

# 过程装备与控制工程

## Process Equipment & Control Engineering

专业代码: 080206

学 制: 4 年

Program Code: 080206

Duration: 4years

### 培养目标:

本专业培养适应经济、科技和社会发展需要, 德、智、体全面发展, 系统掌握数学、物理、化学等自然科学原理及化学工程、机械工程、控制工程和材料工程等相关工程知识, 具备国际视野、人文素质和社会责任感, 适应石油、化工、能源动力、轻工机械、制药等相关行业发展需求, 能使用现代工具开展过程装备设计、研发和工程管理等工作, 富有团队合作和创新精神的高素质人才。

### Educational Objectives:

The specialty fosters the graduates adapt the development of economy, science and society, and it aims to let the graduates master various natural science-based and engineering-related knowledge, including math, physics, chemistry, chemical engineering, control engineering and materials engineering, etc. The major offers professional graduate degrees with an international focus, humanistic quality and social responsibilities, and makes the graduates fit for the various industries development demand, including chemical engineering, petroleum, energy, light industry and pharmacy, etc. The specialty fosters the graduates' practice skills to cope with design, development, integrated innovation, and production management in the process equipment field, and train the graduates have a stronger teamwork spirits and creative minds.

### 毕业要求:

№1.工程知识: 掌握扎实的基础知识、专业基本原理、方法和手段, 能够将数学、自然科学、本专业基础知识和专业知识用于解决复杂工程问题, 并接触和掌握过程装备与控制工程行业部分营运知识, 为解决企业过程装备与控制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、方法和手段和机械行业营运知识, 识别、表达、并通过文献研究分析过程装备与控制工程中的复杂问题, 以获得有效结论。

№3.设计/开发解决方案: 能够设计针对过程装备与控制工程复杂问题的解决方案, 设计满足特定需求的过程装备与控制工程系统、单元(部件)或工艺流程, 并能够在设计环节中体现创新意识, 考虑社会、健康、安全、法律、文化以及环境等因素。

№4.研究: 能够基于科学原理并采用科学方法对过程装备与控制工程复杂问题进行研究, 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: 能够针对过程装备与控制工程复杂问题, 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, 包括对过程装备与控制工程复杂问题的预测与模拟, 并能够

理解其局限性。

№6.工程与社会：能够基于过程装备与控制工程相关背景知识进行合理分析，评价过程装备与控制工程实践和过程装备与控制工程复杂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过程装备与控制工程复杂问题的工程实践对环境、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：能够就过程装备与控制工程复杂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：理解并掌握过程装备与控制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.Engineering Knowledge: An ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to the solution of complex engineering problems.

№2.Problem Analysis: An ability to identify, formulate and analyze complex engineering problems, reaching to substantiated conclusions using basic principles of mathematics, science, and engineering.

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

№4.Research: An ability to conduct investigations of complex engineering problems based on scientific theories and adopting 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 engineering activities, with an understanding of the limitations.

№6.Engineering and Society: An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

№7.Environment and Sustainable Development: An ability to understand and evaluate the impact of professional engineering solutions in environmental and societal contexts and demonstrate knowledge of and need for 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, and as a member or 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：**

华南理工大学“过程装备与控制工程专业”是全国最早开设该专业的六校之一，是教育部机械类教指委过程装备与控制工程分教指委员会单位。工控系前身为化工机械系，创建于1958年，包括化工机械、塑料机械、橡胶机械、造纸机械四个专业。1999年起，根据全国统一的专业目录，改名为过程装备与控制工程。目前过程装备与控制工程专业设“化工装备与控制工程”和“轻工装备及塑料模具”两个方向，学生入校后根据专业兴趣再选择专业方向进行培养。“化工装备与控制工程”方向培养具备化学工程与技术、机械工程、控制工程和管理工程等方面知识，能在化工、石油、能源、轻工、环保、医药、食品、机械及劳动安全等部门从事工程设计、技术开发、过程控制、经营管理以及工程科学研究等方面的高级工程技术人才。“轻工装备及塑料模具”方向主要培养轻工机械、塑料模具、机械制造及其自动化、高分子材料加工成型机械的高级工程技术人才。专业注重专业实验室和校外生产实习基地建设，目前在校内已建成计算机测试与控制实验室、单片机示范实验室、机电传动控制实验室、液压与气动实验室、外压失稳实验室、高分子材料成型加工综合实验室等。

### **Program Profile:**

Process Equipment and Control Engineering (South China University of Technology) possesses perfect senior talent cultivation system, and has long been the Member of Teaching Steering Committee of process equipment and control engineering of Ministry of Education. At present, the process equipment and control engineering major divides into two directions: “Chemical engineering equipment and control engineering” and “light industrial equipment and plastic mould”. After entering the university, students have a right according to their interests and preferences choose to study the future directions. “Chemical engineering equipment and control engineering” aims to foster the students engaging in process equipment, oil & gas transportation equipment, and design, development, install, operation of their control system. “Light industrial equipment and plastic mould” aims to foster the students as a high quality engineers, engaging in

the fields of light industrial mechanical, plastic mould, mechanical manufacture and automation, polymer processing machinery, etc.

### **专业特色:**

本专业覆盖过程装备设计及过程装备控制等工业领域，培养学生掌握过程装备与控制工程领域的技术理论基础知识，受到现代工程师的基本训练，注重学生的动手能力、创新能力，培养在过程装备与控制、机械制造自动化、轻工装备及模具设计等领域从事工程设计、制造、技术开发、科学研究、生产组织和管理等方面的高素质人才。

### **Program Features:**

The major leads to train the student's ability to master the main skill in Process Equipment & Control Engineering, including the basic theoretical knowledge of mechanics, machinery, fluid mechanics, heat transfer, mass-transfer, etc, basic engineer training, pay more attention to teaching practice, and raises student's beginning ability. The major aims to train the students have stronger basic capacity to engage in real work of professional field, e.g., process equipment control, machinery manufacturing and automation, light industrial equipment, mould design and work on engineering design and manufacture, technology development, scientific research, and production and management, etc.

**授予学位:** 工学学士学位

**Degree Conferred:** Bachelor of Engineering

### **主干课程:**

电路与电子技术、工程力学、机械设计基础、流体力学与传热 II、传质与分离工程 II、机械制造工艺学、自动控制理论、机电传动控制、过程装备控制、过程设备设计（化工装备与控制工程方向）、高分子材料成型加工设备（轻工装备及塑料模具）。

### **Core Courses:**

Circuit and Electronic Technology, Engineering Mechanics, Mechanical Design Basics, Fluid Mechanics & Heat Transfer, Mass Transfer and Separation Processes, Mechanical Manufacture Technology, Automatic Control Theories, Process Equipment Control, Process Equipment Design, Plastic Machinery Design, Plastic Forming and Mould Design.

### **特色课程:**

全英语教学课程：过程装备、自动控制理论、数字信号处理与应用

双语教学课程：过程装备控制、流体力学与传热 II、传质与分离工程 II、工程流变学

研究型课程：过程设备设计、工程设计学、高分子材料加工过程建模与仿真

专题研讨课：专题讲座、机器人学导论、3D 打印技术概论、材料成型新装备与新技术

创新实践课程：生产实习、专业实验

创业教育课程：过程装备与控制工程产业模式与创业

### Featured Courses:

Courses Taught in English: Process Equipment、Automatic Control Theory、Digital Signal Processing & Applications

Bilingual Courses: Process Equipment Control, Fluid Mechanics & Heat Transfer II, Mass Transfer and Separation Processes II, Engineering Rehology

Research Courses: Plastic Machinery Design, Methodology of Engineering Design, Modeling and Simulation of Polymer Processing Process

Special Topics: Special Toics in Process Equipment, Light Industrial Equipment Intelligence Robot, 3D Printing Technology on Light Industrial Equipment, Novel Polymer Processing Equipment and Technology

Innovation Practice: Production Practice, Specialty Experiment

Entrepreneurship Courses: Process Equipment & Control Engineering Entrepreneurship

## 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	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	Q	Q	B	B	16	2												2	20					
二	3	G	G	G	G	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	14	2													20					
	4	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E	E	B	B	16	2		2											20					
三	5	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	Q	I	B	B	16	2											1	20						
	6	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	E	E	E	E	14	2		4										20						
四	7	K	K	K	K	A	A	A	A	A	A	A	A	B	B	Q	E	E	E	I	9	2		3									1	20						
	8	O	O	O	O	O	O	O	O	O	O	O	O	O	O	Q	P	P	P														16	3	1	20				
合 计 (周)																		99	13	1	3	9		4		1		4						16	3	5	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	68.0	1052	
	通识 General Education	10.0	160	

学科基础课 Disciplinary Basic Courses	必修 Compulsory	40.0	680	
	选修 Elective	3.0	48	
专业领域课 Specialty- related Courses	必修 Compulsory	8.0	128	
	选修 Elective	14.5	232	
合 计 Total		143.5	2300	
集中实践教学环节(周) Practice Training (Weeks)	必修 Compulsory	39.5	39.5 周	
毕业学分要求 Credits Required for Graduation	143.5+39.5=183.0			

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-con centrated 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 Entrepreneurshi p Education
2300	1860	440	2028	272	183	155.5	27.5	39.5	135	8.5	20

### 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-ai ded Class Hours	实验 Lab Hours	实践 Practic e 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
	145268	C++程序设计基础 C++ Programming Foundations		48				3.0	2	№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
	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
	140016	积分变换 Integral Transformation		16				1.0	3	№1
	145022	计算方法 Numerical Methods		32				2.0	3	№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	No1
	130137	画法几何及机械制图(一) Descriptive Geometry & Machine Drawing(1)		48				3.0	1	No1
	130138	画法几何及机械制图(二) Descriptive Geometry & Machine Drawing(2)		64				4.0	2	No1
		人文科学领域 Humanities	通识课 E	96				6.0		No8
		社会科学领域 Social Science		64				4.0		No8
	合计 Total			1212		64	128	78.0		

### 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 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	135002	电路与电子技术 Electric Circuit and Electronics	必 C	64				4.0	4	No3
	135037	电路与电子技术实验 Experiment of Electric Circuits and Electronics	必 C	32		32		1.0	5	No3
	131058	机械设计基础 Basis of Mechanical Design	必 C	64				4.0	4	No3
	130070	互换性与技术测量 Interchangeability & Measurement Technology	必 C	24				1.5	4	No1
	136115	流体力学与传热II Fluid Mechanics and Heat Transfer	必 C	48				3.0	5	No1
	137063	化工原理实验(一) Experiment of Chemical Engineering Principles(1)	必 C	16		16		0.5	5	No1
	137021	传质与分离工程II Mass Transfer and Separation Processes	必 C	40				2.5	6	No1
	137064	化工原理实验(二) Experiment of Chemical Engineering Principles(2)	必 C	16		16		0.5	6	No1
	147045	大学化学 General Chemistry	必 C	32				2.0	1	No1
	147036	大学化学实验 General Chemistry Experiment	必 C	16		16		0.5	2	No1
	133248	工程力学III Engineering Mechanics	必 C	80				5.0	3	No1
	131039	工程材料及金属工艺学 Engineering Materials and Metal Technics	必 C	48				3.0	3	No1
	131081	自动控制理论 Automatic Control Theory	必 C	40				2.5	4	No3
	131084	单片机设计技术 Mono-Chip Design Technique	必 C	40				2.5	5	No3
	131083	液压与气动 Hydraulic and Pneumatic	必 C	40				2.5	5	No1
	131053	机械制造工艺学 Mechanical Manufacture Technology	必 C	48				3.0	5	No1



	131020	机电传动控制 Mechanical & Electrical Transmission Control	必 C	32				2.0	5	№3	
	131047	工程设计学 Engineering Design	选 E	32				2.0	6	№4	
	131034	科技文献检索 Science and Literature Retrieval	选 E	16				1.0	4	№5	
	130375	机械创新设计 Machinery Innovation Design	选 E	32				2.0	6	№3	
	<b>合 计</b> <b>Total</b>		必 C	680		80		40.0			
			选 E	选修课修读最低要求 3.0 学分 minimum elective course credits required:3							
专业领域课 Specialty-related Courses	<b>化工装备与控制工程方向</b>										
	131122	过程设备设计 Process Equipment Design	必 C	48				3.0	6	№4	
	131097	过程装备控制 Process and Equipment Control	必 C	48				3.0	6	№3	
	131010	工程热力学 Engineering Thermodynamics	必 C	32				2.0	4	№3	
	131145	过程装备与控制工程产业模式与创业 Process Equipment & Control Engineering Entrepreneurship	选 E	16				1.0	7	№6	
	131092	可编程控制器及其应用 Programmable logic controller and its application	选 E	32				2.0	7	№3	
	131128	过程流体机械 Process Fluid Machinery	选 E	32				2.0	5	№3	
	131016	过程装备控制 Process Equipment	选 E	32				2.0	7	№3	
	131048	过程装备计算机辅助 CAD/CAE 技术基础 Fundamentals of Computer-Aided CAD/CAE for Processing Equipment	选 E	32				2.0	7	№5	
	130380	流体力学 Numerical Fluid Dynamics	选 E	32				2.0	5	№3	
	131025	设备腐蚀与防护 Corrosion and Protection of Industry Equipment	选 E	32				2.0	7	№3	
	131117	制冷与空调技术 Refrigeration Principle and Air Conditioning Technology	选 E	32				2.0	7	№3	
	131043	油气安全技术 Oil & Gas Safety Technology	选 E	32				2.0	7	№3	
	131028	压力容器应力分析与可靠性设计 Reliability Design and Stress Analysis of Pressure Vessels	选 E	24				1.5	7	№5	
	131023	断裂与失效分析 Material Failure Analysis	选 E	24				1.5	7	№3	
	131061	专题讲座 Special Topic Lectures	选 E	16				1.0	7	№11	
	120003	创新研究训练 Innovation Research Training	选 E	32			32	2.0		№4	
	120004	创新研究实践 I Innovation Research Practice I	选 E	32			32	2.0		№4	

	120005	创新研究实践 II Innovation Research Practice 2	选 E	32			32	2.0		№4	
	120006	创业实践 Entrepreneurial Practice	选 E	32			32	2.0		№12	
	<b>合 计</b> <b>Total</b>		必 C	128			8.0				
			选 E	选修课修读最低要求 14.5 学分 minimum elective course credits required: 14.5							
	<b>轻工装备及塑料模具方向</b>										
专业领域课 Specialty - related Courses	136204	高分子材料成型加工设备 Polymer Processing Machinery	必 C	48				3.0	6	№3	
	131097	过程装备控制 Process and Equipment Control	必 C	48				3.0	6	№3	
	130363	塑料成型模具 Mould for Plastics	必 C	32				2.0	6	№3	
	130373	高分子物理与化学 Polymer Physics	选 E	48				3.0	4	№1	
	130419	高分子物理与化学实验 Polymer Physics Experiment	选 E	32		32		1.0	4	№1	
	131087	工程流变学 Engineering Rheology	选 E	32				2.0	4	№2	
	131145	过程装备与控制工程产业模式与创业 Process Equipment & Control Engineering Entrepreneurship	选 E	16				1.0	7	№6	
	130420	CAD/CAE/CAM 在轻工装备设计中的应用 The Application of CAD/CAE/CAM in Light Industrial Equipment Design	选 E	32				2.0	5	№5	
	130421	轻工包装装备 Light Industrial Packaging Equipment	选 E	32				2.0	7	№1	
	131105	高分子材料成型工艺学 Polymer processing	选 E	32				2.0	5	№3	
		食品机械装备 Food Machinery and Equipment	选 E	32				2.0	7	№3	
		材料加工成型新装备与新技术 Novel Polymer Processing Equipment and Technology	选 E	8				0.5	7	№12	
		高分子材料加工过程建模与仿真 Polymer Processing Process Modeling and Simulation	选 E	32				2.0	7	№4	
		塑料制品设计 Plastic product design	选 E	24				1.5	6	№4	
	131134	发泡成型技术 Foam Molding Technology	选 E	24				1.5	7	№3	
	130187	机器人学导论 Introduction to Robotics	选 E	24				1.5	7	№3	

130422	3D 打印技术概论 3D Printing Technology	选 E	24				1.5	7	№3
	数字信号处理与应用 Digital Signal Processing & Applications	选 E	32				2.0	7	№3
	量子材料 Quantum Materials	选 E	24				1.5	7	№1
120003	创新研究训练 Innovation Research Training	选 E	32			32	2.0		№4
120004	创新研究实践 I Innovation Research Practice 1	选 E	32			32	2.0		№4
120005	创新研究实践 II Innovation Research Practice 2	选 E	32			32	2.0		№4
120006	创业实践 Entrepreneurial Practice	选 E	32			32	2.0		№12
<b>合计</b>		必 C	128				8.0		
		选 E	选修课修读最低要求 14.5 学分 minimum elective course credits required: 14.5						

备注：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。

#### 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 Practice weeks	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
130357	工程训练 II Engineering Training	必 C	4 周		4.0	3	№1 8 10
130195	机械设计基础课程设计 Course Project of the Basis of Mechanical Design	必 C	2 周		2.0	4	№1 2 3 5
130311	机械基础综合实验 II Mechanical Basic Comprehensive Experiment	必 C	0.5 周		0.5	4	№1 2 3
130423	工业装备控制工程课程设计 Course Project of Industrial Equipment Control Engineering	必 C	2 周		2.0	6	№1 2 3
147076	化工原理课程设计 Course Design for Chemical Engineering	必 C	2 周		2.0	6	№1 2 3 7
131080	学科基础实验（分散进行） Discipline Basic Experiment	必 C	1 周		1.0	4/5	№1 2 3 9

130424	专业综合实验（分散进行） Specialized Comprehensive Experiment (Chemical Engineering Equipment and Control Engineering)	必 C	1 周		1.0	6/7	No1 2 3 6
130241	专业课程设计（分散进行） Specialty Course Design (Chemical Engineering Equipment and Control Engineering)	必 C	3 周		3.0	6/7	No1 2 3 7
131090	生产实习 Production Practice	必 C	4 周		4.0		No1 2 6 8 11 12
131100	毕业设计 Graduation Project	必 C	15 周		15		No1 2 3 4 5 6 10 12
<b>合 计</b> <b>Total</b>		必 C	39.5 周		39.5		

## 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.