.0	8	№1, №2, №5, №7, №9, №11
082100571	物联网导论 Introduction to Internet of Things	选E	32				2.0	8	№1, №2, №5, №7, №9, №11
020100051	创新研究训练 Innovation Research Training	选E	32				2.0	7	№3,4
020100041	创新研究实践 I Innovation Research Practice I	选E	32				2.0	7	№3,4
020100031	创新研究实践II Innovation Research Practice II	选E	32				2.0	7	№3,4
020100061	创业实践 Entrepreneurial Practice	选E	32				2.0	7	№3,9,11
合计 **Total**			选修课修读最低要求 10 学分 minimum elective course credits required:10						

备注：理论课和实验课为 15 学时计 1 学分（对标上海交大密西根学院）。

学时中其他可以为上机和实践学时。

非本学院课程均为跨学院选修课，具体课程根据国际校区其他学院而定

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

课程代码 Course No	课程名称 Course Title	是否必修 C/E	学时数 Total Curriculum Hours		学分数 Credits	开课学期 Semester	毕业要求 Student Outcomes
			实践 Practice weeks	授课 Lecture Hours			
006100151	军事技能 Military Training	必C	2 周		2.0	1	№4
031101551	马克思主义理论与实践 Marxism Theory and Practice	必C	2 周		2.0	4	№6
030100702	工程训练 I Engineering Training	必C	2 周		2.0	4	№1, №3, №4, №11
合计 **Total**		必C	6 周		6.0		
		选E	选修课修读最低要求 4 学分 minimum elective course credits required:4				

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

"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.