

# 机械设计制造及其自动化专业 2017 版本本科培养方案

## Undergraduate Education Plan for Specialty in Mechanical Design & Manufacture & Automation (2017)

专业名称	机械设计制造及其自动化	主干学科	力学、机械工程
Major	Mechanical Design & Manufacture & Automation	Major Disciplines	Mechanics, Mechanical Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering

### 最低毕业学分规定

#### Graduation Credit Criteria

课程性质 Course Nature	课程分类 Course Classification	通识教育课程 Public Basic Courses	专业教育课程 Major Courses	个性课程 Personalized Course	集中性实践教学环节 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Compulsory Courses		29	73.5	\	29.5	\	170
选修课 Elective Courses		9	13	6	\	10	

### 一、培养目标与毕业要求

#### I Educational Objectives & Requirement

##### (一) 培养目标

本专业培养具有扎实的自然科学和人文社会科学基础知识，具有良好的道德品质和社会责任感，具有一定的国际视野，具备扎实的机械设计制造及其自动化专业基础理论知识与应用能力，具有良好的工程实践能力和现代工程工具使用能力，具有团队合作精神和领导潜质的工程技术人才。

本专业培养的学生毕业五年左右应达到以下目标：

- (1) 具有良好的道德修养，并有服务社会的意愿和能力；
- (2) 能够进行机械产品设计、制造工艺设计、生产技术管理和新产品研发；
- (3) 能够在一个技术研发团队中作为骨干或者领导有效地发挥作用；
- (4) 在机械设计制造及其自动化等专业领域具有就业竞争力，并具有终身学习的能力；
- (5) 具有一定的国际视野和对外交流的能力。

This specialty aims at training engineering technical talents, those have solid natural science and social science knowledge, have admirable moral character and the social responsibility, have a certain international view, have solid foundation of theoretical knowledge and the application ability in the field of Mechanical Design, Manufacturing and Automation, have good ability of engineering practice and modern engineering tool using ability, and have the team cooperation spirit and the Leadership potential.

The graduates after 5 years should achieve the following objectives:

1. have good moral cultivation, and the willingness and ability to serve the community;
2. have capabilities of mechanical products design, manufacturing process design, technical management and new product development;
3. be able to work effectively as a backbone or leader in a technology development team;

4. have employment competitiveness in the Mechanical Design, Manufacturing and Automation and other professional fields, and have the ability of life-long learning;
5. have a certain international view, and could expand the knowledge and ability of themselves.

## (二) 毕业要求

本专业学生通过学习机械学、自动化及控制技术的基础理论和方法，接受现代机械工程师的基本训练，具有港口机械、流体传动及控制、模具等三个专业方向的理论知识与应用能力。

毕业生能获得以下几方面的知识和能力：

- (1) **工程知识**：能够将数学、自然科学、工程基础和专业知识用于解决机械领域的复杂工程问题。
- (2) **问题分析**：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析机械设计制造及其自动化专业的工程问题，以获得有效结论。
- (3) **设计/开发解决方案**：能够设计针对港口机械、流体传动及控制、模具等专业方向复杂工程问题的解决方案，设计满足特定需求的系统、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机械工程领域的复杂问题进行研究，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，对复杂机械工程问题进行预测与模拟，并能够理解其局限性。
- (6) **工程与社会**：能够基于工程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复杂工程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。

Through the study of the basic theory and methods of mechanics, automation and control technology, and the basic training of modern mechanical engineers, the undergraduates should have the theoretical knowledge and application ability in the three professional directions of Port Machinery, Fluid Power Transmission and Control, and Mold.

The graduates will achieve the following knowledge and abilities:

1. **Engineering knowledge**: The ability to apply mathematics, natural science, engineering fundamentals, and special knowledge to solve complex engineering problems in the field of machinery.
2. **Problem Analysis**: The ability to use the basic principles of mathematics, natural science and engineering science to identify, express, and analyze complex engineering problems of Mechanical Design, manufacturing and Automation from the work of literature research to acquire effective conclusions.
3. **Design/development solutions**: The ability to determine design solutions to complex engineering problems in the professional directions of Port Machinery, Fluid Power Transmission and Control, and Mold, design systems, units (components) or processes which meet specific needs, and embody innovation in design, social, health, safety, Legal, cultural and environmental factors.

4. **Research:** The ability to conduct research based on scientific principles and scientific methods to solve complex problems in mechanical engineering field, including the design of experiments, analysis and interpretation of data, and the work from information synthesis to reasonable and effective conclusions.
5. **Use modern tools:** The ability to develop, select and use appropriate technologies, resources, modern engineering tools and information technology tools for complex mechanical engineering problems, including predictions and simulations of complex engineering problems, and to understand their limitations.
6. **Engineering and Society:** The ability to analyze the impact of professional engineering practices and complex engineering solutions on social, health, safety, legal and cultural issues, and to understand the responsibilities that should be undertaken, based on the contextual knowledge of the project.
7. **Environment and sustainable development:** The ability to understand and evaluate the impact of engineering practices on complex engineering issues on environmental and social sustainability.
8. **Professional specifications:** Qualifications of the humanities and social sciences, social responsibility, understanding and adhering to engineering ethics and norms, fulfill their responsibilities in engineering practices.
9. **Individuals and Teams:** The ability to assume the roles of individuals, team members and principals in a multidisciplinary team.
10. **Communications:** The ability to communicate effectively with industry peers and the public on complex engineering issues, including writing reports and design presentations, presenting statements, articulating or responding to directives, obtaining a certain international perspective, capable of communication and exchange in cross-cultural context.
11. **Project Management:** The ability to understand and master engineering management principles and economic decision-making methods in a multidisciplinary environment.
12. **Lifelong learning:** The ability to maintain sustainable self-development with the sense of self-learning, lifelong learning and continuous learning.

附：培养目标实现矩阵

培养目标	目标 1	目标 2	目标 3	目标 4	目标 5
毕业要求 1		√		√	
毕业要求 2		√		√	
毕业要求 3		√		√	
毕业要求 4		√		√	
毕业要求 5		√		√	
毕业要求 6	√		√		
毕业要求 7	√		√		
毕业要求 8	√				
毕业要求 9			√		
毕业要求 10			√		√
毕业要求 11		√	√		
毕业要求 12				√	√

## 二、专业核心课程与专业特色课程

### II Core Courses and Characteristic Courses

(一) 专业核心课程:

理论力学、材料力学、机械原理、机械设计、电工与电子技术基础、工程测试技术及应用、机电传动及控制等

**Core Courses:** Theoretical Mechanics, Materials Mechanics, Principles of Machinery, Mechanical Design, Fundamentals of Electrical Engineering & Electronic Technology ,Testing Technology and Its Applications, Mechanical and Electronic Transmission and Control, etc..

(二) 专业特色课程:

起重运输机械、起重运输机金属结构、液压及气压传动、机电传动及控制、工程测试技术及应用、压塑工艺与模具设计

**Characteristic Courses:** Crane Machinery, Metal Structure of Cranes, Hydraulic and Pneumatic Transmission, Mechanical and Electronic Transmission and Control, Modern Testing Technology, Plastic Shaping and Mould Design.

附: 毕业要求实现矩阵:

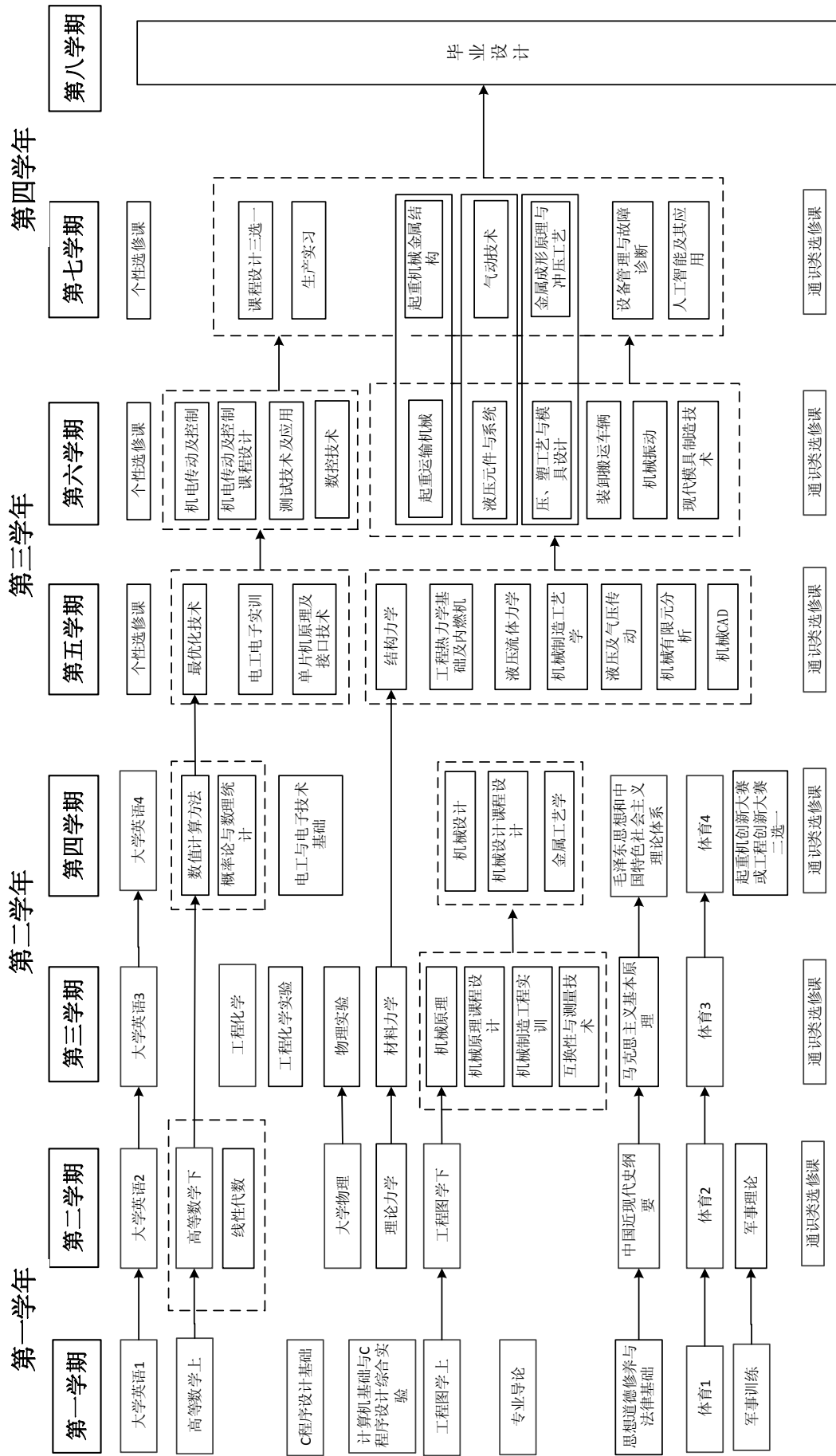
专业 核心 课程	专业 特色 课程	课程名称	机械设计制造及其自动化专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础					√	√	√					
		中国近现代史纲要					√		√					
		马克思主义基本原理						√	√					
		毛泽东思想和中国特色社会主义理论体系概论					√	√	√					
		军事理论						√		√				
		体育							√	√				
		大学英语									√			
		C 程序设计基础	√				√							
		计算机基础与 C 程序设计综合实验	√				√							
		创新创业类								√				
		人文社科类							√					
		经济管理类										√		
		科学技术类						√						
		艺术体育类							√					
		高等数学	√	√										
		线性代数	√	√										
		概率论与数理统计	√	√										
		数值计算方法	√	√			√							
		大学物理	√	√		√	√							
		物理实验	√			√								

专业 核心 课程	专业 特色 课程	课程名称	机械设计制造及其自动化专业毕业要求												
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
		工程化学	√	√		√		√							
		工程化学实验	√			√									
√		理论力学	√	√											
√		材料力学	√	√		√									
		互换性与测量技术	√			√									
√		电工与电子技术基础	√			√	√								
		工程图学	√				√								
		工程热力学基础	√		√				√						√
		液压流体力学	√		√										√
√		机械原理	√	√		√									
√	√	机电传动及控制	√	√	√										
√	√	工程测试技术与应用	√	√		√	√								
√		机械设计	√	√		√		√							
		结构力学	√	√									√		√
		专业导论			√			√			√				√
		金属工艺学	√			√		√							
		机械制造工艺学	√			√		√	√					√	√
√		液压与气压传动	√	√	√				√						√
√		起重运输机械	√		√										√
√		起重机械金属结构	√		√										√
		液压元件与控制系统	√		√				√						√
		气动技术	√	√	√								√		√
√		压、塑工艺与模具设计	√		√				√						√
		金属成形原理及冲压工艺	√		√	√									√
		数控技术	√			√	√								√
		机械振动	√	√		√									√
		现代模具制造技术	√			√	√								√
		装卸搬运车辆	√			√									√
		单片机原理及接口技术	√			√	√								√
		机械 CAD	√		√		√								√
		设备综合管理与故障诊断				√	√							√	√

专业 核心 课程	专业 特色 课程	课程名称	机械设计制造及其自动化专业毕业要求												
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
		最优化技术	√			√	√							√	
		机械有限元分析	√			√	√								
		港口内燃机	√		√				√						√
		人工智能及应用	√				√	√							√
		自动识别技术	√				√								√
		物流自动化系统设计与应用			√	√	√								√
		物流信息系统	√				√								√
		港口平面布局及装卸工艺	√		√				√						√
		传感器原理与应用	√			√									√
		机器人技术	√	√	√										√
		仓储技术与设备	√	√	√	√									√
		技术经济学												√	√
		军事训练								√	√				√
		机械原理课程设计			√							√			√
		机械制造工程实训			√						√		√		√
		机械设计课程设计			√							√			√
		电工电子实习			√										√
		机电传动与控制课程设计		√	√							√			√
		起重机械金属结构课程设计		√	√										√
		液压元件与控制系统课程设计		√	√										√
		压塑工艺与模具设计课程设计		√	√										√
		起重机创新大赛	√	√	√	√	√	√	√	√	√	√	√	√	√
		工程类创新大赛	√	√	√	√	√	√	√	√	√	√	√	√	√
		生产实习						√	√	√				√	√
		毕业设计	√	√	√	√	√	√	√	√	√	√	√	√	√
		形势与政策								√					
		心理健康教育									√				

### 三、课程教学进程图

#### III Teaching Process Map



#### 四、 理论教学建议进程表

#### IV Theory Course Schedule

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(一) 通识教育必修课程 General Education Required Courses									
4220001111	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1	
4220002111	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					2	
4220003111	毛泽东思想和中国特色社会主义理论体 系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		3	
4220005111	马克思主义基本原理 Marxism Philosophy	3	48			8		4	
1060003131	军事理论 Military Theory	1	32				16	1	
4210001171	体育 1 Physical Education I	1	26					1	
4210002171	体育 2 Physical Education II	1	34					2	
4210003171	体育 3 Physical Education III	1	34					3	
4210004171	体育 4 Physical Education IV	1	34					4	
4030002181	大学英语 1 College English I	3	60				12	1	
4030003181	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004181	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004181	大学英语 4 College English IV	2	44				12	4	大学英语 3
4120335171	C 程序设计基础 Foundation of C Language Design	2	32					2	
4120336171	计算机基础与 C 程序设计综合实验 Comprehensive Experiments of Computer Fundamentals and Program Design(C)	1	32	32				2	
小 计 Subtotal		29	640	32	0	48	64		



课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(二) 通识教育选修课程 General Education Elective Courses									
创新创业类 Innovation and Entrepreneurship Courses	要求至少取得 9 个学分，且必须选修艺术体育类课程中的艺术类相关课程并取得至少 2 个学分，在创新创业类课程和经济管理类课程中分别至少选修一门课程。 Students are required to obtain at least 9 credits, which must contain art courses of 2 credits from the category of Art and Physical Education Courses, at least one course from the category of Innovation and Entrepreneurship Courses and the category of Economy and Management Courses respectively.								
人文社科类 Arts and Social Science Courses									
经济管理类 Economy and Management Courses									
科学技术类 Science and Technology Courses									
艺术体育类 Art and Physical Education Courses									
(三) 专业教育必修课程 Basic Disciplinary Required Courses									
4180090111	专业导论 Introduction to Materials Physics	1	16					1	
4050063111	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064111	高等数学 A 下 Advanced Mathematics II	5	80					2	
4180267171	工程图学 A 上 Engineering Graphics I	3	56				8	1	
4180268171	工程图学 A 下 Engineering Graphics II	2.5	56				16	2	
4050229111	线性代数 Linear Algebra	2.5	40					2	
4140125111	理论力学 A Theoretical Mechanics	4.5	72					2	
4050463131	大学物理 B Physics	5	80					2	
4050224111	物理实验 B Physics Lab.	1	32	32				3	
4200374171	工程化学 Engineering Chemistry	1.5	24					3	
4200375171	工程化学实验 Engineering Chemistry Lab.	0.5	16	16				3	
4180023111	互换性与测量技术 B Interchangeability and Measurement	2	32	4				3	
4140002111	材料力学 A Materials Mechanics	5	80	8				3	
4180033111	机械原理 Principles of Machinery	3.5	56	4				3	

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4050486131	数值计算方法 Numerical methods	2	32					4	
4180321171	金属工艺学 A Metallurgical Technology	2.5	40	2				4	
4050058111	概率论与数理统计 B Probability and Mathematical Statistics	3	48					4	
4100012111	电工与电子技术基础 C Fundamentals of Electrical Engineering & Electric Technology	4	64	10				4	
4180272171	机械设计 Mechanical Design	3.5	56	4				4	
4150311171	工程热力学基础 Fundamentals of Engineering Thermodynamics and Combustion Engines	2	32					5	
4180274171	液压流体力学 Hydraulic Fluid Mechanics	2	32					5	
4180275171	液压及气压传动 C Hydraulic and Pneumatic Transmission	2	32					5	
4180041111	结构力学 E Structural Mechanics	2.5	40					5	
4180276171	机械制造工艺学 C Mechanical Manufacturing Technology	2.5	40	4				5	
4180277171	工程测试技术与应用 Testing Technology and Its Applications	2	32	4				6	
4180278171	机电传动与控制 Mechanical and Electronic Transmission and Control	3.5	56	4				6	
小 计 Subtotal		73.5	1224	92	0	0	24		
(四) 专业教育选修课程 Specialized Elective Courses									
港口机械方向									
4180054111	起重运输机械 B Crane Machinery	4.5	72					6	
4180262151	起重机械金属结构 Metal Structure of Cranes	2.5	40					7	
流体传动与控制方向									
4180086111	液压元件与系统 C Hydraulic Elements and Transition Systems	4.5	72					6	
4180055111	气动技术 B Pneumatics	2.5	40					7	

课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
模具方向									
4180280171	压、塑工艺与模具设计 Plastic Shaping and Mould Design	4.5	72					6	
4180281171	金属成形原理及冲压工艺 Principles of Metal Shaping and Hydraulic Forging Press	2.5	40					7	
公共部分									
4180282171	单片机原理及接口技术 B Principles and Interfaces of Single Chip	2	32	4				5	
4180148121	机械 CAD(C) Mechanical CAD	2	32		4			5	
4180176121	最优化技术 B Optimization Technology	2	32		8			5	
4180246141	机械有限元分析 Finite Element Analysis	2	32		4			5	
4180010111	港口内燃机 B Harbor Combustion Engines	2	32					5	
4180254151	数控技术 Numerical Control Technology	2	32	4				6	
4180150121	机械振动 C Mechanical Vibration	2	32	2				6	
4180243131	现代模具制造技术 B Die & Mould Manufacture Technology	2	32	6				6	
4180174121	装卸搬运车辆 B Handling and Carrying Vehicles	2	32	2				6	
4180283171	设备管理与故障诊断 Device Management and Fault diagnosis	2	32	4				7	
4180284171	人工智能及其应用 Artificial Intelligence and Its Application	2	32					7	
小 计 Subtotal		43	688	22	16	0	0		
<p>修读说明：按方向模块选修一组，取得 7 学分(专业方向必修)；公共部分要求选修 6 学分。 NOTE: Students should select one group direction module and obtain 7 credits (specialized direction compulsory); the public courses are required to obtain at least 6 credits.</p>									
(五) 个性课程 Personalized Elective Courses									
4180039111	技术经济学 B Technical Economics	2.5	40					5	
4180175121	自动识别技术 A Automatic Identification Technology	2	32					6	
4180011111	港口平面布局及装卸工艺 Port Layout Planning and Handling Techniques Technology	2	32					6	

课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Operation	实践 Practice	课外 Extra-cur		
4180005111	传感器原理及应用 B Sensors Principle and Application	2	32	6				6	
4180076111	物流自动化系统设计与应用 B Design and Application of Logistic Automation System	2.5	40					7	自动识别技术
4180072111	物流信息系统 B Logistic Information System	2	32					7	
4180234131	机器人技术 A Robotics	2	32	2				7	
4180245131	仓储技术与设备 Warehouse Storage Technology and Equipment	2	32	2				7	
小 计 Subtotal		17	272	10	0	0	0		

修读说明：学生从以上个性课程和学校发布的其它个性课程目录中选课，要求至少选修6学分。  
NOTE: Students can select courses from above and the other personalized courses in catalog, and are required to obtain at least 6 credits.

## 五、集中性实践教学环节

### V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crs	周数 Weeks	建议修读学期 Suggested Term
1060002111	军事训练 Military Training	1.5	3	1
4180111111	机械原理课程设计 Course Design on Principles of Machinery	1.5	1.5	3
4180113111	机械制造工程实训 B Practice of Mechanical Manufacturing Engineering	4	4	3
4180110111	机械设计课程设计 Course Design on Mechanical Design	3	3	4
4100069111	电工电子实习 B Practice of Electrical Engineering & Electronics	1	1	5
4180108111	机电传动及控制课程设计 Course Design on Mechanical and Electronic Transmission and Control	2	2	6
4180117111	生产实习 Production Practice	3	3	7
4180285171	毕业论文 Graduation Thesis	8.5	17	8
港口机械方向				

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crs	周数 Weeks	建议修读学期 Suggested Term
4180286171	起重机创新大赛 Crane Innovation Competition	3	3	4(分散)
4180259151	起重机械金属结构课程设计 Course Design on Mechanical and Electronic Transmission and Control	2	2	7
流体传动与控制方向				
4180287171	工程类创新大赛 Engineering Innovation Competition	3	3	4(分散)
4180131111	液压元件与系统课程设计 Course Design on Hydraulic Elements and Transition Systems	2	2	7
模具方向				
4180288171	工程类创新大赛 Engineering Innovation Competition	3	3	4(分散)
4180130111	压、塑工艺与模具设计课程设计 Course Design on Plastic Shaping and Mould Design	2	2	7
小 计 Subtotal		29.5	39.5	

## 六、其它要求

### VI Recommendations on Course Studies

- 1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。
- 2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。

1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

学院教学责任人：赵章焰  
专业培养方案责任人：周 勇