

# 材料成型及控制工程

## Materials Molding & Control Engineering

专业代码：080203

学 制：4 年

Program Code:080203

Duration: 4 years

### 培养目标：

本专业培养热爱祖国，坚持社会主义道路，适应经济、科技和社会发展需要，在知识、能力、素质各方面全面发展，掌握必需的自然科学、工程技术的基础知识，具有一定人文科学和社会科学素养及创新创业意识，掌握金属/高分子材料成型及控制工程的基础理论、专业知识和基本技能，了解学科与行业发展动态，能在金属/高分子材料成型过程的控制和工艺优化、新材料和新产品的开发和制备、材料成型装备和模具设计以及数值模拟等领域从事科学研究、技术开发及经营管理工作的高级复合型人才。

### Educational Objectives:

In order to meet the economic, science, technology and social development demands, the talent cultivation in the major pays attention to overall development in knowledge, ability, quality aspects. The students in the major are essentially required for not only mastering basic knowledge in the field of natural science, engineering technology, and human science, social science, innovation and entrepreneurship awareness to a certain extent, but also mastering fundamental theories, professional knowledge and basic skills in the discipline of metal /polymer materials Molding & Control Engineering, and comprehending disciplines and industries development trends. The objectives of talent cultivation in the major is to cultivate the senior comprehensive professional talents who will be equipped with the ability and quality of being engaged in scientific research, technology development and management in the fields of metal/polymer material forming process control and process optimization, new materials and new product development and preparation, material molding equipment and mold design and computer simulation.

### 毕业要求：

№1.工程知识：掌握从事金属/高分子材料成型及控制工程工作所需的数学和其它相关自然科学知识、工程基础理论和专业基本原理、方法和手段，具备一定的企业管理知识，了解专业前沿发展状态和趋势，能解决该领域企业的实际复杂工程问题。

№2.问题分析：能够应用数学、自然科学、专业基本原理、方法和技术手段以及经济管理知识，识别、表达、并通过文献研究分析金属/高分子材料成型及控制中的复杂工程问题，以获得有效结论。

№3.设计 / 开发解决方案：能够考虑社会、健康、安全、法律、文化以及环境等因素、并能够在设计环节中体现创新意识，针对金属/高分子材料成型及控制领域的复杂工程问题，提供综合解决方案，设计和开发出满足特定需求的金属/高分子成型设备和模具的系统、单元（部件）及其工艺流

程。

№4.研究：能够综合运用自然科学原理、基础工程理论和专业技术技能，包括实验设计、数据分析、数值模拟等方法，结合文献专利检索和查阅，对金属/高分子材料成型及控制领域的复杂工程问题，通过信息综合得到合理有效的结论。

№5.使用现代工具：能够针对金属/高分子材料成型及控制领域生产和研发过程中的复杂工程问题，开发，选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测和模拟，并能够理解其局限性。

№6.工程与社会：能够基于金属/高分子材料成型及控制领域的相关背景知识进行合理分析、评价工程实践和复杂工程问题的解决方案对社会、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金属/高分子材料成型及控制领域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：具备在多学科背景下的团队中的沟通和合作能力，具有团队合作精神，以及科学决策和组织管理的基本能力，承担个体、团队成员以及负责人的角色。

№10.沟通：能够就金属/高分子材料成型及控制领域的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，包括撰写各类报告和设计文件、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：理解并掌握金属/高分子材料成型及控制工程领域的工程项目管理相关的法律法规、管理知识与经济决策方法，并能在多学科环境中应用，初步具备风险评估和管理能力。

№12.终生学习：掌握自主学习方法和技能，具有终生学习的意识，有不断学习和适用发展的能力。

### **Student Outcomes:**

№1.Engineering Knowledge: An ability to master the required knowledge of mathematics and other relevant natural science, engineering basic theory and professional basic principles, methods and means to engage in metal/polymer materials Molding & Control Engineering work, have a certain enterprise management knowledge, understand the professional forefront development state and trends, and can solve the solution of complex engineering problems.

№2.Problem Analysis: An ability to analyze complex engineering problems of metal/polymer material forming and control by identifying, formulating and literature research, reaching to substantiated conclusions using basic principles of mathematics, natural science, professional basic principles, methods and technical means with management knowledge.

№3.Design / Development Solutions: An ability to provide the comprehensive solutions for complex engineering problems of metal/polymer materials Molding & Control field, and innovatively design and

study systems, units (components) and process that meet specific needs of metal/polymer forming equipment and molds with societal, health, safety, legal, cultural and environmental considerations.

№4.Research: An ability to conduct complex engineering problems of metal/polymer material forming and control field based on scientific theories and adopting scientific methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid and reasonable conclusions.

№5.Applying Modern Tools: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including the prediction and Simulation of complex engineering activities in the production and development process of metal/polymer material forming and control, with an understanding of the limitations.

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

№7.Environment and Sustainable Development: An ability to understand and evaluate the impact of professional engineering solutions in environmental and social sustainability in the field of metal/polymer material forming and control.

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

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

№10.Communication: An ability to communicate effectively on complex engineering problems with the engineering community and general public, such as being able to comprehend and write effective reports and design documentation, make effective presentations, give clear expression or respond to instructions, and communicate in cross-cultural contexts with a certain international perspective.

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

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

## **专业简介：**

材料成型及控制工程专业属于机械类本科专业，开办于 2004 年，专业知识主要涉及金属/高分子材料科学、材料成型工艺、成型加工机械与模具、自动控制、计算机和数值模拟等，具有显著的多学科交叉特色。本专业依托国家金属材料近净成形工程技术研究中心、聚合物新型成型装备国家工程研究中心、金属材料近净成形技术与装备教育部重点实验室（B 类）、聚合物成型加工工程教育

部重点实验室、塑料改性加工国家工程实验室和广东省金属新材料制备与成形重点实验室以及在新三板上市的“华金科技”产业化基地，由两位院士、两位国家杰出青年科学基金获得者等组成的多学科交叉的高水平研究和工程技术以及企业管理团队使得本专业一直保持良好的发展。本专业以培养金属/高分子材料成型领域高素质综合型人才为目标，学生毕业后可在材料制备、机械与模具、航空、航天、车辆、家电、手机和计算机等行业和部门内从事产品设计、工艺制造、科学研究、检测和控制、数值模拟、工程技术管理等方面工作，也可以从事相关学科的研究和教学工作。

### **Program Profile:**

Metal/polymer material forming and control engineering is one of mechanical specialties and was opened in 2004. The specialty has remarkable interdisciplinary features, and its professional knowledge is mainly related to metal/polymer materials science, material forming technology, forming & processing machine and mold, automatic control, computer and numerical simulation. This specialty mainly relies on National Engineering Research Center of Near-Net-Shape Forming for Metallic Materials, National Engineering Research Center of Novel Equipment for Polymer Processing, near net-shape technology of metallic materials and Key Laboratory of the Ministry of Education (B) and Preparation of New Metal Materials, The Key Laboratory of Polymer Processing Engineering (Ministry of Education of China), National Engineering Laboratory for Plastic Modification and Processing and the key laboratory for forming in Guangdong Province and industrialization base of Joaquin technology, this high-level interdisciplinary research and engineering technology as well as an enterprise management team, made up of one academician and many winners of the National Outstanding Young Scientists Fund, have kept the profession well developed. The specialty aims to cultivate high-quality and comprehensive talents in the field of forming of metal/polymer materials. Graduates in this major are primarily employed in the industry of materials preparation, machinery and mold, aviation, aerospace, vehicles, household electrical appliances, mobile phone and computer etc., and the department which is engaged in designing product, manufacturing process, scientific research, detection and control, computer simulation, management of engineering technology and be engaged in related disciplines of research and teaching.

### **专业特色:**

基于材料科学、材料加工与成型、机械与模具、自动控制、数值模拟、材料表征和零件检测的多学科综合教学与实践平台和“基础研究—应用开发—中试基地—产业企业”的科技成果转化系统，所培养的人才不仅掌握材料成型领域的专业知识，而且多学科交叉特点明显、知识面宽、工程实践能力强、就业适应性好，并具备良好的创新创业意识。

### **Program Features:**

This specialty is based on the multi-disciplinary comprehensive teaching and practice platform of metal/polymer materials science, material forming technology, forming & processing machine and mold,

automatic control, computer and numerical simulation, materials analysis and parts inspection, and the technological achievements transformation system of "basic research - application development - pilot base - industry enterprise". Graduates in this major not only master the professional knowledge of the field of material forming, but also have obvious interdisciplinary characteristics, extensive knowledge, excellent engineering practice, good adaptability to employment and good sense of innovation and entrepreneurship.

**授予学位：**工学学士学位

**Degree Conferred:** Bachelor of Engineering

### **主干课程：**

金属材料方向：物理化学、自动控制理论、机械设计基础、机械制造技术基础、材料科学基础、材料成型技术基础、材料的力学与物理性能、金属材料及热处理、材料微观分析方法。

高分子材料方向：物理化学、自动控制理论、机械设计基础、高分子化学、高分子物理、聚合物加工流变学、高分子材料成型工艺学、高分子材料成型加工设备、高分子成型过程控制技术。

### **Core Courses:**

Metal Materials Speciality: Physics Chemistry, Automatic Control Theory, Basis of Mechanical Design, Fundamentals of Machine Manufacturing Technology, Basis of Materials Science, Fundamentals of material forming technology, Materials Mechanical and Physical Properties, Metallic Materials and Heat Treatment, Materials Microstructure Analysis Methods,.

Polymer Materials Speciality: Physics Chemistry, Automatic Control Theory, Basis of Mechanical Design, Polymer Chemistry, Polymer Physics, Rheology in Polymer Processing, Molding Technology of Polymer Materials, Polymer Processing and Molding Equipment, Process Control in Polymer Processing.

### **特色课程：**

双语教学课程：机械制造技术基础、材料成型技术基础、材料科学与工程导论、科技文献检索、高分子材料现代测试技术

全英语课程：纳米材料结构与性能

研究型课程：合金材料制备与成型、材料微观分析方法、材料表面技术、汽车制造技术基础、高分子成型过程控制技术、高分子材料现代测试技术、功能高分子材料

讨论型课程：专业教育与企业讲座

专题研讨课：高分子材料成型加工新技术

创新实践课程：金属材料设计性实验与性能测试课程设计，高分子材料加工设计性实验与性能测试课程设计

创业教育课程：金属材料成型产业模式与创业、高分子材料制备加工产业模式与创业

### **Featured Course:**



	选修 Elective	0.0	0	
专业领域课 Specialty-related Courses	必修 Compulsory	12.0	192	
	选修 Elective	9.5	152	
合计 Total		145.0	2298	
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	145.0+38.0=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-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
2298	1986	312	2026	272	183	163.5	19.5	38	136.5	8.5	2.0

## 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 Credits	开课学期 Semester	毕业要求 Student Outcomes
				总学时 Class Hours	上机 Comput-er-aided Class Hours	实验 Lab Hours	实践 Practice Hours			
公共基础课 General Basic Course	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 Ze Dong 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 College Computer Basis		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 II (a)		80				5.0	1	№1,2
140192	微积分Ⅱ（二） Calculus II (b)		80				5.0	2	№1,2
140197	线性代数与解析几何 Linear Algebra & Analytic Geometry		48				3.0	1	№1,2
140019	概率论与数理统计 Probability & Mathematical Statistics		48				3.0	2	№1,2
141005	大学物理Ⅲ（一） General Physics III(1)		64				4.0	2	№1,2
141007	大学物理实验（一） Physics Experiment(1)		32		32		1.0	2	№4
141006	大学物理Ⅲ（二） General Physics III (2)		64				4.0	3	№1,2
141008	大学物理实验（二） Physics Experiment(2)		32		32		1.0	3	№4
130137	画法几何及机械制图（一） Descriptive Geometry & Machine Drawing (1)		48				3.0	1	№3
130138	画法几何及机械制图（二） Descriptive Geometry & Machine Drawing(2)		64				4.0	2	№3
140016	积分变换 Integral Transformation		16				1.0	3	№1,2
145022	计算方法 Numerical Methods		32				2.0	3	№1,2
145268	C++程序设计基础 C++ Program Designing Basics		48				3.0	2	№5
	人文科学领域 Humanities Field	通识课 E	96				6.0	2	№8
	社会科学领域 Social Science Field		64				4.0	3	№8,11
合 计			1212		64	128	78.0		

### 三、专业教学计划表（续）

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 Hours			
Disciplinary Basic Courses 学科基础课	133248	工程力学Ⅲ Engineering Mechanics III	必 C	80				5.0	3	№1,2
	147058	物理化学 I Physical Chemistry I	必 C	48				3.0	4	№1,2
	135092	电工与电子技术 II Electric Engineering and Electronics	必 C	68				4.0	3	№3



135081	电工与电子技术实验 Experiment of Electric Engineering and Electronics	必 C	24		24		1.0	4	№4
130380	流体力学 Fluid Mechanics	必 C	32				2.0	4	№1,2
134023	传热学 Heat Transfer	必 C	32				2.0	4	№1,2
131081	自动控制理论 Automatic Control Theory	必 C	40				2.5	4	№1,2
130310	机械基础综合实验 I Poly-experiment of Mechanical Fundamentals I	必 C	10		10		0.5	4	№4
131058	机械设计基础 Basis of Mechanical Design	必 C	64				4.0	4	№2,3
130070	互换性与技术测量 Interchangeability and Technological Measurement	必 C	24				1.5	4	№2
<b>1. 金属材料方向</b>									
131053	机械制造技术基础（双语） Fundamentals of Machine Manufacturing Technology (bilingual)	必 C	56		6		3.5	5	№2
130168	材料科学与工程导论（双语） An Introduction to Materials Science and Engineering (bilingual)	必 C	64				4.0	5	№2,4
130167	材料科学基础 Fundamentals of Materials Science	必 C	80		6		5.0	5	№2,4
130170	材料成型技术基础（双语） Fundamentals of material forming technology (bilingual)	必 C	80		8		5.0	5	№3
130172	材料的力学与物理性能 Materials Mechanical and Physical Properties	必 C	40		6		2.5	5	№2,4
<b>合 计 Total</b>		必 C	742		60		45.5		
		选 E	选修课修读最低要求 0 学分 minimum elective course credits required:0						
<b>2. 高分子材料方向</b>									
130361	工程材料及热加工 Engineering Materials and Heat Treatment	必 C	40				2.5	5	№2,4
131053	机械制造技术基础 Fundamentals of Machine Manufacturing Technology	必 C	56		6		3.5	5	№2
131086	高分子化学 Polymer Chemistry	必 C	48				3.0	5	№2
131101	高分子物理 Polymer Physics	必 C	48				3.0	5	№2
131127	高分子材料现代测试技术 Modern Testing Technology of Polymer Materials	必 C	32				2.0	5	№4,5
131057	电气控制技术及应用 Electrical Control Technology and Application	必 C	32		4		2.0	5	№3

	130410	机械与模具 CAD 设计与实践 CAD Design and Practice of Machine and Mold	必 C	32				2.0	5	№5	
	136234	聚合物加工流变学 Rheology in Polymer Processing	必 C	32		2		2.0	5	№2,4	
	<b>合 计 Total</b>			必 C	742		46		45.5		
	<b>1. 金属材料方向</b>										
专业领域课 Specialty-related Courses	131034	科技文献检索 Sci-Tech Literature Retrieval (bilingual)	必 C	16				1.0	5	№5	
	130173	金属材料及热处理 Metallic Materials and Heat Treatment	必 C	48				3.0	6	№1,2	
	130330	金属材料成型装备 Metal Forming Equipment	必 C	32				2.0	6	№3	
	130169	材料微观分析方法 Microstructure Analysis Methods	必 C	64		6		4.0	6	№3	
	130106	金属塑性成型原理 Principles of Metal Forming	必 C	32				2.0	6	№3	
	130292	模具设计 Design of Mold	选 E	48				3.0	6	№3	
	130384	先进连接技术 Advanced Joining Technology	选 E	32				2.0	6	№3	
	130385	绿色制造技术 Green Manufacturing Technology	选 E	32		6		2.0	6	№6,7	
	130316	材料设计基础 Fundamentals of Materials Design	选 E	32				2.0	7	№3	
	130347	材料表面技术 Surface Engineering of Materials	选 E	32				2.0	7	№3	
			管理科学基础知识 Basic Knowledge of Management Science	选 E	16				1.0	6	№11
			材料加工 CAD/CAE/CAM 技术基础 Fundamentals of CAD/CAE/CAM in Materials Processing Engineering	选 E	32		6		2.0	7	№5
	130348	合金材料制备与成型 Alloy Materials Fabrication and Forming	选 E	56					3.5	7	№3
	130293	环境材料学 Eco-materials	选 E	32					2.0	7	№6,7
	130228	汽车制造技术基础 Fundamentals of Automotive Manufacturing Technology	选 E	32					2.0	7	№3
	130386	金属材料成型产业模式与创业 Mode and Entrepreneurship of Metal Processing Industry	选 E	24					1.5	7	№6,9,11
120003	创新研究训练 Innovation Research Training	选 E	32					2.0		№4,12	
120004	创新研究实践 I Innovation Research Practice I	选 E	32					2.0		№4,12	

	120005	创新研究实践 II Innovation Research Practice II	选 E	32				2.0		№4,12
	120006	创业实践 Entrepreneurial Practice	选 E	32				2.0		№4,12
	<b>合 计</b> <b>Total</b>		必 C	192		6		12.0		
			选 E	选修课修读最低要求 9.5 学分 minimum elective course 9.0 credits required:9.5						
	<b>2. 高分子材料方向</b>									
	131135	高分子材料挤出成型设备 Polymer Extrusion Equipment	必 C	32		4		2.0	6	№3
	131136	高分子材料注塑成型设备 Polymer Injection Molding Equipment	必 C	24		4		1.5	6	№3
	130362	高分子材料混合混炼加工设备 Polymer Mixing Processing Equipment	必 C	24		2		1.5	6	№3
	130363	塑料成型模具 Plastic Mold	必 C	40		2		2.5	6	№3
	131105	高分子材料成型工艺学 Molding Technology of Polymer Materials	必 C	40		4		2.5	6	№3
	131106	高分子成型过程控制技术 Process Control in Polymer Processing	必 C	32		4		2.0	6	№3
	130438	液压传动技术 Hydraulic Transmission	选 E	24				1.5	5	№3
		管理科学基础知识 Basic Knowledge of Management Science	选 E	16				1.0	6	№11
	131133	模具数控加工与编程 NC Machining and Programming	选 E	24				1.5	6	№3
	131034	科技文献检索 Scientific literature retrieval	选 E	16				1.0	6	№5
		纳米材料结构与制备 Structure and Preparation of Nanomaterials	选 E	24				1.5	6	№4
	131112	功能高分子材料 Functional Polymer Materials	选 E	24				1.5	6	№4
		高分子材料应用与改性 Application and Modification of Polymer	选 E	24				1.5	7	№3
	130440	高分子材料成型加工新技术 New Technology of Polymer Material Processing	选 E	32				2.0	7	№6,7

专业领域课 Specialty-related Courses

130229	快速成型技术 Rapid Prototyping Technology	选 E	32				2.0	7	№4
	聚合物复合材料 Polymer composites	选 E	24				1.5	7	№4
130187	机器人学导论 Introduction to Robotics	选 E	24				1.5	7	№1
130439	高分子材料制备加工产业模式与创业 Mode of Polymer Processing Industry and Entrepreneurship	选 E	16				1.0	7	№6,9,11
120003	创新研究训练 Innovation Research Training	选 E	32				2.0		№4,12
120004	创新研究实践 I Innovation Research Practice I	选 E	32				2.0		№4,12
120005	创新研究实践 II Innovation Research Practice II	选 E	32				2.0		№4,12
120006	创业实践 Entrepreneurial Practice	选 E	32				2.0		№4,12
<b>合 计</b> <b>Total</b>		必 C	192		20		12.0		
		选 E	选修课修读最低要求 9.5 学分 minimum elective course 9.0 credits required:9.5						

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 II	必 C	4 周		4.0	3	№9
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	№3
131090	生产实习 Production Practice	必 C	4 周		4.0	7	№6
131100	毕业设计（论文） Graduation Design (Thesis)	必 C	15 周		15.0	8	№4,10,12

##### 1. 金属材料方向

130215	金属材料综合实验 Poly-experiment of Metal	必 C	2周		2.0	5	№3
131139	金属材料成型装备课程设计 Course Project of Metal Processing and Molding Equipment	必 C	2周		2.0	6	№3
131142	铸造成型模具课程设计 Course Project of Casting Mold	必 C	2周		2.0	6	№3
131140	金属材料设计性实验与性能测试课程设计 Course Project of Metal Processing Design Experiments and Performance Testing	必 C	2周		2.0	7	№3
<b>2. 高分子材料方向</b>							
130411	高分子材料基础综合实验 Poly-experiment of Polymer	必 C	2周		2.0	5	№3
131107	高分子材料加工设计性实验与性能测试课程设计 Course Project of Polymer Processing Design Experiments and Performance Testing	必 C	1周		1.0	6	№3
131108	高分子成型过程控制技术课程设计 Course Project of Process Control in Polymer Processing	必 C	1周		1.0	6	№3
131109	高分子材料成型加工设备课程设计 Course Project of Polymer Processing and Molding Equipment	必 C	2周		2.0	6	№3
130404	塑料成型模具课程设计 Course Project of Polymer Processing Mold	必 C	2周		2.0	7	№3
<b>合 计 Total</b>		必 C	38周		38.0		
		选 E	选修课修读最低要求 0 学分 minimum elective course credits required: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.