

工业工程专业 2017 版本本科培养方案

Undergraduate Education Plan for Specialty in Industrial Engineering (2017)

专业名称	工业工程	主干学科	工业工程、管理科学与工程、物流管理与工程
Major	Industrial Engineering	Major Disciplines	Industrial Engineering, Management Science and Engineering, Logistics Management and Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineer

最低毕业学分规定

Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized Courses	个性课程 Personalized Course	集中性实践 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses	29	65.5	\	30.5	\	170
选修课 Elective Courses	9	20	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养掌握工业工程领域的基础理论、专业知识、基本方法和实践技能，“适应能力强、实干精神强、创新意识强”，具有一定国际视野，能够在机械与汽车、电子与信息等行业从事工艺规划、设施布置、物流配送、生产计划、质量控制等工业工程领域的研究、设计、应用和管理工作的工程技术人才。

预期学生毕业 5 年后能够达到：

- (1) 具备职业道德、创新意识、社会责任感和国际视野，满足国家建设和社会发展需要。
- (2) 具备综合运用专业知识分析和解决生产与服务系统的效率、质量、成本及环境友好等管理与工程综合性问题的能力；
- (3) 能够胜任离散制造系统执行层的技术骨干和组织管理角色。
- (4) 能够通过继续教育或其它学习渠道更新知识，实现能力和技术水平的提升。

Industrial Engineering (IE) aims at cultivating technical engineers who can master the basic theories, professional knowledge, basic methods and practical skills in the fields of industrial engineering. Some basic qualities such as adaptability, hardworking, innovation, certain international vision can be obtained throughout the study. What's more, it also train people to

work in the machinery and automotive, electronics and information industries, who can engage in the fields of industrial engineering such as process planning, facility layout, logistics, production planning, quality control and etc.

After graduation, students are expected to achieve the following points in 5 years:

1. Having professional ethics, innovation consciousness, social responsibility and international perspective to the requirements of meet national construction and social development;
2. Be able to use professional knowledge to analyze and solve some complex problems related to efficiency, quality, cost and environmental friendliness in the production and service system;
3. Be able to hold a post of technical backbone or organization manager in the execution layers of discrete manufacturing system;
4. Be able to update their knowledge through continuing education or other learning channels, which can finally promote the ability and skill levels.

(二) 毕业要求

- (1) 工程知识：能够将数学、自然科学、工程基础和工业工程专业知识用于解决复杂制系统的工程问题。
- (2) 问题分析：能够应用数学、自然科学和工业工程的基本原理，结合对科技文献研究的结果，识别、表达、分析复杂制系统的工程问题，以获得有效结论。
- (3) 设计/开发解决方案：能够设计针对复杂制系统的工程问题的解决方案，设计满足特定需求的工艺、设施、物流、计划及质量等方面的方案，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：能够基于自然科学基本原理和工业工程专业基础知识，采用科学方法对复杂制造系统的工程问题进行研究，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：能够针对制造系统中的复杂工程问题，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进行建模、数值模拟和分析，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。

1. **Engineering Knowledge:** The ability to apply mathematical, natural science, engineering foundations, and industrial engineering expertise to solve engineering problems in complex systems.
2. **Problem Analysis:** The basic principles of mathematics, natural sciences and industrial engineering can be applied to identify, express and analyze the engineering problems of complex system based on the results of scientific and technological literature research so as to obtain effective conclusions.
3. **Design / Development Solutions:** ability to design solutions to engineering problems of complex engineering systems, to design solutions that meet the specific needs of the process, facilities, logistics, planning and quality aspects. And in the design process to reflect the sense of innovation, taking into account social, health, safety, legal, cultural and environmental factors.
4. **Research:** scientific methods can be used to study the engineering problems of complex manufacturing systems, design and analyze, interpret and interpret the data, and get reasonable and effective conclusions through information synthesis which were based on the basic principles of natural science and the basic knowledge of industrial engineering.
5. **Using modern tools:** Develop, select and use appropriate technologies, resources, modern engineering tools, and information technology tools for complex engineering problems in manufacturing systems, including modeling, simulating and analyzing complex engineering problems and understanding their limitations.
6. **Engineering and society:** Students can make a reasonable analysis based on the background knowledge of Engineering, evaluate the impact of professional engineering practice and complex engineering problem solutions on society, health, safety, law, and culture and understand the responsibilities that should be taken.
7. **Environment and sustainable development:** Students can understand and evaluate the impact of engineering practices for complex engineering problems on the sustainable development of the environment and society.
8. **Professional norms:** Students need to have a sense of humanities, social science and social responsibility and have the ability to understand and abide by the professional ethics and norms of engineering and fulfill their responsibilities in the engineering practice.
9. **Individual and team:** Students can take on the roles of individuals, team members, and leaders in a multidisciplinary team.
10. **Communication:** Students can communicate effectively with the industry peers and the public according to complex engineering problems, including report writing and presentation,

statement designing and clear expression or responding to instructions, and have a certain international vision and communicate in cross cultural background.

11. Project management: Students need to understand and master the engineering management principles and economic decision-making methods, and use them in a multidisciplinary environment.
12. Lifelong learning: Students need to have the consciousness of self-study and lifelong learning and have the ability to learn continuously and adapt to development.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4
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:

工程经济分析、供应链管理、制造信息系统、基础工业工程、生产计划与控制、生产系统建模与仿真、物流工程学、设施规划、统计质量控制、人因工程等。

Engineering Economical Analysis, Supply Chain Management, Manufacturing Information System, Fundamental Industrial Engineering, Operations Management, Production System Modeling and Simulation, Logistics Engineering, Facility Layout, Statistical Quality Control, Human Factors Engineering.

(二) 专业特色课程:

生产计划与控制、统计质量控制、生产系统建模与仿真、物流工程学、设施规划、人因工程

Operations Management, Statistical Quality Control, Production System Modeling and Simulation, Logistics, Facility Layout, Human Factors Engineering.

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	工业工程专业毕业要求											
			(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						✓	✓					✓
		毛泽东思想和中国特色社会主义理论体系概论						✓	✓	✓				✓
		马克思主义基本原理						✓	✓	✓				✓
		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	✓	✓		✓	✓							
		专业导论						✓	✓	✓				
		工程材料	✓	✓		✓								
		高等数学	✓	✓		✓								
		工程图学	✓	✓		✓	✓							
		线性代数	✓	✓		✓								
		大学物理	✓	✓		✓								
		物理实验	✓	✓		✓		✓				✓		
		概率论与数理统计	✓	✓		✓	✓							
√		基础工业工程	✓	✓	✓	✓	✓		✓	✓				
		机械设计基础	✓	✓	✓	✓	✓	✓						
		生产运筹	✓	✓	✓	✓			✓				✓	
		先进制造技术			✓	✓	✓	✓						✓
		机械制造技术基础	✓	✓	✓	✓		✓						
√		工程经济分析	✓	✓	✓	✓		✓	✓					
√		制造信息系统			✓	✓	✓							
√	√	生产计划与控制	✓	✓	✓	✓	✓	✓					✓	
√	√	物流工程学	✓	✓	✓	✓		✓						
√	√	人因工程	✓	✓	✓	✓		✓			✓			
√	√	设施规划	✓	✓	✓	✓		✓						
√	√	生产系统建模与仿真	✓	✓	✓	✓	✓	✓						

专业 核心 课程	专业 特色 课程	课程名称	工业工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
√	√	统计质量控制	√	√	√	√		√						
		工程数据库系统			√	√	√	√						
		IE 案例解析						√	√					
		工程心理学			√	√				√	√	√		
		单元制造理论与方法	√	√	√	√		√						
√		供应链管理			√	√		√						
		物流机械与设备			√	√		√						
		ERP 原理及应用			√	√	√	√						
		工业工程项目管理	√	√	√	√		√			√	√		
		企业文化与 CI 策划			√	√	√	√		√	√	√		
		制造系统工程	√	√	√	√								
		智能制造理论与实践	√			√								
		决策支持系统	√	√	√	√								
		工业工程创新创业课程-创新方法	√	√	√	√								√
		军事训练								√	√	√		
		机械制造工程实训						√			√	√		
		企业认识实习						√	√	√	√	√		√
		机械设计基础课程设计						√		√		√		
		生产计划与控制课程设计						√		√		√		
		制造信息系统课程设计						√		√		√		
		生产实习						√	√	√	√	√		√
		生产系统建模与仿真课程设计										√		
		工业工程综合课程设计	√	√	√	√	√				√	√	√	
		毕业设计	√	√	√	√	√	√				√		√

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									
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1	
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					2	
4220003110	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		4	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003130	军事理论 Military Theory	1	32				16	1	
4210001170	体育 1 Physical Education I	1	26					1	
4210002170	体育 2 Physical Education II	1	34					2	
4210003170	体育 3 Physical Education III	1	34					3	
4210004170	体育 4 Physical Education IV	1	34					4	
4030002180	大学英语 1 College English 1	3	60				12	1	
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3
4120335170	C 程序设计基础 Fundamentals of Computer Program Design(C)	2	32					1	
4120336170	计算机基础与 C 程序设计综合实验 Fundamentals of Computer and Program Design(C Language) experiment	1	32	32				1	
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	要求每个学生至少选修与本专业教学计划内容非相关的课程 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，在创新创业类和经济管理类课程分别至少选修一门。 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									
4050063110	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics II	5	80					2	高等数学上
4050229110	线性代数 Linear Algebra	2.5	40					1	
4080371170	工程图学 A 上 Engineering Graphics I	3	56				8	1	
4080372170	工程图学 A 下 Engineering Graphics II	2.5	56				16	2	工程图学上
4080034110	工程材料 A Engineering Material	2.5	40	4				2	
4080368170	基础工业工程 A Fundamental Industrial Engineering	1.5	24	8				2	
4050463130	大学物理 B Physics	5	80					2	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4080333150	专业导论 Introduction to Specialty	1	16					3	
4050058110	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	
4080376170	先进制造技术 Advanced Manufacturing Technology	2	32					3	
4080476170	生产运筹 Operational Research in Industry	3	48					3	
4080471170	工业工程创新方法 Industrial Engineering Innovation and Entrepreneurship Courses Innovation Method	1	16					3	

课程编号 Course Number	课程名称 Course Title	学分 Crts	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		
4080061110	机械设计基础 Mechanical Designing	3.5	56	6				4	
4080377170	统计质量控制 Statistical Quality Control	2.5	40		4			4	
4080378170	人因工程 C Human Factor Engineering	2.5	40	6				4	
4080064110	机械制造技术基础 A Fundamentals of Mechanical Manufacturing Technology	4	64	6				5	
4080379170	工程经济分析 B Engineering Economical Analysis	2.5	40		6			5	
4080380170	制造信息系统 B Manufacturing Information Systems	2	32					5	
4080381170	生产计划与控制 C Operations Management	3	48	6				5	
4080382170	物流工程学 B Logistics Engineering	2	32					5	
4080095110	设施规划 Facility Layout	2.5	40					6	
4080383170	生产系统建模与仿真 B Production System Modeling and Simulation	3	48		8			6	
小 计 Subtotal		65.5	1088	68	18	0	24		
(四) 专业教育选修课程 Specialized Elective Courses									
4080107110	物流机械与设备 Logistics Machines and Facilities	2.5	40					4	
4080201120	工程数据库系统 A Engineering Database System	2.5	40		8			5	
4080384170	制造系统工程 Manufacturing Systems Engineering	2	32					5	
4080081110	IE 案例解析 IE Cases Analysis	2	32					6	
4080044110	工程心理学 Engineering Psychology	2.5	40					6	
4080029110	单元制造理论与方法 A Cellular Manufacturing Theory and Method	2	32					6	
4080385170	智能制造理论与实践 Theory&Practice of Intelligent Manufacturing	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		
4080386170	决策支撑系统 Decision Support System	2	32					6	
4170043110	供应链管理 A Supply Chain Management	2.5	40					7	
4080003110	ERP 原理及应用 B ERP Principles & Application	2	32					7	
4080046110	工业工程项目管理 Industrial Engineering Project Management	2	32					7	
4080089110	企业文化与 CI 策划 Enterprise Culture & CI Design	2	32					7	
小 计 Subtotal		26	416	0	8	0	0		
修读说明：要求至少选修 20 学分。 NOTE: Minimum subtotal credits:20.									
(五) 个性课程 Personalized Elective Courses									
4080294130	工业工程前沿 Industrial Engineering Frontier	1	16					4	
4080295130	工业工程研究方法与实践 Research Method and Practice of Industrial Engineering	1	16					4	
小 计 Subtotal		2	32	0	0	0	0		
修读说明：学生可跨专业自主选择修读全校其他专业的课程，要求至少选修 6 学分。 NOTE: Students can choose any courses from the other specialties. Minimum subtotal credits: 6.									

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
1060002110	军事训练 Military Training	1.5	3	1
4080150110	机械制造工程实训 B Training on Mechanical Manufacturing Engineering	4	4	3
4080387170	创新创业认识实习 Enterprise Practice	1	1	4
4080146110	机械设计基础课程设计 Course Practice of Machinery Design	2	2	4
4080158110	生产计划与控制课程设计 Course Practice of Production Plan and Control	2	2	5

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crns	周数 Weeks	建议修读学期 Suggested Term
4080170110	制造信息系统课程设计 Course Practice of Manufacturing Information Systems	2	2	5
4080162110	生产实习 Production Practice	3	3	6
4080165110	生产系统建模与仿真课程设计 Course Practice of Production System Modeling and Simulation	2	2	6
4080140110	工业工程综合课程设计 Synthesis Course Design of Industrial Engineering	3	3	7
4080388170	毕业设计 Graduation Design	10	17	8
小 计 Subtotal		30.5	39	

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：胡 剑
专业培养方案责任人：张 峰

过程装备与控制工程专业 2017 版本科培养方案

Undergraduate Education Plan for Specialty in Industrial Equipment and Control Engineering (2017)

专业名称	过程装备与控制工程	主干学科	机械工程
Major	Industrial Equipment and Control Engineering	Major Disciplines	Mechanical Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering
所属大类	机械类（机电）	大类培养年限	1年
Disciplinary	Mechanical	Duration	1 year

最低毕业学分规定

Graduation Credit Criteria

课程分类 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized 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 Required Courses	29	65	\	31	\	170
选修课 Elective Courses	9	20	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养掌握过程控制技术与装备设计领域的基础理论、专业知识、基本方法和实践技能，具有一定国际视野，能够在建材、机械与汽车等行业从事过程控制与装备研究、设计、应用和生产管理工作的工程技术人才。

- (1) 具有从事机械及相关工程工作所需要的自然科学方面的数学、自然科学、计算机等方面的基础理论，掌握扎实的工程基础理论及机械工程学科的专门知识，并具有能够综合运用自然科学、机械工程与现代过程控制的方法与技术，对过程工业系统进行规划、设计、控制、持续改善与创新；
- (2) 具有现代科学创新意识、国际化交流与竞争意识、人文科学素养、职业道德和社会责任感；
- (3) 具有良好的科学文化素质、知识更新能力、创新思维能力，能在生产和服务领域从事技术和管理的应用研究型复合人才。

The professional training to master process control technology and equipment design in the field of basic theory, professional knowledge, basic methods and practical skills, with international perspective, in building materials, machinery and automobile industries engaged in process control and equipment research, design, production, as well as application of process engineering and production management. The objective of cultivating talents includes the following three parts:

1. Both have a solid foundation in mechanical engineering technique, and with process equipment and control engineering system scientific theory and method of modern process control, to make comprehensive use of the technique and method of natural science, mechanical engineering and modern

process control, and to make comprehensive use of the technique and method of natural science, mechanical engineering and modern process control, planning, design, control, continuous improvement and innovation of process industry system;

2. With modern science and innovation consciousness, international exchanges and competition consciousness, humanistic and scientific literacy, occupation ethics and social responsibility;
3. With good quality of science and culture, knowledge renewal ability, creative thinking ability, which can be engaged in applied research talents of technology and management in the field of production and services.

(二) 毕业要求

- (1) 较好的人文社会科学素养、较强的社会责任感和良好的工程职业道德;
 - (2) 从事工程工作所需的相关数理学科基础和一定的项目管理知识;
 - (3) 掌握扎实的过程装备与控制工程专业基本理论知识和专业基础知识,具有系统的过程工业系统实践训练,了解本专业的前沿发展现状和趋势;
 - (4) 综合运用自然科学、机械工程与现代过程控制的方法与技术,对过程工业系统进行规划、设计、控制、持续改善与创新;
 - (5) 具备创新意识和对过程工业新产品、新设备进行研究、开发和设计的初步能力,初步具有本专业过程装备设计开发能力和一定的技术组织管理能力;
 - (6) 掌握科技文献检索、资料查询及运用现代信息技术获取相关信息的基本方法,能通过互联网、期刊资料等渠道了解相关的器件、产品、系统及技术的进展与前沿,能有效地运用各种资源找到解决具体的过控专业技术问题的方法;
 - (7) 了解国家有关过控专业相关的职业和行业的生产、设计、研究与开发的法律、法规以及有关环境保护和可持续发展等方面的方针、政策和法律、法规,正确认识工程实际对客观世界和社会的影响,把握国内外相关的标准、规范和技术变化;
 - (8) 具有初步科学研究、技术开发和工程设计的组织管理能力、表达能力和人际交往能力,能够在团队中发挥作用;
 - (9) 具有适应社会发展能力以及终身学习能力;
 - (10) 具有国际视野和跨文化交流、竞争与合作能力。
1. Good sense of humanities and social science literacy, strong social responsibility better and owns good engineering occupation moral
 2. Required in the engineering work related mathematical discipline foundation and certain knowledge of project management
 3. Grasp of the major of process equipment and control engineering basic theory knowledge and professional basic knowledge, practical training system in process industry with system, understand the latest development status and trend of the professional
 4. Adopt technical methods and techniques of natural science, mechanical engineering and modern process control, planning, design, control, continuous improvement and innovation of process industry system
 5. Have the sense of innovation and the process of industrial new products, new equipment research, development and design of the preliminary ability, initially with the professional process equipment design and development capability and certain technical ability of organization and management;
 6. Master the basic methods of literature search, data query and use of modern information technology to obtain relevant information, can through the Internet, journal data channels understand the devices, products, systems and technologies related to the progress and frontier, effective use of various resources to find solutions to problems of specific process control major;

7. Understand the relevant national laws on control engineering related occupation and industry production, design, research and development, regulations and relevant environmental protection and sustainable development and other aspects of the guidelines, policies and laws and regulations, the correct understanding of the objective world and the actual effect of engineering society, grasp the standards, norms and technical changes associated with both at home and abroad;
8. With the preliminary scientific research, technology development and engineering design management ability, expression ability and interpersonal skills, can play a role in the research team
9. Adapt to the social development ability and the ability of lifelong learning
10. With international vision and cross cultural communication, competition and cooperation ability.

附：培养目标实现矩阵

	目标 1	目标 2	目标 3
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	√		

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：

工程力学、机械原理、机械设计、机械制造技术基础、流体力学与流体机械、过程原理与设备、工业装备成套技术

Engineering Mechanics, Principle of Mechanics, Mechanical Design, Fundamentals of Mechanical Manufacturing Technology, Fluid Mechanics and Fluid Machinery, Process Principles and Equipment Engineering, Complete Sets of Process Equipment Technology

(二) 专业特色课程：

过程控制技术、过程检测技术、粉体力学与设备、建材设备设计

Process Control Engineering, Process Measuring & Testing Technology, Powder Mechanics and Equipment, Design of Building Materials Equipment

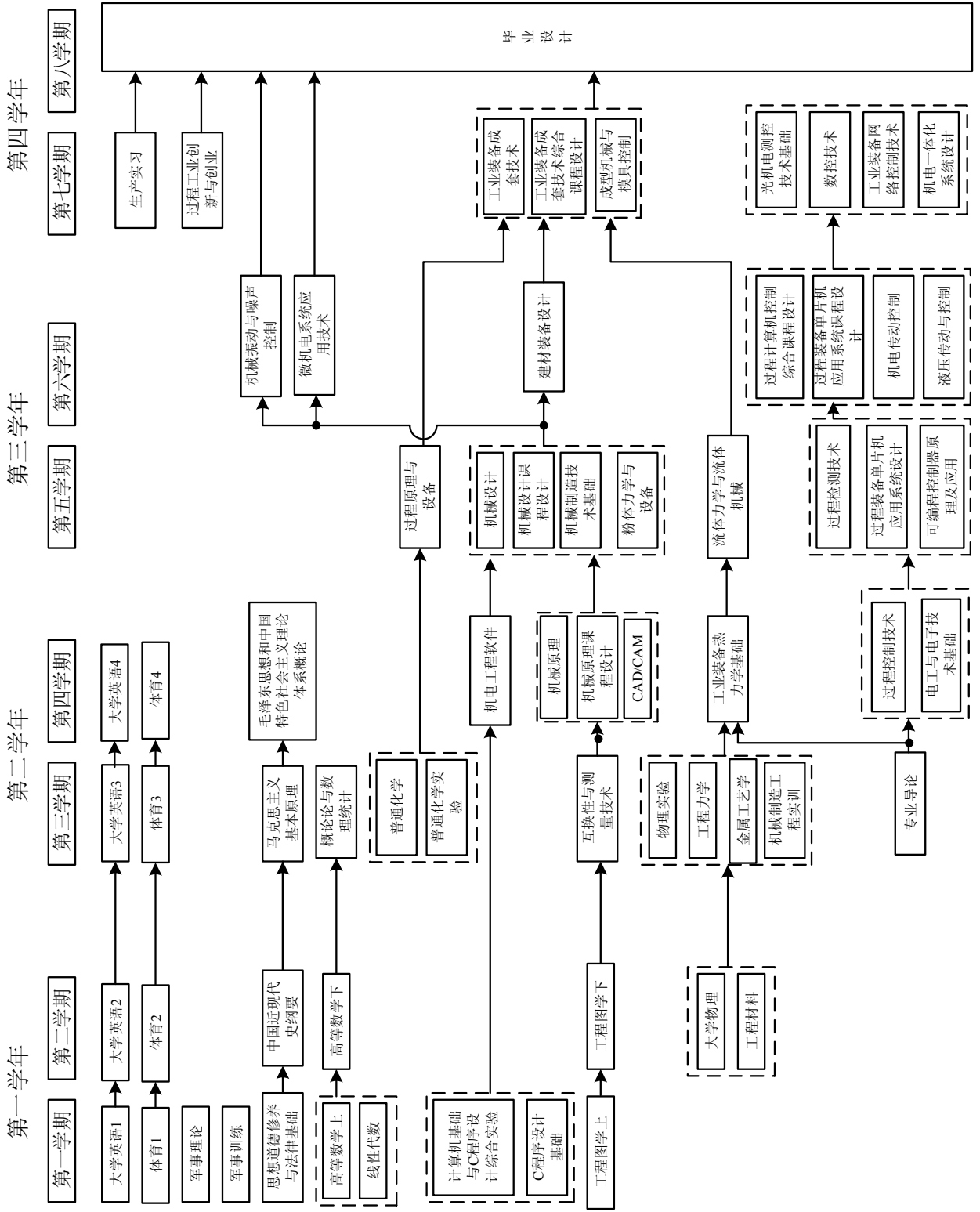
附：毕业要求实现矩阵：

专业 核心 课程	专业 特色 课程	课程名称	过程装备与控制工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
		思想道德修养与法律基础	√							√				
		中国近现代史纲要	√											
		毛泽东思想和中国特色社会主义理论体系概论	√											
		马克思主义基本原理	√											
		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				√			√					
		专业导论			√					√	√			
		工程材料				√		√						
		高等数学上		√		√								
		高等数学下		√		√								
		工程图学上			√									
		工程图学下			√									
		线性代数		√		√								
		大学物理		√		√								
		物理实验		√		√								
		概率论与数理统计		√		√								
√		工程力学		√										
		电工与电子技术基础		√		√								
		普通化学			√									
		普通化学实验			√									
		互换性与测量技术			√									
		金属工艺学			√									
		材料力学		√		√								
		工业装备热力学基础			√	√								
	√	过程控制技术			√	√								
	√	过程检测技术			√	√								
√		机械原理						√						
√		机械设计						√						

专业 核心 课程	专业 特色 课程	课程名称	过程装备与控制工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
		过程装备单片机应用系统设计					√							
√		流体力学与流体机械			√	√								
		液压传动与控制			√	√								
√		机械制造技术基础				√	√							
√		过程原理与设备			√		√							
	√	粉体力学与设备				√	√							
√		工业装备成套技术				√	√							
	√	建材装备设计			√	√					√			
		CAD/CAM					√		√					
		机电工程软件					√		√					
		可编程控制器原理及应用					√		√					
		机电传动控制					√		√					
		光机电测控技术基础					√		√					
		机电一体化系统设计				√					√			
		成型机械与模具设计				√	√							
		数控技术				√	√							
		工业装备网络控制技术				√	√							
		机械振动与噪声控制				√	√							
		微机电系统应用技术			√	√								
		过程工业创新与创业					√					√	√	
		军事训练	√											
		机械制造工程实训				√					√			
		过程计算机控制综合课程设计				√					√			
		机械原理课程设计				√					√			
		过程装备单片机应用系统设计课程设 计				√					√			
		机械设计课程设计				√					√			
		生产实习			√							√		
		工业装备成套技术综合课程设计			√						√			
		毕业设计				√						√	√	

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 Crts	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									
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1	
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					2	
4220003110	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		4	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003130	军事理论 Military Theory	1	32				16	1	
4210001170	体育 1 Physical Education I	1	26					1	
4210002170	体育 2 Physical Education II	1	34					2	
4210003170	体育 3 Physical Education III	1	34					3	
4210004170	体育 4 Physical Education IV	1	34					4	
4030002180	大学英语 1 College English I	3	60				12	1	
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3
4120335170	C 程序设计基础 C Language Programming	2	32					1	
4120336170	计算机基础与 C 程序设计综合实验 Foundations of Computer and C Language Programming Experiments	1	32	32				1	
小 计 Subtotal		29	640	32	0	48	64		

课程编号 Course Number	课程名称 Course Title	学分 Crts	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	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	5	80					1	要求每个学生至少选修与本专业教学计划内容非相关的课程 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									
4050063110	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics II	5	80					2	高等数学上
4050229110	线性代数 Linear Algebra	2.5	40					1	
4080371170	工程图学 A 上 Engineering Graphics I	3	56				8	1	
4080372170	工程图学 A 下 Engineering Graphics II	2.5	56				16	2	工程图学上
4080034110	工程材料 A Engineering Material	2.5	40	4				2	
4200371170	普通化学 C General Chemistry	2	32					3	
4200372170	普通化学实验 C General Chemistry Lab.	0.5	16	16				3	
4050463130	大学物理 B Physics	5	80					2	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4080389170	专业导论 Introduction to Specialty	1	16					3	
4050058110	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	
4080367170	金属工艺学 B Metallurgical Technology	2	32	2				3	
4050072110	工程力学 B Engineering Mechanics	4	64					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		
4080054110	互换性与测量技术 B Interchangeability and Measurement	2	32	4				3	
4100012110	电工与电子技术基础 C Fundamentals of Electrical Technology & Electrical Engineering	4	64	10				4	
4080062110	机械原理 Principle of Mechanics	3.5	56	4				4	
4080102110	工业装备热力学基础 Industrial Equipment Thermal Theory	2	32					4	
4080390170	机械设计 Mechanical Designing	3.5	56	4				5	
4080391170	过程原理与设备 C Process Principles and Equipment	2.5	40	6				5	
4080086110	流体力学与流体机械 Fluid Mechanics and Fluid Machines	2.5	40	2				5	
4080393170	机械制造技术基础 D Fundamentals of Mechanical Manufacturing Technology	2.5	40	6				5	
4080394170	工业装备成套技术 B Complete Sets of Process Equipment Technology	2.5	40					7	
4080395170	过程工业创新与创业 Process Indusry Innovation and Entrepreneurship	1	16	6				7	
小 计 Subtotal		65	1088	96	0	0	24		
(四) 专业教育选修课程 Specialized Elective Courses									
4080206120	过程控制技术 Process Control Engineering	2.5	40	4				4	
4080199120	CAD/CAM(B) CAD/CAM	2.5	40		10			4	
4080208120	机电工程软件 Engineering Software of Electric Machine	2.5	40		12			4	
4080205120	过程检测技术 Process Measuring & Testing Technology	2.5	40	4				5	
4080399170	粉体力学与设备 B Powder Mechanics and Power Machines	2.5	40	4				5	
4080396170	过程装备单片机应用系统设计 B Design of Single-Chip Computer Application System for Industrial Equipment	2.5	40	6				5	
4080082110	可编程控制器原理及应用 A Fundamentals & Application of Programmable Controllers	2.5	40	6				5	

课程编号 Course Number	课程名称 Course Title	学分 Crts	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		
4080213120	液压传动与控制 B Hydraulic Transmission and Control	2.5	40	2				6	
4080397170	建材装备设计 B Designs of Building Materials Equipment	2.5	40					6	
4080055110	机电传动控制 A Transmission and Control of Electric Machine	2.5	40	4				6	
4080237110	工业装备网络控制技术 Networks Control Technology of Industry Equipments	2.5	40	4				7	
4080098110	数控技术 A Numerical Control Technique	2.5	40	4				7	
4080217120	机电一体化系统设计 A Mechatronics System Design	2.5	40					7	
4080200120	成型机械与模具设计 B Tool and Mould Design	2.5	40					7	
小 计 Subtotal		35	560	38	22	0	0		
修读说明：要求至少选修 20 学分。 NOTE: Minimum subtotal credits:20.									
(五) 个性课程 Personalized Elective Courses									
4080290130	微机电系统应用技术 Application Technology of Micro Electro Mechanical System	2	32					6	
4080400170	机械振动与噪声控制 Control of Mechanical Vibration and Noise	2	32					6	
4080401170	光机电测控技术基础 B Measurement Technology of Ray and Electro-mechanics	2	32					7	
小 计 Subtotal		6	96	0	0	0	0		
修读说明：学生可跨专业自主选择修读全校其他专业的课程，要求至少选修 6 学分。 NOTE: Students can choose any courses from the other specialties. Minimum subtotal credits: 6.									

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 Crts	周数 Weeks	建议修读学期 Suggested Term
1060002110	军事训练 Military Training	1.5	3	1
4080150110	机械制造工程实训 B Training on Mechanical Manufacturing Engineering	4	4	3
4080149110	机械原理课程设计 Curricula Design of Mechanical Principles	1.5	1.5	4

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
4080147110	机械设计课程设计 Course Practice of Machinery Design	3	3	5
4080197110	过程计算机控制综合课程设计 A Course Practice of Process Computer Control	3	3	6
4080402170	过程装备单片机应用系统课程设计 Curricula Design of Computer Interface Technology	3	3	6
4080159110	生产实习 Production Practice	2	2	6
4080141110	工业装备成套技术综合课程设计 A Curricula Design of Complete Sets of Process Equipment Technology	3	3	7
4080403170	毕业设计 Graduation Design	10	17	8
小 计 Subtotal		31	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：胡 剑
专业培养方案责任人：胥 军、叶 涛

测控技术与仪器专业 2017 版本本科培养方案

Undergraduate Education Plan for Specialty in Measuring & Control Technology and Instrument(2017)

专业名称 测控技术与仪器	主干学科 仪器科学与技术
Major Measuring&Control Technology and Instrument	Major Instrument Science and Disciplines Technology
计划学制 四年	授予学位 工学学士
Duration 4 Years	Degree Granted Bachelor of Mechanical Engineering

最低毕业学分规定

Graduation Credit Criteria

课程类 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized Courses	个性课程 Personalized Course	集中性实践 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses	29	65.5	\	30.5	\	170
选修课 Elective Courses	9	20	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养掌握测控技术与仪器领域的基础理论、专业知识、基本方法和实践技能，“适应能力强、实干精神强、创新意识强”，具有一定国际视野，能够在机械与汽车、电子与信息等行业从事测控仪器与系统研究、设计、应用和生产管理工作的工程技术人才。

学生毕业 5 年左右能达到：

- (1) 有良好的职业素养和社会责任感，有意愿并有能力服务社会；
- (2) 能够独立从事测量与控制技术研究、测控仪器与系统设计开发及应用、质量监控、技术保障等工作；
- (3) 能够在一个设计、生产或科研团队中担任技术骨干或组织管理角色；
- (4) 能够通过继续教育或其它学习渠道更新知识，实现能力和技术水平的提升。

The graduate are required to master basic theory and professional knowledge, basic specialty methods and practical skills, be “good adaptability, good doer spirit, good innovation”, own a certain international vision, become a engineering and technical talented person engaged in measurement and control instrument and system research, design, application and production management in the field of machinery and automobile, electronics and information industries.

Graduates should achieve following levels after five years:

1. Have good professional qualities and sense of social responsibility, willing and able to serve society.
2. Have the ability to engage independently in the study of measurement and control technology, the designation, development and application of measurement and control instruments and

system, quality control, technical support, etc.

3. Have the ability of being a technical backbone or organization manager in a designing, producing or researching group.
4. Being able to improve abilities and skills by updating knowledge through further-education or other way of study.

(二) 毕业要求

- (1) 工程知识：能够将数学、自然科学、工程基础和测控技术与仪器专业知识用于解决机械电子领域测控系统的复杂工程问题。
 - (2) 问题分析：能够应用数学、自然科学和测控技术与仪器系统的基本原理，结合对科技文献研究的结果，识别、表达、分析机械电子领域测控系统的复杂工程问题，以获得有效结论。
 - (3) 设计/开发解决方案：能够设计针对机械电子领域复杂测控系统工程问题的解决方案，设计满足特定需求的测控系统、测控单元（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：能够基于自然科学基本原理和测控专业基础知识，采用科学方法对机械电子领域测控系统的复杂工程问题进行研究，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：能够针对机械电子领域测控系统的复杂工程问题，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进行建模、数值模拟和分析，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。
1. Engineering knowledge:have the ability of applying mathematics, natural science and engineering foundation and professional knowledge to solve the engineering problem of complex measurement and control system in machinery and electronics field.
 2. Problem analyses:have the ability of identification, expression and analysis engineering problem of complex measurement and control system in machinery and electronics field through literature research.
 3. Design/development solution:Have the ability of development solutions for complex measurement and control system engineering problemin machinery and electronics field, designing the measurement and control system, measurement and control unit (parts), or processto meet the specific needs, and can reflect innovation consciousness in the design

- process, consider the social, health, safety, legal, cultural and environmental factors.
4. Research ability: have the ability of basing on natural science knowledge and Measurement and control professional knowledge, using scientific methods to study the engineering problem of complex measurement and control system in machinery and electronics field, to design experiments, analyze and interpret data, and get the conclusion of reasonable and effective through comprehensive information.
 5. Using modern tools ability: have the ability of development, selection and use appropriate technology, resources, modern engineering tools and information technology tools to solve engineering problem of complex measurement and control system in machinery and electronics field, including modeling, numerical simulation and analyses, and to understand the limitations.
 6. Engineering and social: have the ability of carrying on the reasonable analysis based on the engineering background knowledge, evaluating impact of the professional engineering practice and complex engineering problems solutions to social, health, safety, legal and culture, and understand the responsibility.
 7. Environmental protection and sustainable development: have the ability of understanding and evaluating impact of engineering practice to environmental protection and social sustainable development.
 8. Professional norms: with the humanities and social science literacy, social responsibility, can understand and comply with engineering practice in engineering ethics and norms, fulfill their responsibilities.
 9. Individuals and teams: have the ability of taking the role of individuals, team members, and the person in charge in a multidisciplinary context.
 10. Communication: have the ability of communicating effectively with industry peers and the public for complex engineering problems, including writing a report and presentation, statement, clear expression or to respond to commands. And have certain international vision, can make communication and exchange in the cross-cultural context.
 11. Project management: understand and master the principles of engineering management and economic decision-making methods, and can be applied in a multidisciplinary environment.
 12. Lifelong learning: have a sense of autonomous learning and lifelong learning, and be able to learn and adapt to the development.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4
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	√			

	培养目标 1	培养目标 2	培养目标 3	培养目标 4
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:

测试信号分析与处理、误差理论与数据处理、精密机械设计、测控仪器电子技术基础(I、II)、仪器仪表电路、测控系统微处理器原理及应用、传感器原理及应用、控制工程基础、仪器光学基础。

Signal Analysis and Processing, Error Theory and Data Processing, Precision Mechanism Design, Basic Electronic Technology of Measure and Control Instrument(I、II), Instrument Circuit, Microcontroller Principle and Its Application of Measure and Control System, Principle and Application of Sensors, Fundamentals of Control Engineering, Fundamentals of Optical Instrument.

(二) 专业特色课程:

测控系统微处理器原理及应用、传感器原理及应用、现代仪器设计、光纤传感器、无损检测技术、图像检测与处理技术、嵌入式系统设计、可编程控制器原理及应用。

Microcontroller Principle and Its Application of Measure and Control System, Principle and Application of Sensors, Modern Instrument Design, Optical Fiber Sensor, Nondestructive Testing Technique, Image Detection and Processing Technique, Design of Embedded System, Fundamentals & Application of Programmable Logic Controller.

附：毕业要求实现矩阵:

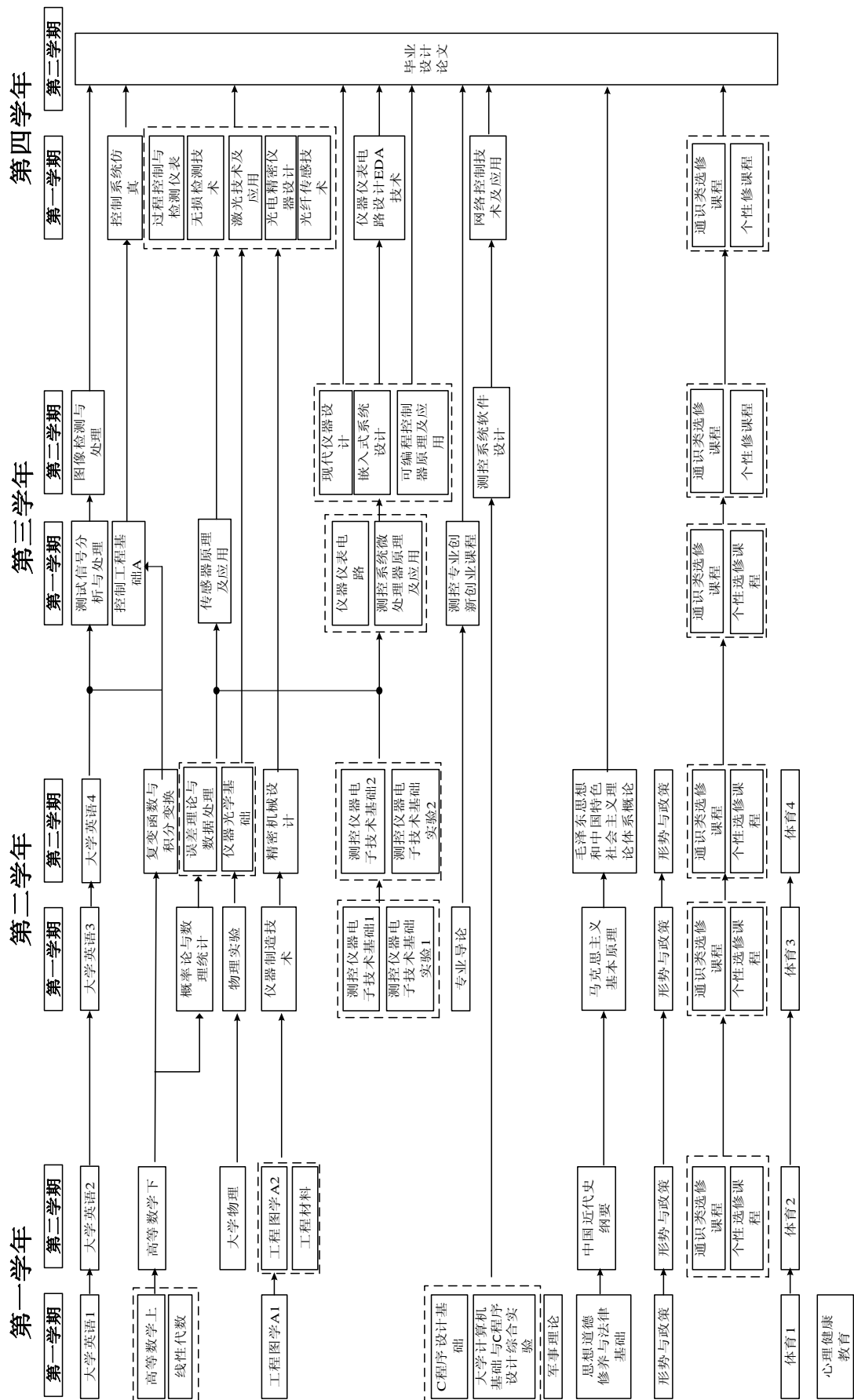
专业核心课程	专业特色课程	课程名称	测控技术与仪器专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础								√				
		中国近现代史纲要								√				
		毛泽东思想和中国特色社会主义理论体系概论								√				
		马克思主义基本原理								√				
		军事理论								√				
		体育								√				
		大学英语									√	√		
		C 程序设计基础	√					√						

专业 核心 课程	专业 特色 课程	课程名称	测控技术与仪器专业毕业要求													
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
		大学计算机基础与C程序设计综合实验					√									
		心理健康教育								√						
		创新创业类课程			√			√	√	√						
		经济管理类课程						√	√	√	√					
		专业导论						√	√	√						
		高等数学	√													
		线性代数	√													
		概率论与数理统计	√													
		复变函数与积分变换	√													
		大学物理	√													
		物理实验				√										
		工程材料		√				√	√							
		工程图学	√	√	√											
√		测控仪器电子技术基础(I、II)	√		√											
		测控仪器电子技术基础实验课(I、II)				√										
√		仪器光学基础	√	√												
√		测试信号分析与处理	√	√		√						√				
√		精密机械设计	√	√												
√		仪器仪表电路	√	√	√											
√		控制工程基础	√	√			√									
√		误差理论与数据处理	√			√										
√	√	测控系统微处理器原理及应用	√			√	√									
√	√	传感器原理及应用	√	√												
		创新创业方法(测控)		√	√			√	√	√						
	√	现代仪器设计	√	√				√								
		仪器制造技术			√			√					√			
		测控系统软件设计					√									
		仪器仪表电路设计 EDA 技术			√	√										

专业 核心 课程	专业 特色 课程	课程名称	测控技术与仪器专业毕业要求												
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
		控制系统仿真	√			√	√								
	√	光纤传感技术	√	√											
	√	图像检测与处理技术		√		√									
	√	可编程控制器原理及应用		√	√										
	√	嵌入式系统设计			√		√								
		过程控制与检测仪表	√	√											
		激光技术及应用		√											
	√	无损检测技术					√	√	√						
		网络控制技术及应用			√	√									
		光电精密仪器设计		√	√			√	√						
		军事训练								√					
		机械制造工程实训			√		√							√	
		测控系统微处理器应用课程设计		√	√	√	√								
		传感器及其应用电路课程设计			√	√	√							√	
		智能仪器综合课程设计			√	√	√								
		生产实习						√	√	√	√				
		仪器仪表机构零件及工艺课程设计			√			√		√					
		测控系统综合课程设计			√	√	√		√		√	√	√		
		毕业设计			√	√	√	√	√		√	√	√	√	√

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									
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1	
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					2	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
4220003110	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		4	
1060003130	军事理论 Military Theory	1	32				16	1	
4210001170	体育 1 Physical Education I	1	26					1	
4210002170	体育 2 Physical Education II	1	34					2	
4210003170	体育 3 Physical Education III	1	34					3	
4210004170	体育 4 Physical Education IV	1	34					4	
4030002180	大学英语 1 College English I	3	60				12	1	
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3
4120335170	C 程序设计基础 C Language Programming	2	32					1	
4120336170	计算机基础与 C 程序设计综合实验 Foundations of Computer and C Language Programming Experiments	1	32	32				1	
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			要求每个学生至少选修与本专业教学计划内容非相关的课程 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									
4050229110	线性代数 Linear Algebra	2.5	40					1	
4050063110	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics II	5	80					2	高等数学上
4080371170	工程图学 A 上 Engineering Graphics I	3	56				8	1	
4080372170	工程图学 A 下 Engineering Graphics II	2.5	56				16	2	工程图学上
4050463130	大学物理 B Physics	5	80					2	
4080034110	工程材料 A Engineering Material	2.5	40	4				2	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4080332150	专业导论 Introduction to Specialty	1	16					3	
4050058110	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	
4080404170	测控仪器电子技术基础 1 Basic Electronic Technology of Measure & Control Instrument I	4	64					3	大学物理
4080406170	测控仪器电子技术基础实验 1 Experiments of Basic Electronic Technology of Measure & Control Instrument I	0.5	16	16				3	测控仪器电子技术基础 1

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		
4080265130	精密机械设计 B Precision Mechanism Design	4	64	8				4	工程图学, 工程材料
4080405170	测控仪器电子技术基础 2 Basic Electronic Technology of Measure & Control Instrument II	3	48					4	
4080407170	测控仪器电子技术基础实验 2 Experiments of Basic Electronic Technology of Measure & Control Instrument II	0.5	16	16				4	测控仪器电子技术基础 2
4050052110	复变函数与积分变换 B Complex Function and Integral Transform	3	48					4	高等数学
4080258130	仪器光学基础 B Fundamentals of Optical Instrument	2.5	40	4				4	大学物理
4080257130	误差理论与数据处理 A Error Theory and Data Processing	2	32					4	概率论与数理统计
4080349150	测控系统微处理器原理及应用 Microcontroller Principle and Its Application	4	64	24				5	测控仪器电子技术基础 2
4080408170	传感器原理及应用 C Principle and Application of Sensors	3	48	10				5	大学物理 测控仪器电子技术基础
4080115110	仪器仪表电路 Instrument Circuit	2	32	4				5	测控仪器电子技术基础
4080266130	控制工程基础 C Fundamentals of Control Engineering	3	48	8				5	复变函数与积分变换
4080315140	测试信号分析与处理 A Signal Analysis and Processing	2.5	40		4			5	高等数学 线性代数
4080409170	测控技术创新创业方法 Innovation and Entrepreneurship Courses for the Specialty	1	16					5	
小 计 Subtotal		65.5	1104	126	4	0	24		
(四) 专业教育选修课程 Specialized Elective Courses									
专业教育限选课程									
4080410170	仪器制造技术 A Instrument Manufacture Technology	3	48	4				3	工程材料

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		
4080411170	测控系统软件设计基础 Software Design of Measure and Control System	2.5	40		12			6	C 程序设计基础
4080412170	现代仪器设计 B Modern Instrument Design	3	48	8				6	仪器仪表电路 测控系统微处理
专业教育任选课程									
4080093110	嵌入式系统设计 B Design of Embedded System	2	32	4				6	测控系统微处理器原理及应用
4080083110	可编程控制器原理及应用 B Fundamentals&Applicationof Programmable Logic Controller	2	32	4				6	测控系统微处理器原理及应用
4080101110	图像检测与处理技术 A Imagine Detection and Processing Technique	2	32		4			6	测试信号分析与处理
4080413170	光纤传感技术 A Technique of Optical Fiber Sensor	1.5	24	4				7	传感器原理及应用
4080414170	仪器仪表电路设计 EDA 技术 The EDA Technique for Circuit	2	32		4			7	仪器仪表电路
4080415170	控制系统仿真 Simulation for Control System	2	32		4			7	控制工程基础
4080052110	过程控制与检测仪表 Process Control and Meter	2	32	4				7	控制工程基础 传感器原理及应用
4080416170	激光技术及应用 C Principle and Applications of Laser	1.5	24	4				7	仪器光学基础
4080104110	无损检测技术 A Nondestructive Testing Technique	3	48	8				7	工程材料 仪器制造技术
4080049110	光电精密仪器设计 Design of Photoelectric Precision Instrument	2	32					7	精密机械设计 仪器光学基础 误差理论与数据处理
4080256130	网络控制技术及应用 Networked Control Technology and Its Application	2	32	4				7	测控系统软件设计
小 计 Subtotal		30.5	488	44	24	0	0		

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		
修读说明：要求至少选修 20 学分。 NOTE: Minimum subtotal credits:20.									
(五) 个性课程 Personalized Elective Courses									
4080417170	光电成像测量技术及应用 Technique&Application of Photoelectric imaging Measurement	2	32	24				7	仪器光学基础、传感器原理及应用
小 计 Subtotal		2	32	24	0	0	0		
修读说明：学生从以上推荐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
1060002110	军事训练 Military Training	1.5	3	1
4080150110	机械制造工程实训 B Training on Mechanical Manufacturing Engineering	4	4	3
4080233120	仪器仪表机构零件及工艺课程设计 B Course Design on Part, Mechanism and Technics of Instrument and Meter	2	2	4
4080339140	测控系统微处理器应用课程设计 Course Design on Microcontroller Application of Measure and Control System	2	2	5
4080418170	传感器及其应用电路课程设计 Course Design on Sensors and Application Circuits	3	3	5
4080419170	智能仪器综合课程设计 Course Design on Intelligent Instrument	3	3	6
4080160110	生产实习 Production Practice	2	2	6
4080420170	测控系统综合课程设计 A Course Design on Measure and Control System	3	3	7
4080421170	毕业设计 Graduation Design	10	17	8
小 计 Subtotal		30.5	39	

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. 测控专业学生参加“测控技术与仪器创新设计大赛”，提交合格作品，按照评定等级计 1~2 个课外学分，具体由测控技术与仪器系负责组织和考核。
3. 测控专业学生必须在通识教育选修课程或个性课程中选修至少 1 学分的数学、物理、化学类课程。
- 4、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.Students of the specialty must participate in “Creative &skill competition of Measuring & control technology and instrument”, submit qualified works , count 1~2 credits according to different grade. The activities will be organized and assessed by the measuring & control technology and instrument department .

3. Students of the specialty must select at least 1 credit of mathematics or physics or chemical courses from General Education Elective Courses or Personalized Elective Courses.

4.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：胡 剑
专业培养方案责任人：黄安贻

包装工程专业（卓越工程师班）2017 版本本科培养方案

Undergraduate Education Plan for Specialty in Packaging Engineering(Excellent Engineer Class)(2017)

专业名称	包装工程	主干学科	包装工程
Major	Packaging Engineering	Major Disciplines	Packaging 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

课程分类 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized 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 Required Courses	29	63.5	\	32.5	\	170
选修课 Elective Courses	9	20	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养掌握包装工程领域的基础理论、专业知识、基本方法和实践技能，具有创新创业意识和职业素养，能够在商品生产与流通部门、包装企业、科研机构、外贸、商检等部门从事包装系统设计、质量检测、技术管理和科学研究的工程技术人才。学生毕业 5 年左右能达到：

- (1) 有良好的职业素养和社会责任感，有意愿并有能力服务社会；
- (2) 能够独立从事包装工程技术研究、包装系统设计开发及应用、质量检测、技术管理等工作；
- (3) 能够在设计、生产或科研团队中担任技术骨干或组织管理角色；
- (4) 能够通过继续教育或其它学习渠道更新知识，实现能力和技术水平的提升。

The talent cultivating goal of packing engineering is to culture the special engineering and technical personnel who master the basic theory, professional knowledge, the basic method and practical skills in the field of packaging engineering. Graduates who are of innovative consciousness and professional quality can be engaged in packaging system design, quality inspection, technical management and scientific research in the departments of commodity production and circulation, packaging enterprises, scientific research institutions, foreign trade.

After graduation, the achievements of students can be got in the next 5 years:

1. Graduates have a good sense of professionalism and social responsibility, willingness and ability to serve the community.
2. Graduates have the abilities to work independently in packaging engineering technology research, packaging system design, development and application, quality inspection and technology management.
3. Graduates have the abilities to serve as core technicians or organization managers in a design, production or research team.
4. Graduates have the abilities to renew knowledge through continuing education or other learning

channels to achieve the improvement of ability and technical level.

(二) 毕业要求

1. **工程知识:** 能够将数学、自然科学、工程基础和包装工程专业知识用于解决测试、控制和设计分析相关的复杂工程问题;
 2. **问题分析:** 能够应用数学、自然科学和包装系统工程问题的基本原理, 结合对科技文献研究的结果, 识别、表达、分析复杂工程问题, 以获得有效结论;
 3. **设计/开发解决方案:** 能够设计针对复杂包装系统工程问题的解决方案, 设计满足特定需求的包装系统、包装机械装备(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:** 能够基于自然科学基本原理和包装专业基础知识, 采用科学方法对一般包装系统的复杂工程问题进行研究, 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:** 能够针对测试、控制和包装系统等复杂工程问题, 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进行建模、数值模拟和分析, 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。
1. **Engineering knowledge:** Graduates have the abilities to apply mathematics, natural science, engineering foundation and packaging engineering to the complex engineering problems which are related to testing, control and design analysis.
 2. **Problem analysis:** Graduates have the abilities to identify, express, analysis complex engineering problems and then obtain valid conclusions by applying the basic principle of mathematics, natural science and packaging systems engineering and combined with the results of science and technology literature research.
 3. **Design/development solution:** Graduates have the abilities to provide solutions to complex packaging systems engineering problems and design packaging systems, packaging machinery and equipment (components) or technical process which can satisfy the specific demands. In the process of design, innovation consciousness, considering the social, health, safety, legal, cultural and environmental factors are fully revealed.
 4. **Research:** Based on natural science basic theory and basic knowledge of packaging, graduates can adopt the scientific methods to study the complex engineering problems of general packaging system, design experiments, analyze and interpret data. Then the reasonable and effective conclusions are got by the integration of information.
 5. **Using modern tools:** To solve the complex engineering problems of test, control and packaging system, graduates have the abilities to develop, select and use appropriate technology, resource and tools of

modern engineering and information technology. By modeling, numerical simulation and analysis, graduates can understand the limitations of complicated engineering problems.

6. **Engineering and society:** Graduates have the abilities to carry on the reasonable analysis based on the engineering background knowledge, evaluate the influence of engineering practice and complex engineering solutions to social, health, safety, law and culture and understand the responsibility.
7. **Environmental and sustainable development:** Facing the complex engineering issues, graduates have the ability to understand and evaluate the impact of engineering practices on the sustainable development of environment and society.
8. **Occupational specification:** Graduates have the abilities of humanistic and social science literacy and responsibilities. Graduates can comply with engineering ethics and norms and fulfill its responsibilities in engineering practice.
9. **Individuals and teams:** Graduates are competent for the roles of individuals, team members and leaders in a group of multidisciplinary background.
10. **Communication:** Graduates have the abilities of effective communication with industry peers and the public in complex engineering issues which include reports writing, documents design, statements presenting, expressing clearly or responding to instructions. With a certain international vision, graduates can freely communicate under a cross-cultural background.
11. **Project management:** Graduates can systematically understand and master the principles of engineering management and economic decision-making methods which can be applied in multidisciplinary environments.
12. **Lifelong learning:** Graduates are of the awareness of self-learning and lifelong learning and have the ability of continuous learning and adaptive development.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4
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：

专业核心课程：机械设计、包装结构设计、运输包装、包装机构设计、包装系统设计

Core Courses: Mechanical Designing, Packaging Structure Design, Transport Packaging, Packaging Mechanism Design, Packaging System Design.

(二) 专业特色课程:

专业特色课程: 包装材料学、包装结构设计、运输包装、包装技术、包装测试、包装机构设计、包装自动控制、包装系统设计、包装造型与装潢设计、包装工艺及设备

Characteristic Courses: Packaging Materials, Packaging Structure Design, Transport Packaging, Packaging Technology, Packaging Test and Measurement Technology, Packaging Mechanism Design, Packaging Automatic Control, Packaging System Design, Packaging Modelling and Decorating, Packaging Technology and Equipment, Packaging Engineering Specialty Experiment.

附: 毕业要求实现矩阵:

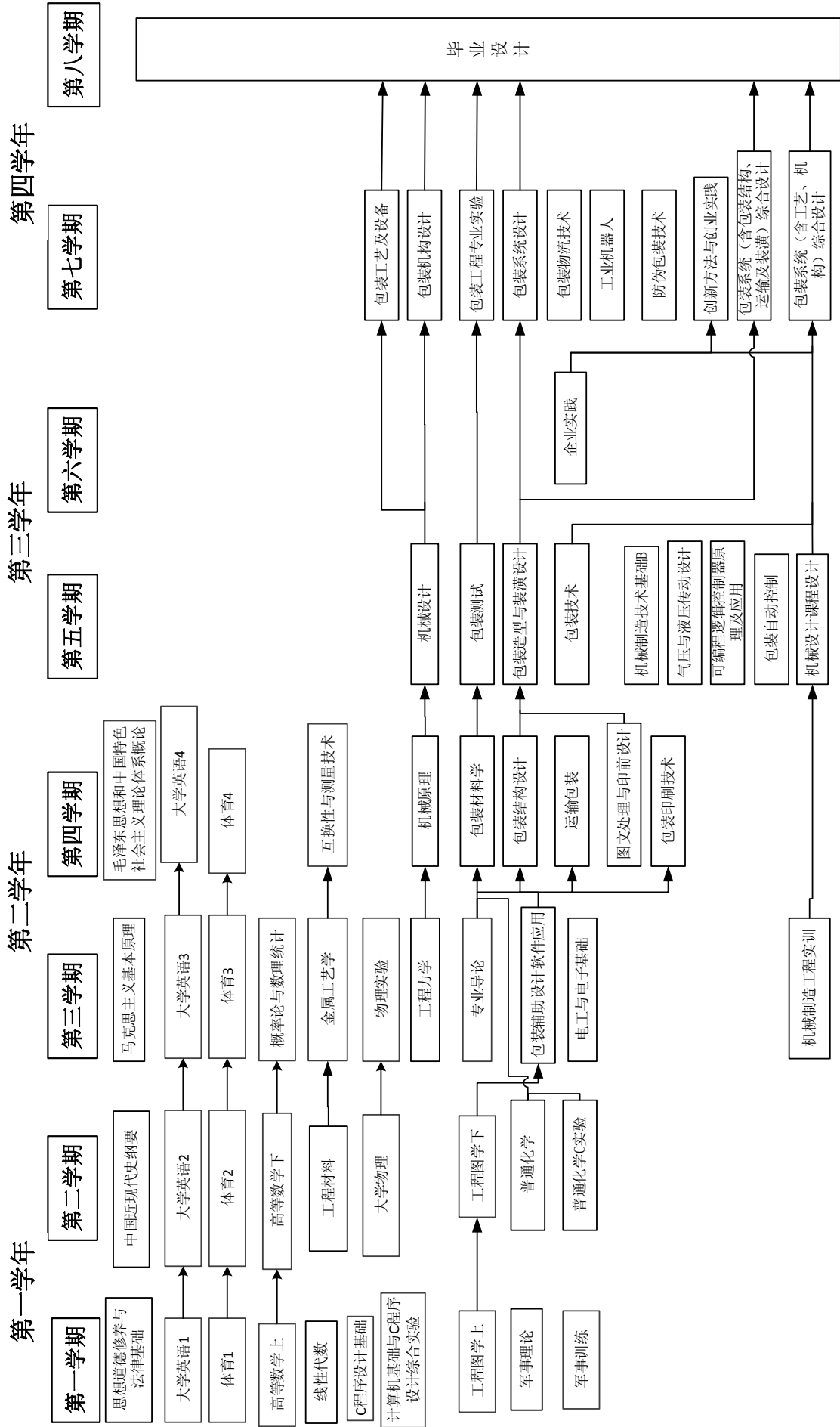
专业 核心 课程	专业 特色 课程	课程名称	包装工程专业(卓越工程师班)毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础			√					√				
		中国近现代史纲要			√					√				
		毛泽东思想和中国特色社会主义理论体系概论			√				√	√				
		马克思主义基本原理			√					√				
		军事理论			√			√			√			
		体育 1									√			
		体育 2									√			
		体育 3									√			
		体育 4									√			
		大学英语 1					√					√		
		大学英语 2					√					√		
		大学英语 3					√					√		
		大学英语 4					√					√		
		C 程序设计基础					√							
		计算机基础与 C 程序设计综合实验					√							
		高等数学上	√	√		√								
		高等数学下	√	√		√								
		线性代数	√	√		√								
		工程图学上	√		√									
		工程图学下	√		√									
		大学物理	√	√		√								
		工程材料	√	√		√	√							

专业 核心 课程	专业 特色 课程	课程名称	包装工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		普通化学	√	√		√								
		普通化学实验	√	√		√								
		专业导论	√											
		物理实验	√	√		√								
		概率论与数理统计	√	√		√								
		金属工艺学	√	√	√	√								
		互换性与测量技术	√	√	√	√								
		工程力学	√	√	√	√								
		电工与电子基础	√	√	√	√								
		互换性与测量技术	√	√	√	√								
		机械原理	√	√	√	√								
√	√	包装结构设计	√	√	√	√								
√	√	运输包装	√	√	√	√								
√		机械设计	√	√	√	√								
√	√	包装机构设计		√	√	√								
√	√	包装系统设计		√	√	√								
		包装工程专业实验				√	√							
		创新方法与创业实践						√			√	√	√	
		包装辅助设计软件应用					√							
√		包装材料学	√	√	√	√								
√		包装技术	√	√	√	√								
√		包装自动控制	√	√	√	√								
√		包装测试	√	√	√	√								
		图文处理与印前设计					√							
		包装印刷技术	√						√					
		机械制造技术基础	√	√	√	√								
		气压与液压传动设计	√	√	√	√								
		可编程逻辑控制器原理及应用	√	√	√	√								
		包装物流技术		√		√		√	√					

专业 核心 课程	专业 特色 课程	课程名称	包装工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		工业机器人	√		√	√								
		防伪包装技术			√	√	√		√					
	√	包装造型与装潢设计			√		√	√	√					
	√	包装工艺及设备	√	√	√	√								
		军事训练						√					√	
		机械制造工程实训		√	√	√								
		机械设计课程设计		√	√	√								
		企业实践						√		√			√	
		包装系统综合设计 1		√	√	√	√	√						
		包装系统综合设计 2		√	√	√	√	√						
		毕业设计		√	√	√	√	√						

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 Crts	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									
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1	
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					2	
4220003110	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		4	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003130	军事理论 Military Theory	1	32				16	1	
4210001170	体育 1 Physical Education I	1	26					1	
4210002170	体育 2 Physical Education II	1	34					2	
4210003170	体育 3 Physical Education III	1	34					3	
4210004170	体育 4 Physical Education IV	1	34					4	
4030002180	大学英语 1 College English I	3	60				12	1	
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3
4120335170	C 程序设计基础 C Language Programming	2	32					1	
4120336170	计算机基础与 C 程序设计综合实验 Foundations of Computer and C Language Programming Experiments	1	32	32				1	
小 计 Subtotal		29	640	32	0	48	64		

课程编号 Course Number	课程名称 Course Title	学分 Crts	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	要求每个学生至少选修与本专业教学计划内容非相关的课程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									
4050229110	线性代数 Linear Algebra	2.5	40					1	
4050063110	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics II	5	80					2	高等数学上
4080371170	工程图学 A 上 Engineering Graphics I	3	56				8	1	
4080372170	工程图学 A 下 Engineering Graphics II	2.5	56				16	2	工程图学上
4080034110	工程材料 A Engineering Material	2.5	40	4				2	
4200371170	普通化学 C General Chemistry	2	32					2	
4200372170	普通化学实验 C General Chemistry Experiment	0.5	16	16				2	
4050463130	大学物理 B Physics	5	80					2	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4080331150	专业导论 Introduction to Specialty	1	16					3	
4050058110	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	
4080367170	金属工艺学 B Metallurgical Technology	2	32	2				3	
4050071110	工程力学 A Engineering Mechanics	4	64	4				3	
4100012110	电工与电子技术基础 C Electrical and Electronic Technology Foundation	4	64	10				3	
4080054110	互换性与测量技术 B Interchangeability and Measurement	2	32	4				4	

课程编号 Course Number	课程名称 Course Title	学分 Crts	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		
4080011110	包装结构设计 B Packaging Structure Design	2.5	40	4				4	包装辅助设计 软件应用
4080117110	运输包装 Transport Packaging	2.5	40	4				4	包装辅助设计 软件应用
4080062110	机械原理 Principle of Mechanics	3.5	56	4				4	
4080060110	机械设计 Mechanical Designing	4	64	6				5	
4080422170	包装机构设计 A Packaging Mechanism Design	2.5	40	6				7	机械原理 机械设计
4080013110	包装系统设计 Packaging System Design	1.5	24		12			7	
4080353150	包装工程专业实验 B Packaging Engineering Specialty Experiment	1	32	32				7	包装材料 包装测试
4080469170	创新方法与创业实践 Innovative Methods and Entrepreneurial Practices	1	16			8		7	
小 计 Subtotal		63.5	1040	128	12	8	24		
(四) 专业教育选修课程 Specialized Elective Courses									
4080470170	包装辅助设计软件应用 A Aided Design Software Application of Packaging	2	32		24			3	
4080458170	包装材料学 B Packaging Materials	2	32					4	
4080459170	图文处理与印前设计 A Image & Word Process and Chromatic Theory	2.5	40					4	
4080016110	包装印刷技术 Introduction of Packaging Printing	2.5	40					4	
4080010110	包装技术 Packaging Technology	2.5	40	4				5	
408460170	包装测试 A Packaging Test and Measurement Technology	2.5	40	16				5	
4080461170	包装自动控制 B Packaging Automatic Control	3.5	56	10				5	
4080065110	机械制造技术基础 B Machinery Manufacturing Technology Basis	3.5	56	6				5	
4080462170	气压与液压传动设计 Design of Pneumatic and hydraulic Transmission	2	32	6				5	
4080186110	可编程逻辑控制器原理及应用 Principle and Application of Programmable Logic Controllers	2	32	4				5	

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		
4080012110	包装物流技术 Technology of Packaging Logistics	2	32					7	
4080202120	工业机器人 Industrial Robots	2	32					7	
4080032110	防伪包装技术 Anti-counterfeiting Packaging and Bar Code Technology	1.5	24					7	
小 计 Subtotal		30.5	488	46	24	0	0		

修读说明：要求至少选修 20 学分。其中《包装辅助设计软件应用》、《包装材料学》、《包装技术》、《包装测试》和《包装自动控制》为必选课程。

NOTE: Minimum subtotal credits:20.

(五) 个性课程

Personalized Elective Courses

4080463170	包装造型与装潢设计 B Packaging Modelling and Decorating	3	48			24		5	图文处理与 印前设计
4080464170	包装工艺及设备 B Packaging Technology and Equipment	2	32	4				7	
小 计 Subtotal		5	80	4	0	24	0		

修读说明：学生可跨专业自主选择修读全校其他专业的课程，要求至少选 2 门本专业个性课程，总共至少选修 6 学分。

NOTE: Students can choose any courses from the other specialties. Minimum subtotal credits: 6.

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
1060002110	军事训练 Military Training	1.5	3	1
4080150110	机械制造工程实训 B Training on Mechanical Manufacturing Engineering	4	4	3
4080147110	机械设计课程设计 Course Practice of Machinery Design	3	3	5
4080359140	企业实践 Enterprise Practice	10	20	6
4080465170	包装系统综合设计 1 Synthesis Course Design of Packaging System 1	2	2	7
4080466170	包装系统综合设计 2 Synthesis Course Design of Packaging System 2	2	2	7
4080467170	毕业设计 Graduation Design	10	17	8
小 计 Subtotal		32.5	51	

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：胡 剑

专业培养方案责任人：周 斌

机械工程专业国际班（智能制造工程方向） 2017 版本科培养方案

Undergraduate Education Plan for Specialty in Mechanical Engineering International Class (Intelligent Manufacturing Engineering, 2017)

专业名称 机械工程	主干学科 机械工程
Major Mechanical Engineering	Major Disciplines Mechanical Engineering
计划学制 四年	授予学位 工学学士
Duration 4 Years	Degree Granted Bachelor of Mechanical Engineering

最低毕业学分规定

Graduation Credit Criteria

课程分类 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized 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 Required Courses	23	71.5	/	29.5	/	150
选修课 Elective Courses	9	12	/	/	5	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

培养掌握智能制造领域的基础理论与专业知识，具有一定国际视野和较强的创新思维，能综合多学科知识，从事智能制造相关产品与技术的设计制造、科研开发、应用研究等方面工作，能在各自所工作的领域作为骨干成员或者领导发挥作用。学生毕业 5 年后能够达到：

- (1) 具备智能制造领域（特别是汽车、建材建工和通用机械）的多学科交叉融合知识；
- (2) 具有科学精神与创新意识；
- (3) 具有良好的国际视野，以及职业素养与团队精神；
- (4) 具有较强的持续学习与终身学习能力；
- (5) 毕业生在智能制造相关领域具有就业竞争力或有能力进入研究生阶段学习。

This major aims at training students who have abilities of becoming key staffs or leaders in their working realms. They would grasp the basic theoretical and specialized knowledge of intelligent manufacturing, and have would have the international view, high innovation abilities and the capabilities of using multidisciplinary knowledge comprehensively. They would specialize on the design, manufacturing, research, development, application etc. of the productions related to intelligent manufacturing. 5 years after graduation, they would achieve the following knowledge and abilities:

1. Students should have multidisciplinary knowledge of intelligent manufacturing (particularly

- in automobile, building materials and general machinery);
2. They should own scientific spirit, innovation consciousness;
 3. They should have international view, good professional qualities and team spirit;
 4. They should have high capabilities of continuous learning and lifelong learning;
 5. Graduate should have the high competitive capabilities of employment and entering master study in the realm of intelligent manufacturing.

(二) 毕业要求

- (1) 工程知识：掌握从事智能制造工程工作所需的数理学科、自然科学，以及智能制造工程基础理论和专业知识，并能综合应用于复杂机械工程问题的求解；
 - (2) 问题分析：能够应用数学、自然科学和机械工程科学的基本原理，并通过文献研究，识别、表达、分析复杂智能制造工程问题，以获得有效结论；
 - (3) 设计/开发解决方案：针对复杂工程问题，能够应用智能制造工程的基本理论和方法，设计满足特定需求的机械系统和制造工艺，开发解决方案，并能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：具备对智能制造工程问题中的机械、控制、电气、液压、制造工艺等的技术方案进行设计、分析与研究的初步能力，并能针对方案设计的结果进行有效分析和评价；
 - (5) 使用现代工具：具备现代工具的使用能力，具备获取、理解与甄别各类信息的能力，能合理应用于复杂智能制造工程问题的解决，并能够理解其局限性；
 - (6) 工程与社会：具备查阅与运用机械工程专业领域相关方针、政策与法律法规能力，具备综合考虑社会、健康、安全、法律以及文化影响下的智能制造工程问题的分析评价能力；
 - (7) 环境和可持续发展：理解和认识智能制造工程专业与社会发展、环境保护和社会可持续发展的关系，具备复杂智能制造工程问题的解决方案对环境和社会可持续发展影响的分析能力；
 - (8) 职业规范：具有良好的人文社会科学素养与社会责任感，能够在智能制造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：能够在团队中做好自己承担的角色，能与团队其他成员有效沟通，听取意见或建议并作出合理反应；
 - (10) 沟通：具备机械工程领域智能制造工程问题的描述能力，具备与业界同行与社会公众有效沟通与交流的能力，并能跨文化沟通与交流；
 - (11) 项目管理：具备基本的项目管理能力，能采取有效的项目行动，持续改善工程实践，并能在多学科环境中应用；
 - (12) 终身学习：具有自主学习和探索科学问题的能力，具有终身学习和适应发展的能力。
1. Engineering knowledge: The graduates should master the mathematical and physical sciences, natural science and basic theory and professional knowledge of intelligent manufacturing engineering, and solve the problem of complicated intelligent manufacturing;
 2. Problem analyses: The graduates should analyze and establish the mathematical physics model which can be applied to the problem of intelligent manufacturing engineering.
 3. Design/development solution: The graduates should understand the professional technical standards and norms of mechanical engineering, and know the frontier development status and trends of mechanical professional, and have the preliminary ability to research, design and development of machinery industry, new products, new technology, new equipment with

- innovative thinking;
4. Research ability: The graduates should have preliminary ability of design, analysis and research of the intelligent manufacturing engineering machinery, control, electrical, hydraulic, manufacturing process, and can give the effective analysis and evaluation;
 5. Using modern tools ability: The graduates should have the ability to use modern tools, to obtain, understand and identify all kinds of information, and to solve the problem of intelligent manufacturing;
 6. Engineering and social: The graduates should have the ability to access and use the related policy, policies, laws and regulations ability of intelligent manufacturing engineering, with considering the society, health, safety, law and culture influence under intelligent manufacturing engineering problem analysis ability;
 7. Environmental protection and sustainable development: The graduates should understand and aware the relationship between intelligent manufacturing engineering professional and social development, environment protection and social sustainable development, and have the ability to analyze the impact between environmental and social of the complex mechanical engineering solutions;
 8. Professional norms: The graduates should have good quality of humanities and social sciences, strong sense of responsibility for society and proper engineering profession ethics;
 9. Individuals and teams: The graduates should be able to do their own role in the team, to communicate effectively with other members of the team, to listen to opinions or suggestions and to make a reasonable response;
 10. Communication: The graduates should have the ability to describe complex engineering problems in the field of intelligent manufacturing engineering, with the ability to communicate effectively with the community and the public, and to cross cultural communication and exchange;
 11. Project management: The graduates should have the basic project management skills, and be able to take effective project action, continuous improvement of engineering practice;
 12. Learning Skills: The graduates should be able to adapt to social development and can study in a lifelong term.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 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			√		

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
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:

电工与电子技术、工程热力学与流体、机械设计与制图、材料性能与应用、机械动力学、现代设计方法、机械制造技术基础、微处理器原理及应用、新型传感器与智能控制、深度学习理论与方法。

Fundamentals of electrical and electronic technology, Engineering Thermodynamics and Fluid Engineering, Mechanical Design and Drawing, Material properties and applications; Mechanical dynamics; Modern design method; Mechanical manufacturing technology; Microprocessor principle and application; New sensors and intelligent control; Deep Learning Theory and Methods

(二) 专业特色课程:

机械制造技术基础、机械设计与制图、材料性能与应用、机械动力学、新型传感器与智能控制、深度学习理论与方法、设计与制造 (I、II、III)。

Mechanical manufacturing technology; Mechanical Design and Drawing, Material properties and applications; Mechanical dynamics; New sensors and intelligent control; Deep Learning Theory and Methods, Design and Manufacturing(I,II,III)

附：毕业要求实现矩阵：

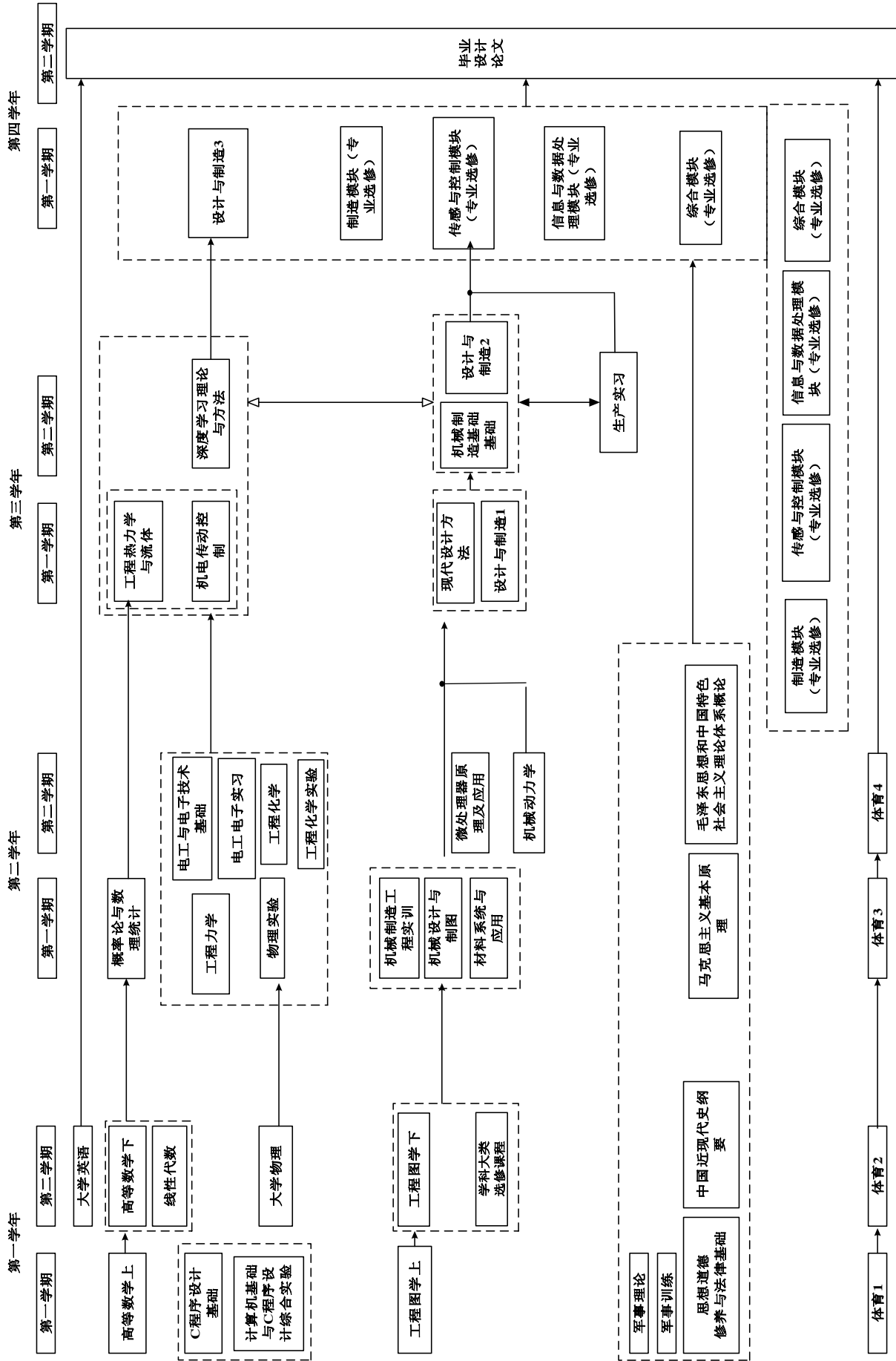
专业 核心 课程	专业 特色 课程	课程名称	机械工程专业国际班（智能制造工程方向）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础						√	√	√				
		中国近现代史纲要								√				
		毛泽东思想和中国特色社会主义理论体系概论								√				√
		马克思主义基本原理								√				√
		军事理论									√			
		大学体育（1-4）								√	√			
		大学英语（1-4）										√		
		C 程序设计基础					√	√						

专业 核心 课程	专业 特色 课程	课程名称	机械工程专业国际班（智能制造工程方向）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		计算机基础与 C 程序设计综合实验		√		√								
		高等数学（上、下）		√		√								
		线性代数		√										
		概率论与数理统计		√										
		大学物理		√										
		物理实验		√										
		工程化学												
		工程化学实验												
√	√	机械设计与制图	√	√	√	√								
√	√	材料性能与应用	√		√	√								
		机械制造工程实训			√						√			
√		电工与电子技术	√	√										
		电工电子实习		√										
		工程力学	√	√										
√		工程热力学与流体	√	√										
	√	设计与制造(1-3)		√	√	√								√
√	√	机械制造技术基础		√		√								
√		机械动力学	√	√			√							
√		现代设计方法	√	√										
√		微处理器原理及应用	√	√										
√	√	新型传感器与智能控制	√			√								
√	√	深度学习理论与方法	√	√										
		生产实习			√					√	√			√
		选课课程-传感与控制模块				√								√
		选课课程-智能制造模块				√		√						√

专业 核心 课程	专业 特色 课程	课程名称	机械工程专业国际班（智能制造工程方向）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		选课课程-信息与数据处理模块					√					√		
		选课课程-综合模块			√				√					√
		毕业设计（论文）				√	√	√				√	√	

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 Crts	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									
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1	
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					2	
4220003110	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		4	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003130	军事理论 Military Theory	1	32				16	1	
4210001110	体育 1 Physical Education I	1	32					1	
4210002110	体育 2 Physical Education II	1	32					2	
4210003110	体育 3 Physical Education III	1	32					3	
4210004110	体育 4 Physical Education IV	1	32					4	
4030286170	大学英语 E College English	3	64				16	1	
4120335170	C 程序设计基础 C Language Programming	2	32					1	
4120336170	计算机基础与 C 程序设计综合实验 Foundations of Computer and C Language Programming Experiments	1	32	32				1	
小 计 Subtotal		23	512	32	0	48	32		

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，在每个模块中均须至少选择一门，其中艺术体育类课程中的艺术类相关课程要求取得至少 2 个学分。 All 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 every category.							
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									
4050229110	线性代数 Linear Algebra	2.5	40					1	
4050063110	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics II	5	80					2	高等数学上
4080456170	机械设计与制图 Mechanical Design and Drawing	7.5	120	4			20	2	
4050463130	大学物理 B Physics	5	80					2	
4050224110	物理实验 B Physics Lab.	1	32	32				3	大学物理
4050058110	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	
4050071110	工程力学 A Engineering Mechanics	4	64	4				3	
4080438170	材料性能与应用 Material properties and applications	4.5	72	10				3	
4200374170	工程化学 Engineering Chemistry	1.5	24					4	
4200375170	工程化学实验 Engineering Chemistry Experiment	0.5	16	16				4	
4100012110	电工与电子技术基础 C Fundamentals of electrical and electronic technology	4	64	10				4	

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		
4080439170	机械动力学 Mechanical dynamics	4	64					4	
4080442170	微处理器原理及应用 Microprocessor principle and application	4	64	8				4	
4080440170	工程热力学与流体 Engineering Thermodynamics and Fluid Engineering	4	64	10				5	
4080441170	现代设计方法 Modern design method	4	64	12				5	
4080064110	机械制造技术基础 A Mechanical manufacturing technology	4	64	6				6	
4080443170	新型传感器与智能控制 New sensors and intelligent control	4	64	8				6	
4080444170	深度学习理论与方法 Deep Learning Theory and Methods	4	64	8				6	
小 计 Subtotal		71.5	1168	128	0	0	20		
(四) 专业教育选修课程 Specialized Elective Courses									
制造模块(4 选 2)									
4080202120	工业机器人 Industry Robot	2	32					5	
4080048110	工艺过程自动化 Process Automation	2	32					7	
4080080110	精密加工与特种加工 Technology of Special Machining and Precision Machining	2	32					7	
4080445170	增材制造 Additive Manufacturing	2	32	4				7	
传感与控制模块 (3 选 1)									
4080198110	机电传动控制 B Transmission and Control of Electric Machine	2	32	4				5	
4120399170	物联网技术及应用 Internet of Things Technology and Applications	2	32	4				5	
4080083110	可编程控制器原理及应用 B Fundamentals & Application of Programmable Logic Controller	2	32	4				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 Operation	实践 Practice	课外 Extra-cur		
信息与数据处理模块 (4 选 2)									
4120400170	数据结构 D data structure	2	32					5	
4080429170	计算机仿真 B Computer Simulation	2	32		4			5	
4080446170	CFD 与 FEA CFD AND FEA	2	32		4			7	
4120078110	数据挖掘 C Data mining	2	32		8			7	
综合模块 (3 选 1)									
4080447170	工程项目与管理 Project and Management	2	32					6	
4080057110	机电一体化系统设计 B Mechatronics System Design	2	32					7	
4080058110	机械 CAD/CAM Machinery CAD/CAM	2	32		6			7	
小 计 Subtotal		28	448	16	22	0	0		
修读说明：要求至少选修 12 学分。 NOTE: Minimum subtotal credits:12.									

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
1060002110	军事训练 Military Training	1.5	3	1
4080150110	机械制造工程实训 B Machinery Manufacturing Engineering Practice B	4	4	3
4100069110	电工电子实习 B Practice in Electrical Engineering & Electronics B	1	1	4
4080434170	机械工程专业生产实习 Production Practice	2	2	6
4080448170	设计与制造 1 Design and Manufacturing I (concept design)	3	3	5

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
4080449170	设计与制造 2 Design and Manufacturing I (product design)	4	4	6
4080450170	设计与制造 3 Design and Manufacturing I (product manufacturing)	4	4	7
4080437170	毕业设计 Graduation Design	10	17	8
小 计 Subtotal		29.5	38	

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： 胡 剑
专业培养方案责任人： 李益兵

机械工程专业（学硕班）2017 版本本科培养方案

Undergraduate Education Plan for Specialty in Mechanical Engineering (Bachelor +Master Class, 2017)

专业名称 机械工程	主干学科 机械工程
Major Mechanical Engineering	Major Disciplines Mechanical Engineering
计划学制 四年	授予学位 工学学士
Duration 4 Years	Degree Granted Bachelor of Mechanical 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 Specialized 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 Required Courses		29	75	/	35	/	170
选修课 Elective Courses		9	12	/	/	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养掌握机械工程专业领域的基础理论与专业知识，具有一定国际视野和较强的创新思维，能在机械设计、机械制造和机电控制等领域从事科学研究、设计制造、应用与管理等相关工作，能在各自所工作的领域成为创新拔尖人才。学生毕业 5 年后能够达到：

- (1) 具备继续深造与从事研究的广泛技能；
- (2) 具有科学精神与创新意识；
- (3) 具有较好的职业素养、团队精神及国际视野；
- (4) 具有较强的持续学习与终身学习能力；
- (5) 能从事机械工程领域内的科学研究与创新研究工作。

This major aims at training students who have abilities of becoming top-notch personnel in their working realms. They would grasp the basic theoretical and specialized knowledge, and would have the international view and high innovation abilities. They would specialize on the design, manufacturing, research, development, application and management in the realms of mechanical design, mechanical manufacturing and electromechanical control. 5 years after graduation, they would achieve the following knowledge and abilities:

1. Students should have skills and abilities of further study and research;
2. They should own scientific spirit, innovation consciousness;
3. They should have good professional qualities, team spirit and international view;
4. They should have high capabilities of continuous learning and lifelong learning;
5. They would engage in the scientific research and innovation study in mechanical realm.

(二) 毕业要求

- (1) 工程知识：掌握从事机械工程专业工作所需的数理学科、自然科学，以及机械工程基础

理论和专业知识，并能综合应用于复杂机械工程问题的求解；

- (2) 问题分析：能够应用数学、自然科学和机械工程科学的基本原理，并通过文献研究，识别、表达、分析复杂机械工程问题，以获得有效结论；
 - (3) 设计/开发解决方案：针对复杂工程问题，能够应用机械工程的基本理论和方法，设计满足特定需求的机械系统和制造工艺，开发解决方案，并能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：具备对复杂机械工程问题中的机械、控制、电气、液压、制造工艺等的技术方案进行设计、分析与研究的初步能力，并能针对方案设计的结果进行有效分析和评价；
 - (5) 使用现代工具：具备现代工具的使用能力，具备获取、理解与甄别各类信息的能力，能合理应用于复杂机械工程问题的解决，并能够理解其局限性；
 - (6) 工程与社会：具备查阅与运用机械工程专业领域相关方针、政策与法律法规能力，具备综合考虑社会、健康、安全、法律以及文化影响下的复杂机械工程问题的分析评价能力；
 - (7) 环境和可持续发展：理解和认识机械工程专业与社会发展、环境保护和社会可持续发展的关系，具备复杂机械工程问题的解决方案对环境和社会可持续发展影响的分析能力；
 - (8) 职业规范：具有良好的人文社会科学素养与责任感，能够在机械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：能够在团队中做好自己承担的角色，能与团队其他成员有效沟通，听取意见或建议并作出合理反应；
 - (10) 沟通：具备机械工程领域复杂工程问题的描述能力，具备与业界同行与社会公众有效沟通与交流的能力，并能跨文化沟通与交流；
 - (11) 项目管理：具备基本的项目管理能力，能采取有效的项目行动，持续改善工程实践，并能在多学科环境中应用；
 - (12) 终身学习：具有自主学习和探索科学问题的能力，具有终身学习和适应发展的能力。
1. Engineering knowledge: The graduates should master the mathematical and physical sciences, natural science and basic theory and professional knowledge of mechanical engineering, and solve the problem of complicated mechanical engineering;
 2. Problem analyses: The graduates should analyze and establish the mathematical physics model which can be applied to the problem of complicated mechanical engineering.
 3. Design/development solution: The graduates should understand the professional technical standards and norms of mechanical engineering, and know the frontier development status and trends of mechanical professional, and have the preliminary ability to research, design and development of machinery industry, new products, new technology, new equipment with innovative thinking;
 4. Research ability: The graduates should have preliminary ability of design, analysis and research of the complex mechanical engineering machinery, control, electrical, hydraulic, manufacturing process, and can give the effective analysis and evaluation;
 5. Using modern tools ability: The graduates should have the ability to use modern tools, to obtain, understand and identify all kinds of information, and to solve the problem of complex mechanical engineering;
 6. Engineering and social: The graduates should have the ability to access and use the related policy, policies, laws and regulations ability of mechanical engineering, with considering the

society, health, safety, law and culture influence under complex mechanical engineering problem analysis ability;

7. Environmental protection and sustainable development: The graduates should understand and aware the relationship between mechanical engineering professional and social development, environment protection and social sustainable development, and have the ability to analyze the impaction between environmental and social of the complex mechanical engineering solutions;
8. Professional norms: The graduates should have good quality of humanities and social sciences, strong sense of responsibility for society and proper engineering profession ethics;
9. Individuals and teams: The graduates should be able to do their own role in the team, to communicate effectively with other members of the team, to listen to opinions or suggestions and to make a reasonable response;
10. Communication: The graduates should have the ability to describe complex engineering problems in the field of mechanical engineering, with the ability to communicate effectively with the community and the public, and to cross cultural communication and exchange;
11. Project management: The graduates should have the basic project management skills, and be able to take effective project action, continuous improvement of engineering practice;
12. Learning Skills: The graduates should be able to adapt to social development and can study in a lifelong term.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 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、控制工程基础、测试技术、机电传动

控制、流体力学与液压传动、机械制造技术基础、数控技术、机械制造装备设计。

Core Courses: Theoretical Mechanics, Mechanics of Materials, Principle of Mechanics, Mechanical Design, Fundamental of Control Engineering, Measuring and Testing Technique, Transmission and Control of Electric Machine, Fluid Mechanics and Hydraulic Transmission, Foundation of Mechanical Manufacturing Technology, Numerical Control Technique, Machine Equipment Design.

(二) 专业特色课程:

学术论文写作、学术训练 I、II。

Characteristic Courses: Academic paper writing, Academic Training I,II.

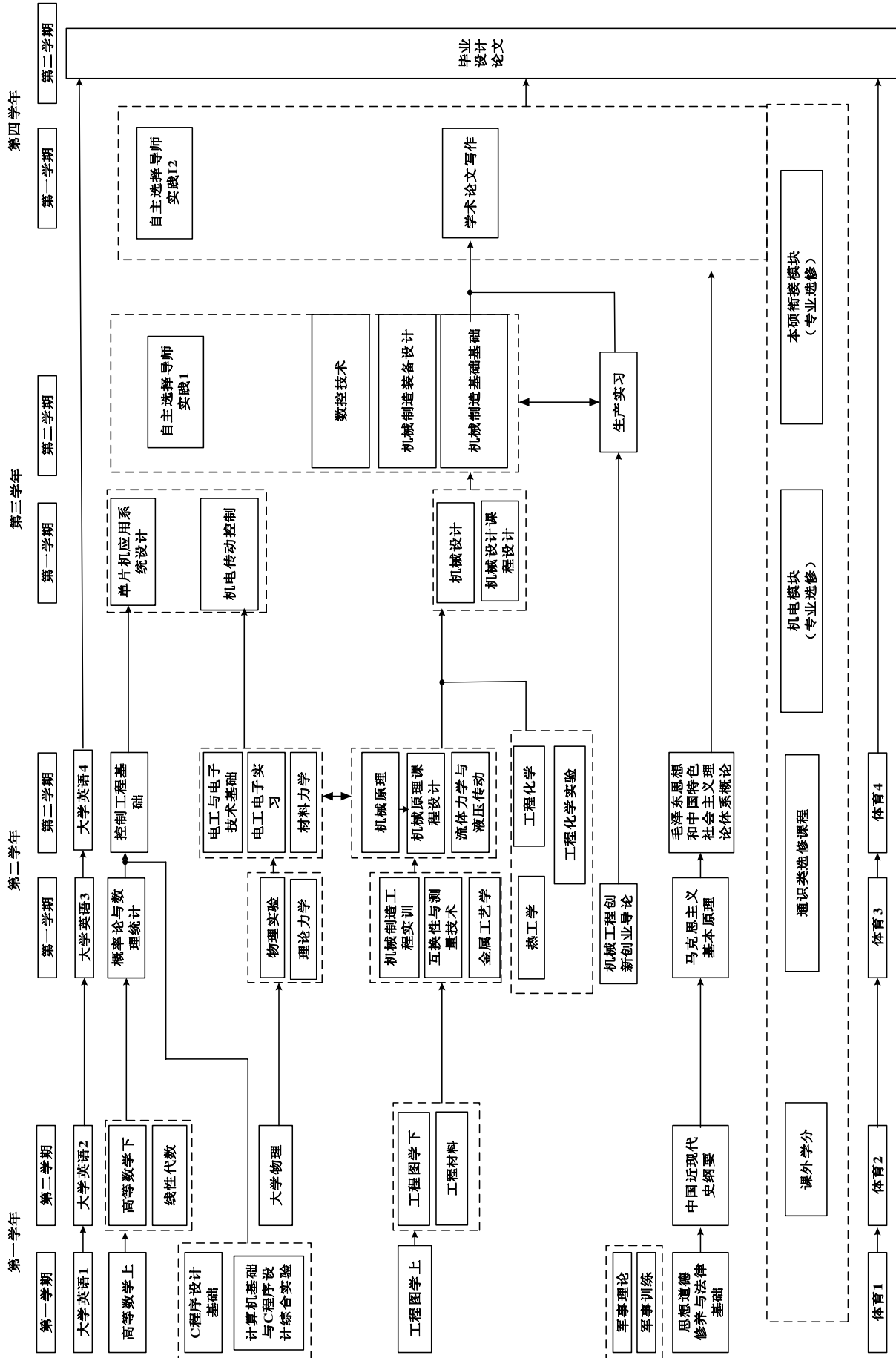
附: 毕业要求实现矩阵:

专业 核心 课程	专业 特色 课程	课程名称	机械工程专业(学硕班)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									√				
		毛泽东思想和中国特色社会 主义理论体系概论									√				√
		马克思主义基本原理									√				√
		军事理论										√			
		大学体育(1-4)									√	√			
		大学英语(1-4)											√		
		C 程序设计基础						√	√						
		计算机基础与 C 程序设计综 合实验		√		√									
		机械工程专业创新创业导论			√										√
		高等数学(上、下)		√		√									
		线性代数		√											
		概率论与数理统计		√											
		大学物理		√											
		物理实验		√											
		工程化学		√											
		工程化学实验		√											
		工程图学(上、下)	√		√										
		工程材料	√		√										
		学科通识选修课程									√				√

专业 核心 课程	专业 特色 课程	课程名称	机械工程专业（学硕班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		互换性与测量技术	√		√									
		机械制造工程实训			√						√			
		电工与电子技术基础	√	√										
		电工电子实习		√										
√		理论力学		√										
		金属工艺学			√	√								
√		机械原理	√	√										
		机械原理课程设计		√		√								
√		流体力学与液压传动	√	√										
√		材料力学	√	√										
√		机械设计	√		√									
		机械设计课程设计		√	√									√
		热工学	√											
√		控制工程基础	√	√										
√		单片机应用系统设计	√											
√		机电传动控制	√			√								
√		测试技术	√	√										
√		数控技术	√	√										
	√	学术训练 I、II				√		√	√				√	
√		机械制造技术基础		√		√								
		生产实习			√					√	√			√
		选课课程-机电模块				√		√						√
		选课课程-衔接拓展			√				√					√
		毕业设计（论文）				√	√	√				√	√	

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									
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1	
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					2	
4220003110	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		4	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003130	军事理论 Military Theory	1	32				16	1	
4210001170	体育 1 Physical Education I	1	26					1	
4210002170	体育 2 Physical Education II	1	34					2	
4210003170	体育 3 Physical Education III	1	34					3	
4210004170	体育 4 Physical Education IV	1	34					4	
4030002180	大学英语 1 College English 1	3	60				12	1	
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3
4120335170	C 程序设计基础 C Language Programming	2	32					1	
4120336170	计算机基础与 C 程序设计综合实验 Foundations of Computer and C Language Programming Experiments	1	32	32				1	
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, 在每个模块中均须至少选择一门, 其中艺术体育类课程中的艺术类相关课程要求取得至少 2 个学分。 All 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 every category.								
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									
4050229110	线性代数 Linear Algebra	2.5	40					1	
4050063110	高等数学 A 上 Advanced Mathematics 1	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics 2	5	80					2	
4080371170	工程图学 A 上 Engineering Graphics I	3	56				8	1	
4080372170	工程图学 A 下 Engineering Graphics II	2.5	56				16	2	
4080034110	工程材料 A Engineering Material	2.5	40	4				2	
4050463130	大学物理 B Physics	5	80					2	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4050058110	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	
4080367170	金属工艺学 B Engineering Material	2	32	2				3	
4080054110	互换性与测量技术 B Interchangeability and Measurement	2	32	4				3	
4050129110	理论力学 A Theoretical Mechanics	4.5	72					3	
4090330170	热工学 A Heat and Thermodynamics	2	32					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		
4200374170	工程化学 Engineering Chemistry	1.5	24					4	
4200375170	工程化学实验 Engineering Chemistry Experiment	0.5	16	16				4	
4080423170	控制工程基础 A Basis of Control Engineering	2	32	4				4	
4080424170	流体力学与液压传动 B Fluid Mechanics and Hydraulic	2	32	4				4	
4100012110	电工与电子技术基础 C Fundamentals of electrical and electronic technology	4	64	10				4	
4050018110	材料力学 C Mechanics of Materials	4	64	4				4	
4080062110	机械原理 Principle of Mechanics	3.5	56	4				4	
4080390170	机械设计 Mechanical Design	3.5	56	4				5	
4080428170	测试技术 C Measuring & Testing Technology	2	32	4				5	
4080338140	单片机应用系统设计 B Micro-Controller Unit Application System Design	3	48	6				5	
4080198110	机电传动控制 B Transmission and Control of Electric Machine	2	32	4				5	
4080064110	机械制造技术基础 A Fundamentals of Mechanical Manufacturing Technology	4	64	6				6	
4080425170	数控技术 B Numerical Control Techniques	2	32	2				6	
4080451170	学术论文写作 Academic paper writing	1	16	4				7	
小 计 Subtotal		75	1248	114	0	0	24		
(四) 专业教育选修课程 Specialized Elective Courses									
机电模块 (要求至少修读 6 学分,《机械制造装备设计》为必选课程。)									
4080202120	工业机器人 Industry Robot	2	32					5	
4080427170	传感器原理及应用 A Fundamentals & Application of Sensors	2	32	4				5	

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		
4080426170	机械制造装备设计 Machine Equipment Design	2	32					6	
4080088110	模具设计与制造 B Mould Design and Manufacture	2	32					7	
4080080110	精密加工与特种加工 Technology of Special Machining and Precision Machining	2	32					7	
4080058110	机械 CAD/CAM Machinery CAD/CAM	2	32		6			7	
衔接拓展 (要求修读至少 6 学分,《机械工程专业创新创业导论》为必修课程。)									
4080430170	机械工程专业创新创业导论 Introduction of Innovation and Entrepreneurship of Mechanical Engineering	1	16					3	
4080429170	计算机仿真 B Computer Simulation	2	32		4			5	
4080452170	计算机辅助产品分析 Computer aided product analysis	2	32					5	
4090164130	科技文献检索与写作 Science Literature retrieval and writing	1	16					6	
4050053110	复变函数与积分变换 C Complex function and integral transformation	2	32					7	
4120055110	人工智能概论 B Artificial Intelligent	2	32					7	
4120299140	JAVA 语言程序设计 D Java Programming Design	2.5	40		8			7	
小 计 Subtotal		24.5	392	4	18	0	0		
修读说明: 要求至少选修 12 学分。 NOTE: Minimum subtotal credits:12.									

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
1060002110	军事训练 Military Training	1.5	3	1
4080150110	机械制造工程实训 B Machinery Manufacturing Engineering Practice	4	4	3

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
4100069110	电工电子实习 B Practice in Electrical Engineering & Electronics	1	1	4
4080149110	机械原理课程设计 Curricula Design of Mechanical Principles	1.5	1.5	4
4080147110	机械设计课程设计 Course Practice of Machinery Design	3	3	5
4080434170	机械工程专业生产实习 Production Practice	2	2	6
4080453170	本硕学术训练 1 Academic Training I	7	7	6
4080454170	本硕学术训练 2 Academic Training II	5	10	7
4080437170	毕业设计 Graduation Design	10	17	8
小 计 Subtotal		35	48.5	

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：胡 剑
专业培养方案责任人：李益兵

机械工程专业（卓越工程师班）2017 版本本科培养方案

Undergraduate Education Plan for Specialty in Mechanical Engineering (Excellent Engineer Class) (2017)

专业名称	机械工程	主干学科	机械工程
Major	Mechanical Engineering	Major Disciplines	Mechanical Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Mechanical Engineering
所属大类	机械类（机电）	大类培养年限	1 年
Disciplinary	Mechanical(Electromechanical)	Mechanical Duration	1 year

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 Specialized 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 Required Courses		29	69	/	33	/	170
选修课 Elective Courses		9	20	/	/	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养掌握机械工程专业领域的基础理论、专业知识与实践技能，具有一定国际视野，能在机械设计、机械制造和机电控制等领域从事设计制造、研究开发、应用与管理等相关工作，成长为服务行业的“适应能力强、实干精神强、创新意识强”卓越工程技术人才。学生毕业 5 年后能够达到：

- (1) 具备机械工程领域内（特别是汽车、建材建工和通用机械）设计制造的基础理论和专门知识；
- (2) 有良好的职业素养和社会责任感，有意愿并有能力服务社会；
- (3) 能够在一个设计、生产或管理团队中担任技术骨干或组织管理角色；
- (4) 具有较强的持续学习与终身学习能力；
- (5) 能从事机械工程领域内的设计制造、研究开发、应用与管理等工作。

This major aims at training outstanding engineering specialists, which would have high adaptabilities, high practice spirit and strong innovation consciousness in the realms of the mechanical design, mechanical manufacturing and electromechanical control etc. They would have the basic theoretical and specialized knowledge, and practical skills, and they would specialize on mechanical design and manufacturing, research and development, application and management in these realms. 5 years after graduation, they would achieve the following knowledge and abilities:

1. Student should grasp the theoretical and specialized knowledge of mechanical engineering

- (particularly in automobile, building materials and general machinery);
2. They should have good professional qualities, the sense of social responsibility, and intent on serving the society;
 3. They would be team leaders or manager of design, manufacturing or management;
 4. They should have high capabilities of continuous learning and lifelong learning;
 5. They would engage in the design and manufacturing, research and development, application and management in mechanical realm.

(二) 毕业要求

- (1) 工程知识：掌握从事机械工程工作所需的数理学科、自然科学，以及机械工程基础理论和专业知识，并能综合应用于复杂机械工程问题的求解；
 - (2) 问题分析：能够应用数学、自然科学和机械工程科学的基本原理，并通过文献研究，识别、表达、分析复杂机械工程问题，以获得有效结论；
 - (3) 设计/开发解决方案：针对复杂工程问题，能够应用机械工程的基本理论和方法，设计满足特定需求的机械系统和制造工艺，开发解决方案，并能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：具备对复杂机械工程问题中的机械、控制、电气、液压、制造工艺等的技术方案进行设计、分析与研究的初步能力，并能针对方案设计的结果进行有效分析和评价；
 - (5) 使用现代工具：具备现代工具的使用能力，具备获取、理解与甄别各类信息的能力，能合理应用于复杂机械工程问题的解决，并能够理解其局限性；
 - (6) 工程与社会：具备查阅与运用机械工程专业领域相关方针、政策与法律法规能力，具备综合考虑社会、健康、安全、法律以及文化影响下的复杂机械工程问题的分析评价能力；
 - (7) 环境和可持续发展：理解和认识机械工程专业与社会发展、环境保护和社会可持续发展的关系，具备复杂机械工程问题的解决方案对环境和社会可持续发展影响的分析能力；
 - (8) 职业规范：具有良好的人文社会科学素养与责任感，能够在机械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：能够在团队中做好自己承担的角色，能与团队其他成员有效沟通，听取意见或建议并作出合理反应；
 - (10) 沟通：具备机械工程领域复杂工程问题的描述能力，具备与业界同行与社会公众有效沟通与交流的能力，并能跨文化沟通与交流；
 - (11) 项目管理：具备基本的项目管理能力，能采取有效的项目行动，持续改善工程实践，并能在多学科环境中应用；
 - (12) 终身学习：具有自主学习和探索科学问题的能力，具有终身学习和适应发展的能力。
1. Engineering knowledge: The graduates should master the mathematical and physical sciences, natural science and basic theory and professional knowledge of mechanical engineering, and solve the problem of complicated mechanical engineering;
 2. Problem analyses: The graduates should analyze and establish the mathematical physics model which can be applied to the problem of complicated mechanical engineering.
 3. Design/development solution: The graduates should understand the professional technical standards and norms of mechanical engineering, and know the frontier development status and trends of mechanical professional, and have the preliminary ability to research, design

and development of machinery industry, new products, new technology, new equipment with innovative thinking;

4. Research ability: The graduates should have preliminary ability of design, analysis and research of the complex mechanical engineering machinery, control, electrical, hydraulic, manufacturing process, and can give the effective analysis and evaluation;
5. Using modern tools ability: The graduates should have the ability to use modern tools, to obtain, understand and identify all kinds of information, and to solve the problem of complex mechanical engineering;
6. Engineering and social: The graduates should have the ability to access and use the related policy, policies, laws and regulations ability of mechanical engineering, with considering the society, health, safety, law and culture influence under complex mechanical engineering problem analysis ability;
7. Environmental protection and sustainable development: The graduates should understand and aware the relationship between mechanical engineering professional and social development, environment protection and social sustainable development, and have the ability to analyze the impact between environmental and social of the complex mechanical engineering solutions;
8. Professional norms: The graduates should have good quality of humanities and social sciences, strong sense of responsibility for society and proper engineering profession ethics;
9. Individuals and teams: The graduates should be able to do their own role in the team, to communicate effectively with other members of the team, to listen to opinions or suggestions and to make a reasonable response;
10. Communication: The graduates should have the ability to describe complex engineering problems in the field of mechanical engineering, with the ability to communicate effectively with the community and the public, and to cross cultural communication and exchange;
11. Project management: The graduates should have the basic project management skills, and be able to take effective project action, continuous improvement of engineering practice;
12. Learning Skills: The graduates should be able to adapt to social development and can study in a lifelong term.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 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			√		

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
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、控制工程基础、测试技术、机电传动控制、流体力学与液压传动、机械制造技术基础、数控技术、机械制造装备设计。

Core Courses: Theoretical Mechanics, Mechanics of Materials, Principle of Mechanics, Mechanical Design, Fundamental of Control Engineering, Measuring and Testing Technique, Transmission and Control of Electric Machine, Fluid Mechanics and Hydraulic Transmission, Foundation of Mechanical Manufacturing Technology, Numerical Control Technique, Machine Equipment Design.

(二) 专业特色课程:

企业自主选修课程、企业实践。

Characteristic Courses: Self-elective courses in Enterprise, Enterprise Practice.

附：毕业要求实现矩阵：

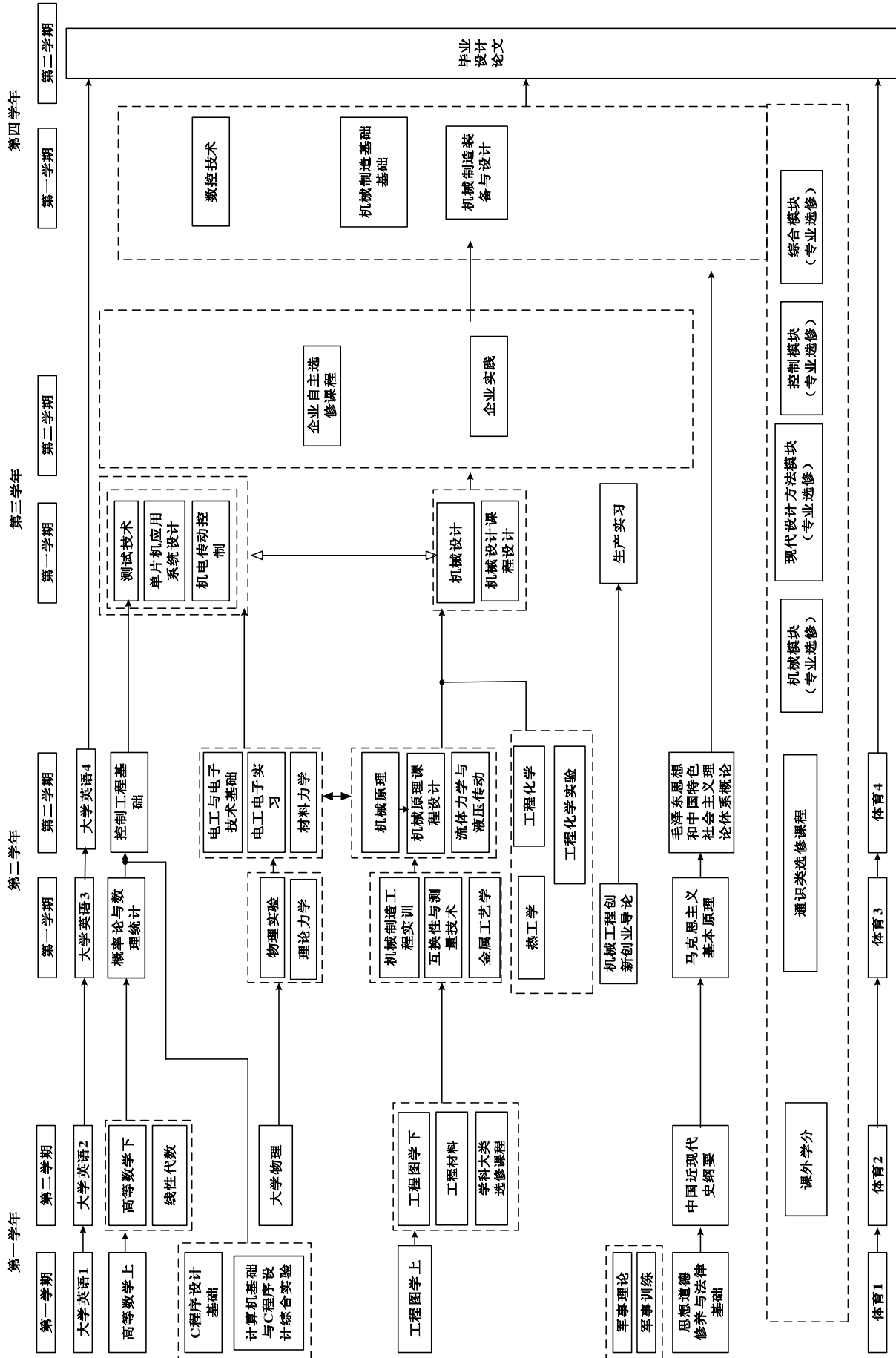
专业 核心 课程	专业 特色 课程	课程名称	机械工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础						√	√	√				
		中国近现代史纲要								√				
		毛泽东思想和中国特色社会主义理论体系概论								√				√
		马克思主义基本原理								√				√
		军事理论									√			
		大学体育（1-4）								√	√			
		大学英语（1-4）										√		
		C 程序设计基础					√	√						
		计算机基础与 C 程序设计综合实验		√		√								
		机械工程专业创新创业导论			√									√
		高等数学（上、下）		√		√								

专业 核心 课程	专业 特色 课程	课程名称	机械工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		线性代数		√										
		概率论与数理统计		√										
		大学物理		√										
		物理实验		√										
		工程化学		√										
		工程化学实验		√										
		工程图学（上、下）	√		√									
		工程材料	√		√									
		通识选修课程								√				√
		互换性与测量技术	√		√									
		机械制造工程实训			√						√			
		电工与电子技术基础	√	√										
		电工电子实习		√										
√		理论力学		√										
		金属工艺学			√	√								
√		机械原理	√	√										
		机械原理课程设计		√		√								
√		流体力学与液压传动	√	√										
√		材料力学	√	√										
√		机械设计	√		√									
		机械设计课程设计		√	√									√
		热工学	√											
√		控制工程基础	√	√										
		单片机应用系统设计	√											
√		机械制造技术基础		√		√								

专业 核心 课程	专业 特色 课程	课程名称	机械工程专业（卓越工程师班）毕业要求												
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
	√	企业自主选修课程									√	√	√		
	√	企业实践		√	√	√									
√		机电传动控制	√			√									
√		测试技术	√	√											
		生产实习			√						√	√			√
√		数控技术	√	√											
√		机械制造装备与设计	√												
		选课课程-控制模块				√									√
		选课课程-机械模块				√		√							√
		选课课程-现代方法应用模块					√						√		
		选课课程-综合模块			√				√						√
		毕业设计（论文）				√	√	√				√	√		

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									
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1	
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					2	
4220003110	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		4	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003130	军事理论 Military Theory	1	32				16	1	
4210001170	体育 1 Physical Education I	1	26					1	
4210002170	体育 2 Physical Education II	1	34					2	
4210003170	体育 3 Physical Education III	1	34					3	
4210004170	体育 4 Physical Education IV	1	34					4	
4030002180	大学英语 1 College English I	3	60				12	1	
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3
4120335170	C 程序设计基础 C Language Programming	2	32					1	
4120336170	计算机基础与 C 程序设计综合实验 Foundations of Computer and C Language Programming Experiments	1	32	32				1	
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，在每个模块中均须至少选择一门，其中艺术体育类中必须选修艺术类相关课程并取得至少2学分。 All students are required to obtain at least 9 credits, and must select at least one course from every module.
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									
4050063110	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics II	5	80					2	
4050229110	线性代数 Linear Algebra	2.5	40					1	
4080371170	工程图学 A 上 Engineering Graphics I	3	56				8	1	
4080372170	工程图学 A 下 Engineering Graphics II	2.5	56				16	2	
4050463130	大学物理 B Physics	5	80					2	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4200375170	工程化学实验 Engineering Chemistry Experiment	0.5	16	16				4	
4050058110	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	
4100012110	电工与电子技术基础 C Fundamentals of electrical and electronic technology	4	64	10				4	
4080034110	工程材料 A Engineering Material	2.5	40	4				2	
4080367170	金属工艺学 B Engineering Material	2	32	2				3	
4080054110	互换性与测量技术 B Interchangeability and Measurement	2	32	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		
4050129110	理论力学 A Theoretical Mechanics	4.5	72					3	
4050018110	材料力学 C Mechanics of Materials	4	64	4				4	
4080062110	机械原理 Principle of Mechanics	3.5	56	4				4	
4080338140	单片机应用系统设计 B Micro-Controller Unit Application System Design	3	48	6				5	
4080423170	控制工程基础 A Basis of Control Engineering	2	32	4				4	
4090330170	热工学 A Heat and Thermodynamics	2	32					3	
4080064110	机械制造技术基础 A Fundamentals of Mechanical Manufacturing Technology A	4	64	6				7	
4080425170	数控技术 B Numerical Control Technique	2	32	2				7	
4080424170	流体力学与液压传动 B Fluid Mechanics and Hydraulic	2	32	4				4	
4080455170	企业自主选修课程 Self-elective Courses in Enterprises	4	64					6	
小 计 Subtotal		69	1152	98	0	0	24		
(四) 专业教育选修课程 Specialized Elective Courses									
机械模块 (机械设计、机械制造装备设计为必选课程, 其他 3 选 1)									
4080390170	机械设计 Mechanical Designing	3.5	56	4				5	
4080426170	机械制造装备设计 Machine Equipment Design	2	32					7	
4080202120	工业机器人 Industry Robot	2	32					5	
4080088110	模具设计与制造 B Mould Design and Manufacture	2	32					7	
4080080110	精密加工与特种加工 Technology of Special Machining and Precision Machining	2	32					7	
控制模块 (机电传动控制为必选课程, 其他 3 选 1)									

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		
4080198110	机电传动控制 B Transmission and Control of Electric Machine	2	32	4				5	
4080427170	传感器原理及应用 A Fundamentals & Application of Sensors	2	32	4				5	
4120067110	物联网工程概论 Internet of Things	2	32					7	
4080083110	可编程控制器原理及应用 B Fundamentals & Application of Programmable Logic Controller	2	32	4				7	
现代方法应用 (测试技术为必选课程, 其他 3 选 1)									
4080428170	测试技术 C Measuring & Testing Technology	2	32	4				5	
4080429170	计算机仿真 B Computer Simulation	2	32		4			5	
4080110110	现代设计技术 Modern Design Technology	2	32					5	
4080058110	机械 CAD/CAM Machinery CAD/CAM	2	32		6			7	
综合模块 (机械工程专业创新创业导论、工程化学为必选课程, 其他 3 选 1)									
4080430170	机械工程专业创新创业导论 Introduction of Innovation and Entrepreneurship of Mechanical Engineering	1	16					3	
4200374170	工程化学 Engineering Chemistry	1.5	24					4	
4080057110	机电一体化系统设计 B Mechatronics System Design	2	32					7	
4080048110	工艺过程自动化 Process Automation	2	32					7	
4170075110	技术经济及企业管理 A Economic Theory and Enterprise Management	2	32					7	
小 计 Subtotal		26.5	424	16	10	0	0		
修读说明: 要求至少选修 20 学分。 NOTE: Minimum subtotal credits:20.									

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 Crts	周数 Weeks	建议修读学期 Suggested Term
1060002110	军事训练 Military Training	1.5	3	1
4080150110	机械制造工程实训 B Machinery Manufacturing Engineering Practice B	4	4	3
4100069110	电工电子实习 B Practice in Electrical Engineering & Electronics B	1	1	4
4080149110	机械原理课程设计 Curricula Design of Mechanical Principles	1.5	1.5	4
4080147110	机械设计课程设计 Course Practice of Machinery Design	3	3	5
4080434170	机械工程专业生产实习 Production Practice	2	2	5
4080356140	企业实践 Enterprise Practice	10	20	6
4080437170	毕业设计 Graduation Design	10	17	8
小 计 Subtotal		33	51.5	

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：胡 剑
专业培养方案责任人：李益兵

过程装备与控制工程专业（卓越工程师班）

2017 版本本科培养方案

Undergraduate Education Plan for Specialty in Industrial Equipment and Control Engineering(Excellent Engineer Class) (2017)

专业名称	过程装备与控制工程	主干学科	机械工程
Major	Industrial Equipment and Control Engineering	Major Disciplines	Mechanical Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering
所属大类	机械类（机电）	大类培养年限	1 年
Disciplinary	Mechanical	Duration	1 year

最低毕业学分规定

Graduation Credit Criteria

课程分类 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized 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 Required Courses	29	65	\	31	\	170
选修课 Elective Courses	9	20	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养掌握过程控制技术与装备设计领域的基础理论、专业知识、基本方法和实践技能，具有一定国际视野和较强的工程实践能力，能够在建材、机械与汽车等行业从事过程控制与装备设计、制造和工程项目管理工作的应用型高级技术人才。

- (1) 既具备扎实的机械工程技术基础，又掌握现代过程控制装备与控制工程系统科学的理论和方法，能够综合运用自然科学、机械工程与现代过程控制的方法与技术，对过程工业系统进行规划、设计、控制、持续改善与创新；
- (2) 具有现代科学创新意识、国际化交流与竞争意识、人文科学素养、职业道德和社会责任感；
- (3) 具有良好的科学文化素质、知识更新能力、创新思维能力，能在生产和服务领域从事技术和管理的应用研究型复合人才。

The professional training to master process control technology and equipment design in the field of basic theory, professional knowledge, basic methods and practical skills, with international perspective and strong engineering practice ability, in building materials, machinery and automobile industries engaged in process control and equipment research, design, production, as well as application of process engineering and

project management. The objective of cultivating talents includes the following three parts:

1. Both have a solid foundation in mechanical engineering technique, and with process equipment and control engineering system scientific theory and method of modern process control, to make comprehensive use of the technique and method of natural science, mechanical engineering and modern process control, and to make comprehensive use of the technique and method of natural science, mechanical engineering and modern process control, planning, design, control, continuous improvement and innovation of process industry system;
2. With modern science and innovation consciousness, international exchanges and competition consciousness, humanistic and scientific literacy, occupation ethics and social responsibility;
3. With good quality of science and culture, knowledge renewal ability, creative thinking ability, which can be engaged in applied research talents of technology and management in the field of production and services.

(二) 毕业要求

- (1) 较好的人文社会科学素养、较强的社会责任感和良好的工程职业道德;
 - (2) 从事工程工作所需的相关数理学科基础和电气控制基础;
 - (3) 掌握扎实的过程装备与控制工程专业基本理论知识和专业基础知识,具有系统的过程工业系统实践训练,了解本专业的前沿发展现状和趋势;
 - (4) 综合运用自然科学、机械工程与现代过程控制的方法与技术,对过程工业系统进行规划、设计、控制、持续改善与创新,并具备相应的实验技能;
 - (5) 具备创新意识和对过程工业新产品、新设备进行研究、开发和设计的初步能力,初步具有本专业过程装备设计开发能力和初步的工程项目实施的能力;
 - (6) 掌握文献检索、资料查询及运用现代信息技术获取相关信息的基本方法,能通过互联网、期刊资料等渠道了解相关的器件、产品、系统及技术的进展与前沿,能有效地运用各种资源找到解决具体的过控专业技术问题的方法;
 - (7) 了解国家有关过控专业相关的职业和行业的生产、设计、研究与开发的法律、法规以及有关环境保护和可持续发展等方面的方针、政策和法律、法规,正确认识工程实际对客观世界和社会的影响,把握国内外相关的标准、规范和技术变化;
 - (8) 经历过过控系统的设计、运行和维护或解决实际工程问题的系统化训练;
 - (9) 具有适应社会发展能力以及终身学习能力;
 - (10) 具有国际视野和跨文化交流、竞争与合作能力。
1. Good sense of humanities and social science literacy, strong social responsibility better and owns good engineering occupation moral
 2. Required in the engineering work related mathematical discipline foundation and basic knowledge of electrical control;
 3. Grasp of the major of process equipment and control engineering basic theory knowledge and professional basic knowledge, practical training system in process industry with system, understand the latest development status and trend of the professional;
 4. Adopt technical methods and techniques of natural science, mechanical engineering and modern process control, planning, design, control, continuous improvement and innovation of process industry system, as well as corresponding Experimental skills;
 5. (Have the sense of innovation and the process of industrial new products, new equipment research, development and design of the preliminary ability, initially with the professional process equipment design & development capability and with the basic ability of practical project implementation;
 6. Master the basic methods of literature search, data query and use of modern information technology to

obtain relevant information, can through the Internet, journal data channels understand the devices, products, systems and technologies related to the progress and frontier, effective use of various resources to find solutions to problems of specific process control major;

7. Understand the relevant national laws on control engineering related occupation and industry production, design, research and development, regulations and relevant environmental protection and sustainable development and other aspects of the guidelines, policies and laws and regulations, the correct understanding of the objective world and the actual effect of engineering society, grasp the standards, norms and technical changes associated with both at home and abroad;
8. With the experience systematic training of the design, running and maintenance of measurement and control system or solving practical engineering problem;
9. Adapt to the social development ability and the ability of lifelong learning.
10. With international vision and cross cultural communication, competition and cooperation ability.

附：培养目标实现矩阵

	目标 1	目标 2	目标 3
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	√		

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:

工程力学、机械原理、机械设计、机械制造技术基础、流体力学与流体机械、过程原理与设备、工业装备成套技术

Engineering Mechanics, Principle of Mechanics, Mechanical Design, Fundamentals of Mechanical Manufacturing Technology, Fluid Mechanics and Fluid Machinery, Process Principles and Equipment Engineering, Complete Sets of Process Equipment Technology

(二) 专业特色课程:

过程控制技术、过程检测技术、粉体力学与设备、建材设备设计

Process Control Engineering, Process Measuring & Testing Technology, Powder Mechanics and Equipment, Design of Building Materials Equipment

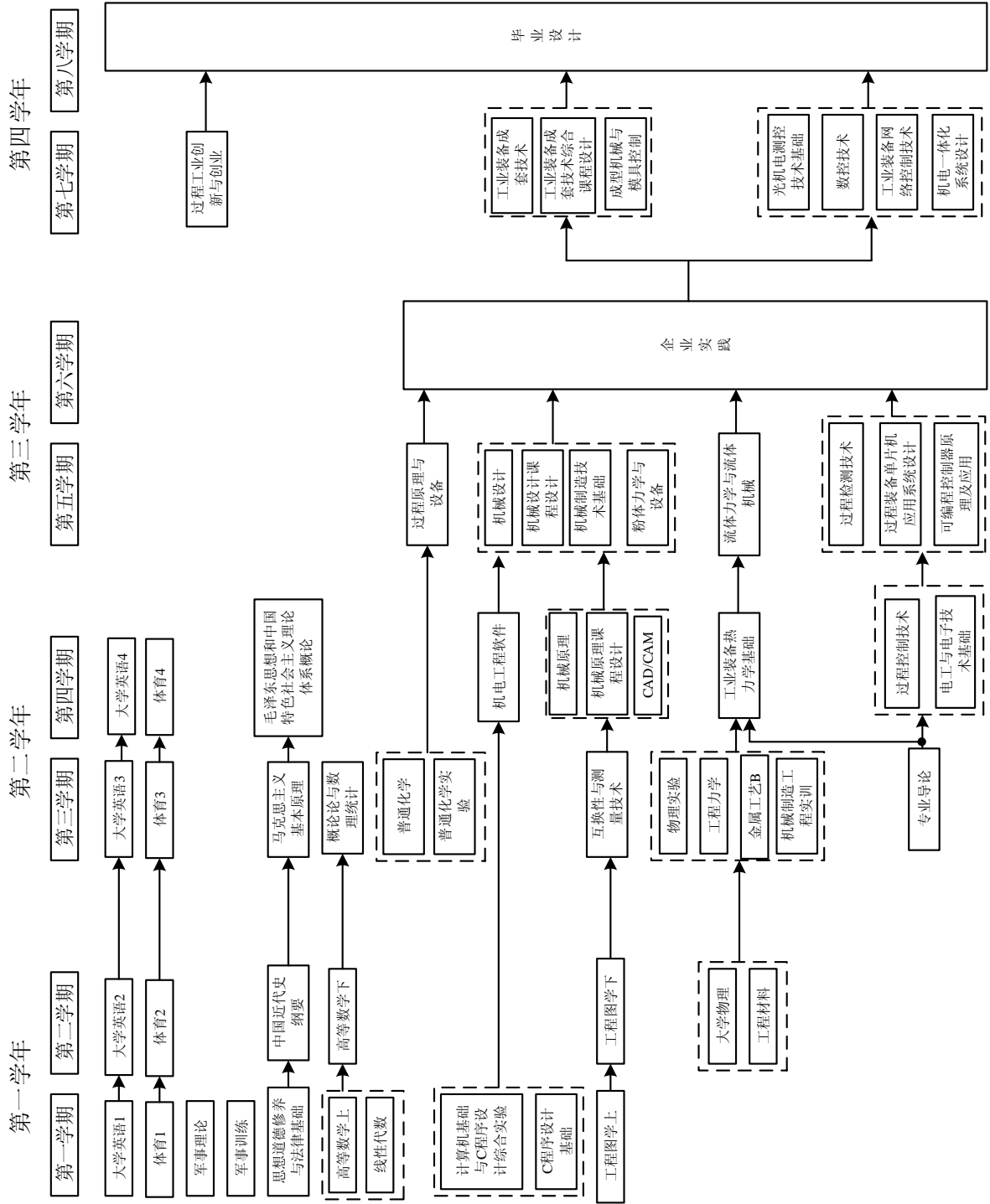
附：毕业要求实现矩阵:

专业 核心 课程	专业 特色 课程	课程名称	过程装备与控制工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
		思想道德修养与法律基础	√							√				
		中国近现代史纲要	√											
		毛泽东思想和中国特色社会主义理论体系概论	√											
		马克思主义基本原理	√											
		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				√			√					
		专业导论			√					√	√			
		工程材料				√	√							
		高等数学上		√		√								
		高等数学下		√		√								
		工程图学上			√									
		工程图学下			√									
		线性代数		√		√								
		大学物理		√		√								
		物理实验		√		√								
		概率论与数理统计		√		√								
√		工程力学		√										
		电工与电子技术基础		√		√								
		普通化学			√									
		普通化学实验			√									
		互换性与测量技术			√									
		金属工艺学			√									
		材料力学		√		√								
		工业装备热力学基础			√	√								
	√	过程控制技术			√	√								
	√	过程检测技术			√	√								
√		机械原理						√						
√		机械设计						√						

专业 核心 课程	专业 特色 课程	课程名称	过程装备与控制工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
		过程装备单片机应用系统设计					√							
√		流体力学与流体机械			√	√								
√		机械制造技术基础				√	√							
√		过程原理与设备			√		√							
	√	粉体力学与设备				√	√							
√		工业装备成套技术				√	√							
	√	建材装备设计			√	√					√			
		CAD/CAM					√		√					
		机电工程软件					√		√					
		可编程控制器原理及应用					√		√					
		机电传动控制					√		√					
		光机电测控技术基础					√		√					
		机电一体化系统设计				√					√			
		成型机械与模具设计				√	√							
		数控技术				√	√							
		工业装备网络控制技术				√	√							
		机械振动与噪声控制				√	√							
		微机电系统应用技术			√	√								
		过程工业创新与创业					√					√	√	
		军事训练	√											
		机械制造工程实训				√					√			
		机械原理课程设计				√					√			
		组态编程开发与应用课程设计				√					√			
		机械设计课程设计				√					√			
		企业实践			√							√		
		工业装备成套技术综合课程设计			√						√			
		毕业设计				√						√	√	

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									
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1	
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					2	
4220003110	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		4	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003130	军事理论 Military Theory	1	32				16	1	
4210001170	体育 1 Physical Education I	1	26					1	
4210002170	体育 2 Physical Education II	1	34					2	
4210003170	体育 3 Physical Education III	1	34					3	
4210004170	体育 4 Physical Education IV	1	34					4	
4030002180	大学英语 1 College English I	3	60				12	1	
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3
4120335170	C 程序设计基础 C Language Programming	2	32					1	
4120336170	计算机基础与 C 程序设计综合实验 Foundations of Computer and C Language Programming Experiments	1	32	32				1	
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	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	2.5	40					1	要求每个学生至少选修与本专业教学计划内容非相关的课程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									
4050229110	线性代数 Linear Algebra	2.5	40					1	
4050063110	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics II	5	80					2	高等数学上
4080371170	工程图学 A 上 Engineering Graphics I	3	56				8	1	
4080372170	工程图学 A 下 Engineering Graphics II	2.5	56				16	2	工程图学上
4080034110	工程材料 A Engineering Material	2.5	40	4				2	
4050463130	大学物理 B Physics	5	80					2	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4200371170	普通化学 C General Chemistry	2	32					3	
4200372170	普通化学实验 C General Chemistry Lab.	0.5	16	16				3	
4080389170	专业导论 Introduction to Specialty	1	16					3	
4050058110	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	
4080367170	金属工艺学 B Metallurgical Technology	2	32	2				3	
4050072110	工程力学 B Engineering Mechanics	4	64					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		
4080054110	互换性与测量技术 B Interchangeability and Measurement	2	32	4				3	
4100012110	电工与电子技术基础 C Fundamentals of Electrical Technology & Electrical Engineering	4	64	10				4	
4080102110	工业装备热力学基础 Industrial Equipment Thermal Theory	2	32					4	
4080062110	机械原理 Principle of Mechanics	3.5	56	4				4	
4080390170	机械设计 Mechanical Designing	3.5	56	4				5	
4080391170	过程原理与设备 C Process Principles and Equipment	2.5	40	6				5	
4080086110	流体力学与流体机械 Fluid Mechanics and Fluid Machines	2.5	40	2				5	
4080393170	机械制造技术基础 D Fundamentals of Mechanical Manufacturing Technology	2.5	40	6				5	
4080394170	工业装备成套技术 B Complete Sets of Process Equipment Technology	2.5	40					7	
4080395170	过程工业创新与创业 Process Indusry Innovation and Entrepreneurship	1	16	6				7	
小 计 Subtotal		65	1088	96	0	0	24		
(四) 专业教育选修课程 Specialized Elective Courses									
4080206120	过程控制技术 Process Control Engineering	2.5	40	4				4	
4080199120	CAD/CAM(B) CAD/CAM	2.5	40		10			4	
4080208120	机电工程软件 Engineering Software of Electric Machine	2.5	40		12			4	
4080205120	过程检测技术 Process Measuring & Testing Technology	2.5	40	4				5	
4080399170	粉体力学与设备 B Powder Mechanics and Power Machines	2.5	40	4				5	
4080396170	过程装备单片机应用系统设计 B Design of Single-Chip Computer Application System for Industrial Equipment	2.5	40	6				5	
4080082110	可编程控制器原理及应用 A Fundamentals & Application of Programmable Controllers	2.5	40	6				5	

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		
4080213120	液压传动与控制 B Hydraulic Transmission and Control	2.5	40	2				7	
4080397170	建材装备设计 B Designs of Building Materials Equipment	2.5	40					7	
4080237110	工业装备网络控制技术 Networks Control Technology of Industry Equipments	2.5	40	4				7	
4080055110	机电传动控制 A Transmission and Control of Electric Machine	2.5	40	4				7	
4080098110	数控技术 A Numerical Control Technique	2.5	40	4				7	
4080217120	机电一体化系统设计 A Mechatronics System Design	2.5	40					7	
4080200120	成型机械与模具设计 B Tool and Mould Design	2.5	40					7	
小 计 Subtotal		35	560	38	22	0	0		
修读说明：要求至少选修 20 学分。 NOTE: Minimum subtotal credits:20.									
(五) 个性课程 Personalized Elective Courses									
4080290130	微机电系统应用技术 Application Technology of Micro Electro Mechanical System	2	32					7	
4080400170	机械振动与噪声控制 Control of Mechanical Vibration and Noise	2	32					7	
4080401170	光机电测控技术基础 B Measurement Technology of Ray and Electro-mechanics	2	32					7	
小 计 Subtotal		6	96	0	0	0	0		
修读说明：学生可跨专业自主选择修读全校其他专业的课程，要求至少选修 6 学分。 NOTE: Students can choose any courses from the other specialties. Minimum subtotal credits: 6.									

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
1060002110	军事训练 Military Training	1.5	3	1
4080149110	机械原理课程设计 Curricula Design of Mechanical Principles	1.5	1.5	4

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
4080147110	机械设计课程设计 Course Practice of Machinery Design	3	3	5
4080322140	组态编程开发与应用课程设计 Curricula Design of Configuration Programming Development and Practice	2	2	5
4080357140	企业实践 Enterprise Practice	10	20	6
4080141110	工业装备成套技术综合课程设计 A Curricula Design of Complete Sets of Process Equipment Technology	3	3	7
4080403170	毕业设计 Graduation Design	10	17	8
小 计 Subtotal		31	49.5	

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：胡 剑
专业培养方案责任人：胥 军、叶 涛

测控技术与仪器专业（卓越工程师班）2017 版本本科培养方案

Undergraduate Education Plan for Specialty in Measuring & Control Technology and Instrument (Excellent Engineer Class) (2017)

专业名称	测控技术与仪器	主干学科	仪器科学与技术
Major	Measuring&Control Technology and Instrument	Major Disciplines	Instrument Science and Technology
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Mechanical Engineering

最低毕业学分规定

Graduation Credit Criteria

课程类 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized Courses	个性课程 Personalized Course	集中性实践 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses	29	65.5	\	35.5	\	170
选修课 Elective Courses	9	15	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养能够适应国家经济、科技、行业、社会发展对高素质工程技术人才的要求，掌握测控技术与仪器领域的基础理论、专业知识、基本方法和实践技能，具有较强的工程能力和创新创业意识，良好的团队合作精神和较宽的国际化视野，能够在机械与汽车、电子与信息等行业从事测控仪器与系统研究、设计、应用和生产管理工作的工程师。

学生毕业 5 年左右能达到：

- (1) 有良好的职业素养和社会责任感，有意愿并有能力服务社会；
- (2) 能够独立从事测量与控制技术研究、测控仪器与系统设计开发及应用、质量监控、技术保障等工作；
- (3) 能够在一个设计、生产或科研团队中担任技术骨干或组织管理角色；
- (4) 能够通过继续教育或其它学习渠道更新知识，实现能力和技术水平的提升。

The aim is to train engineer who can adapt to the requirements for high-quality engineering and technical talents by the development of the national economy, science technology, industry and society; master basic theory and professional knowledge, basic specialty methods and practical skills; ownstrong engineering capabilities , entrepreneurial and innovative consciousness, good teamwork spirit ,and a certain international vision;be able to engaged in measurement and control instrument and system research, design, application and production management in the field of machinery and automobile, electronics and information industries.

Graduate should achieve following levels after five years:

1. Have good professional qualities and sense of social responsibility, willing and able to serve society.
2. Have the ability to engage independently in the study of measurement and control technology, the designation, development and application of measurement and control instruments and system, quality control, technical support, etc.
3. Have the ability of being a technical backbone or organization manager in a designing, producing or researching group.
4. Being able to improve abilities and skills by updating knowledge through further-education or other way of study.

(二) 毕业要求

- (1) 工程知识：能够将数学、自然科学、工程基础和测控技术与仪器专业知识用于解决机械电子领域测控系统的复杂工程问题。
 - (2) 问题分析：能够应用数学、自然科学和测控技术与仪器系统的基本原理，结合对科技文献研究的结果，识别、表达、分析机械电子领域测控系统的复杂工程问题，以获得有效结论。
 - (3) 设计/开发解决方案：能够设计针对机械电子领域复杂测控系统工程问题的解决方案，设计满足特定需求的测控系统、测控单元（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：能够基于自然科学基本原理和测控专业基础知识，采用科学方法对机械电子领域测控系统的复杂工程问题进行研究，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：能够针对机械电子领域测控系统的复杂工程问题，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进行建模、数值模拟和分析，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。
1. Engineering knowledge: have the ability of applying mathematics, natural science and engineering foundation and professional knowledge to solve the engineering problem of complex measurement and control system in machinery and electronics field.
 2. Problem analyses: have the ability of identification, expression and analysis engineering problem of complex measurement and control system in machinery and electronics field

through literature research.

3. Design/development solution: Have the ability of development solutions for complex measurement and control system engineering problem in machinery and electronics field, designing the measurement and control system, measurement and control unit (parts), or process to meet the specific needs, and can reflect innovation consciousness in the design process, consider the social, health, safety, legal, cultural and environmental factors.
4. Research ability: have the ability of basing on natural science knowledge and Measurement and control professional knowledge, using scientific methods to study the engineering problem of complex measurement and control system in machinery and electronics field, to design experiments, analyze and interpret data, and get the conclusion of reasonable and effective through comprehensive information.
5. Using modern tools ability: have the ability of development, selection and use appropriate technology, resources, modern engineering tools and information technology tools to solve engineering problem of complex measurement and control system in machinery and electronics field, including modeling, numerical simulation and analyses, and to understand the limitations.
6. Engineering and social: have the ability of carrying on the reasonable analysis based on the engineering background knowledge, evaluating impact of the professional engineering practice and complex engineering problems solutions to social, health, safety, legal and culture, and understand the responsibility.
7. Environmental protection and sustainable development: have the ability of understanding and evaluating impact of engineering practice to environmental protection and social sustainable development.
8. Professional norms: with the humanities and social science literacy, social responsibility, can understand and comply with engineering practice in engineering ethics and norms, fulfill their responsibilities.
9. Individuals and teams: have the ability of taking the role of individuals, team members, and the person in charge in a multidisciplinary context.
10. Communication: have the ability of communicating effectively with industry peers and the public for complex engineering problems, including writing a report and presentation, statement, clear expression or to respond to commands. And have certain international vision, can make communication and exchange in the cross-cultural context.
11. Project management: understand and master the principles of engineering management and economic decision-making methods, and can be applied in a multidisciplinary environment.
12. Lifelong learning: have a sense of autonomous learning and lifelong learning, and be able to learn and adapt to the development.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4
毕业要求 1		√		
毕业要求 2		√		
毕业要求 3		√		

	培养目标 1	培养目标 2	培养目标 3	培养目标 4
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:

测试信号分析与处理、误差理论与数据处理、精密机械设计、测控仪器电子技术基础(I、II)、仪器仪表电路、测控系统微处理器原理及应用、传感器原理及应用、控制工程基础、仪器光学基础。

Signal Analysis and Processing, Error Theory and Data Processing, Precision Mechanism Design, Basic Electronic Technology of Measure and Control Instrument(I、II), Instrument Circuit, Microcontroller Principle and Its Application of Measure and Control System, Principle and Application of Sensors, Fundamentals of Control Engineering, Fundamentals of Optical Instrument.

(二) 专业特色课程:

测控系统微处理器原理及应用、传感器原理及应用、现代仪器设计、光纤传感器、无损检测技术、可编程控制器原理及应用。

Microcontroller Principle and Its Application of Measure and Control System, Principle and Application of Sensors, Modern Instrument Design, Optical Fiber Sensor, Nondestructive Testing Technique, Fundamentals & Application of Programmable Logic Controller.

附：毕业要求实现矩阵：

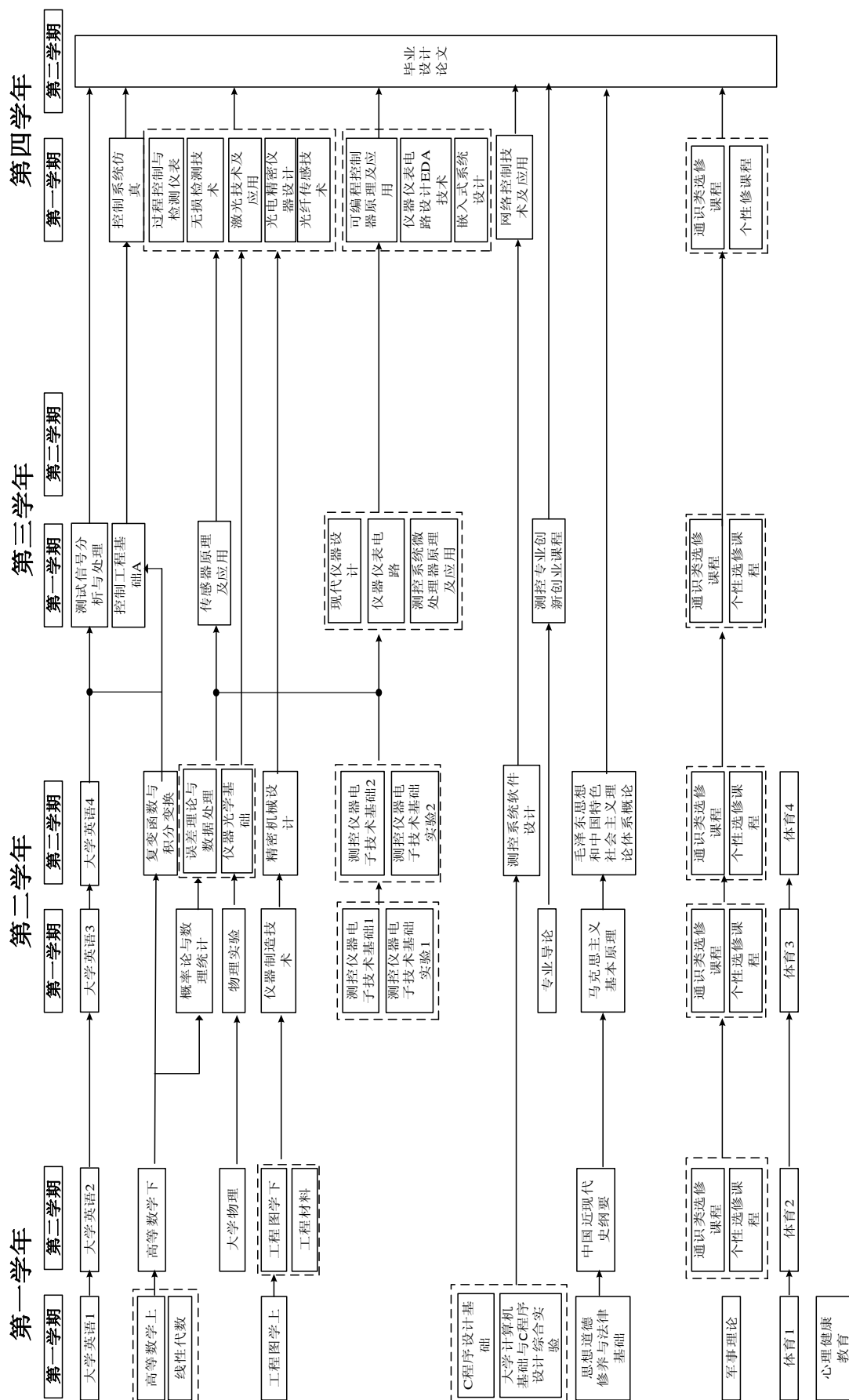
专业 核心 课程	专业 特色 课程	课程名称	测控技术与仪器专业（卓越工程师班）毕业要求												
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
		思想道德修养与法律基础									√				
		中国近现代史纲要									√				
		毛泽东思想和中国特色社会主义理论体系概论									√				
		马克思主义基本原理									√				
		军事理论									√				
		体育									√				

专业 核心 课程	专业 特色 课程	课程名称	测控技术与仪器专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		大学英语									√	√		
		C 程序设计基础	√				√							
		大学计算机基础与C程序设计综合实验					√							
		心理健康教育								√				
		创新创业类课程			√			√	√	√				
		经济管理类课程						√	√	√	√			
		专业导论						√	√	√				
		高等数学	√											
		线性代数	√											
		概率论与数理统计	√											
		复变函数与积分变换	√											
		大学物理	√											
		物理实验				√								
		工程材料		√				√	√					
		工程图学	√	√	√									
√		测控仪器电子技术基础（I、II）	√		√									
		测控仪器电子技术基础实验课（I、II）				√								
√		仪器光学基础	√	√										
√		测试信号分析与处理	√	√		√						√		
√		精密机械设计	√	√										
√		仪器仪表电路	√	√	√									
√		控制工程基础	√	√			√							
√		误差理论与数据处理	√			√								
√	√	测控系统微处理器原理及应用	√			√	√							
√	√	传感器原理及应用	√	√										
		测控技术创新创业方法		√	√			√	√	√				
	√	现代仪器设计	√	√				√						
		仪器制造技术			√			√					√	

专业 核心 课程	专业 特色 课程	课程名称	测控技术与仪器专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		测控系统软件设计					√							
		仪器仪表电路设计 EDA 技术			√	√								
		控制系统仿真	√			√	√							
	√	光纤传感技术	√	√										
	√	可编程控制器原理及应用		√	√									
	√	嵌入式系统设计			√		√							
		过程控制与检测仪表	√	√										
		激光技术及应用		√										
	√	无损检测技术					√	√	√					
		网络控制技术及应用			√	√								
		光电精密仪器设计		√	√			√	√					
		军事训练								√				
		机械工程实训			√		√						√	
		测控系统微处理器应用课程 设计		√	√	√	√							
		传感器及其应用电路课程 设计			√	√	√						√	
		企业实践		√	√	√	√	√	√	√	√	√	√	√
		仪器仪表机构零件及工艺课 程设计			√			√		√				
		测控系统综合课程设计			√	√	√		√		√	√	√	
		毕业设计		√	√	√	√	√	√		√	√	√	√

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 Crts	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									
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1	
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					2	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
4220003110	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		4	
1060003130	军事理论 Military Theory	1	32				16	1	
4210001170	体育 1 Physical Education I	1	26					1	
4210002170	体育 2 Physical Education II	1	34					2	
4210003170	体育 3 Physical Education III	1	34					3	
4210004170	体育 4 Physical Education IV	1	34					4	
4030002180	大学英语 1 College English I	3	60				12	1	
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3
4120335170	C 程序设计基础 C Language Programming	2	32					1	
4120336170	计算机基础与 C 程序设计综合实验 Foundations of Computer and C Language Programming Experiments	1	32	32				1	
小 计 Subtotal		29	640	32	0	48	64		

课程编号 Course Number	课程名称 Course Title	学分 Crts	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			要求每个学生至少选修与本专业教学计划内容非相关的课程 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									
4050063110	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics II	5	80					2	高等数学上
4050229110	线性代数 Linear Algebra	2.5	40					1	
4080371170	工程图学 A 上 Engineering Graphics I	3	56				8	1	
4080372170	工程图学 A 下 Engineering Graphics II	2.5	56				16	2	工程图学上
4050463130	大学物理 B Physics	5	80					2	
4080034110	工程材料 A Engineering Material	2.5	40	4				2	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4080332150	专业导论 Introduction to Specialty	1	16					3	
4050058110	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	
4080404170	测控仪器电子技术基础 1 Basic Electronic Technology of Measure & Control Instrument I	4	64					3	大学物理
4080406170	测控仪器电子技术基础实验 1 Experiments of Basic Electronic Technology of Measure & Control Instrument I	0.5	16	16				3	测控仪器电子技术基础 1

课程编号 Course Number	课程名称 Course Title	学分 Crts	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		
4080405170	测控仪器电子技术基础 2 Basic Electronic Technology of Measure & Control Instrument II	3	48					4	测控仪器电子技术基础 1
4080407170	测控仪器电子技术基础实验 2 Experiments of Basic Electronic Technology of Measure & Control Instrument II	0.5	16	16				4	测控仪器电子技术基础 2
4080265130	精密机械设计 B Precision Mechanism Design	4	64	8				4	工程图学
4050052110	复变函数与积分变换 B Complex Function and Integral Transform	3	48					4	高等数学
4080258130	仪器光学基础 B Fundamentals of Optical Instrument	2.5	40	4				4	大学物理
4080257130	误差理论与数据处理 A Error Theory and Data Processing	2	32					4	概率论与数理统计
4080349150	测控系统微处理器原理及应用 Microcontroller Principle and Its Application	4	64	24				5	测控仪器电子技术基础 2
4080408170	传感器原理及应用 C Principle and Application of Sensors	3	48	10				5	大学物理 测控仪器电子技术基础
4080115110	仪器仪表电路 Instrument Circuit	2	32	4				5	测控仪器电子技术基础
4080266130	控制工程基础 C Fundamentals of Control Engineering	3	48	8				5	复变函数与积分变换
4080315140	测试信号分析与处理 A Signal Analysis and Processing	2.5	40		4			5	高等数学 线性代数
4080409170	测控技术创新创业方法 Innovation and Entrepreneurship Courses for the Specialty	1	16					5	
小 计 Subtotal		65.5	1104	126	4	0	24		
(四) 专业教育选修课程 Specialized Elective Courses									
专业教育限选课程									
4080410170	仪器制造技术 A Instrument Manufacture Technology	3	48	4				3	工程材料

课程编号 Course Number	课程名称 Course Title	学分 Crts	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		
4080411170	测控系统软件设计基础 Software Design of Measure and Control System	2.5	40		12			4	C 程序设计基础
4080412170	现代仪器设计 B Modern Instrument Design	3	48	8				5	仪器仪表电路 测控系统微处理
专业教育任选课程									
4080414170	仪器仪表电路设计 EDA 技术 The EDA Technique for Circuit	2	32		4			7	仪器仪表电路
4080093110	嵌入式系统设计 B Design of Embedded System	2	32	4				7	测控系统微处理器原理及应用
4080413170	光纤传感技术 A Technique of Optical Fiber Sensor	1.5	24	4				7	传感器原理及应用
4080083110	可编程控制器原理及应用 B Fundamentals&Applicationof Programmable Logic Controller	2	32	4				7	测控系统微处理器原理及应用
4080052110	过程控制与检测仪表 Process Control and Meter	2	32	4				7	控制工程基础 传感器原理及应用
4080415170	控制系统仿真 Simulation for Control System	2	32		4			7	控制工程基础
4080416170	激光技术及应用 C Principle and Applications of Laser	1.5	24	4				7	仪器光学基础
4080104110	无损检测技术 A Nondestructive Testing Technique	3	48	8				7	工程材料 仪器制造技术
4080049110	光电精密仪器设计 Design of Photoelectric Precision Instrument	2	32					7	精密机械设计, 仪器光学基础 误差理论与数据处理
4080256130	网络控制技术及应用 Networked Control Technology and Its Application	2	32	4				7	测控系统软件设计
小 计 Subtotal		28.5	456	40	20	0	0		
修读说明: 要求至少选修 15 学分。 NOTE: Minimum subtotal credits:15.									

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		
(五) 个性课程 Personalized Elective Courses									
4080417170	光电成像测量技术及应用 Technique&Application of Photoelectric imaging Measurement	2	32	24				7	仪器光学基 础、传感器 原理及应用
小 计 Subtotal		2	32	24	0	0	0		
修读说明：学生从以上推荐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: Sudents 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
1060002110	军事训练 Military Training	1.5	3	1
4080150110	机械制造工程实训 B Training on Mechanical Manufacturing Engineering	4	4	3
4080233120	仪器仪表机构零件及工艺课程设计 B Course Design on Part, Mechanism and Technics of Instrument and Meter	2	2	4
4080339140	测控系统微处理器应用课程设计 Course Design on Microcontroller Application of Measure and Control System	2	2	5
4080418170	传感器及其应用电路课程设计 Course Design on Sensors and Application Circuits	3	3	5
4080358140	企业实践 Enterprise Practice	10	20	6 (企业)
4080420170	测控系统综合课程设计 A Course Design on Measure and Control System	3	3	7
4080421170	毕业设计 Graduation Design	10	17	8 (企业)
小 计 Subtotal		35.5	54	

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、测控专业学生参加“测控技术与仪器创新设计大赛”，提交合格作品，按照评定等级计 1~2 个课外学分，具体由测控技术与仪器系负责组织和考核。
- 3、测控专业学生必须在通识教育选修课程或个性课程中选修至少 1 学分的数学、物理、化学类课程。
- 4、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.Students of the specialty must participate in “Creative &skill competition of Measuring & control technology and instrument”, submit qualified works , count 1~2 credits according to different grade. The activities will be organized and assessed by the measuring & control technology and instrument department .

3. Students of the specialty must select at least 1 credit of mathematics or physics or chemical courses from General Education Elective Courses or Personalized Elective Courses.

4.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：胡 剑

专业培养方案责任人：黄安贻

机械工程专业 2017 版本本科培养方案

Undergraduate Education Plan for Specialty in Mechanical Engineering (2017)

专业名称 机械工程	主干学科 机械工程
Major Mechanical Engineering	Major Disciplines Mechanical Engineering
计划学制 四年	授予学位 工学学士
Duration 4 Years	Degree Granted Bachelor of Mechanical Engineering
所属大类 机械类（机电）	大类培养年限 1 年
Disciplinary Mechanical(Electromechanical)	Mechanical 1 year Duration

最低毕业学分规定

Graduation Credit Criteria

课程分类 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized 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 Required Courses	29	65	/	31	/	170
选修课 Elective Courses	9	20	6	/	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养掌握机械工程专业领域的基础理论与专业知识，能在机械设计、机械制造和机电控制等领域从事设计制造、研究开发、应用与管理等工作的高级专业技术人才。学生毕业 5 年后能够达到：

- (1) 具有科学精神与创新意识、国际化交流与竞争意识、人文科学素养、职业道德和社会责任感；
- (2) 具备机械工程领域内设计制造的基础理论和专门知识，能从事机械工程领域内的设计制造、科研开发、应用研究和运行管理等工作；
- (3) 具备知识应用、工程实践、组织管理、团队合作以及自主学习和适应发展的能力；
- (4) 具备较强的工程实践能力与持续学习能力；
- (5) 能通过继续教育和自我发展，成为所从事工作领域中的骨干或领导者。

This major aims at training high-ranking specialists, which would have the basic theoretical and specialized knowledge. They would specialize on the design, manufacturing, research, development, application and management in the realms of mechanical design, mechanical manufacturing and electromechanical control. 5 years after graduation, they would achieve the following knowledge and abilities:

- (1) The graduates should have the sense of innovation, international cooperation, humanistic quality, professional ethics and responsibility for society;
- (2) The graduates should master the fundamental theories about the design and manufacture of mechanical engineering and some specialized knowledge, and should be qualified in

designing and manufacture, scientific and technological development, research for application and operational management.

- (3) The graduates should have the capabilities to apply theory, practice in projects, organize and manage and the abilities to self-study and get adapt to new development ;
- (4) The graduates should have strong engineering practice ability and continuous learning ability
- (5) The graduates should be able to grow to senior engineering and technical personnel or senior management personnel through continuing education and self-development.

(二) 毕业要求

- (1) 工程知识：掌握从事机械工程工作所需的数理学科、自然科学，以及机械工程基础理论和专业知识，并能综合用于解决复杂机械工程问题。
 - (2) 问题分析：能够应用数学、自然科学和机械工程科学的基本原理，并通过文献研究，识别、表达、分析复杂机械工程问题，以获得有效结论。
 - (3) 设计/开发解决方案：能够设计针对机械、控制系统相关的复杂工程问题的解决方案，设计满足特定需求的机械/控制系统或工艺流程，并能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：能够基于科学原理和机械工程专业知识，采用科学方法对复杂机械工程问题中的机械、控制、电气、液压、制造工艺等进行研究，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：能够针对机械和控制系统等复杂工程问题，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进行建模、数值模拟和分析，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：能够就机械/控制系统相关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，能采取有效的项目行动，持续改善工程实践，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。
- (1) Engineering Knowledge: The graduates should apply the mathematical and physical sciences, natural science and basic theory and professional knowledge of mechanical engineering, to solve the problem of complicated mechanical engineering;
 - (2) Problem Analysis: The graduates should analyze and establish the mathematical physics model which can be applied to the problem of complicated mechanical engineering.
 - (3) Developing Solution: The graduates should apply the basic theories and methods of mechanical engineering to complicated engineering problems, design mechanical systems and manufacturing processes to meet specific needs, develop solutions, and reflect the sense of innovation in the design process, taking into account social, health, safety, legal,

- cultural and environmental factors;
- (4) Study: The graduates should have preliminary ability of design, analysis and research of the complex mechanical engineering machinery, control, electrical, hydraulic, manufacturing process, and can give the effective analysis and evaluation;
 - (5) Using Modern Tools: The graduates should have the ability to use modern tools, to obtain, understand and identify all kinds of information, and to solve the problem of complex mechanical engineering;
 - (6) Engineering and Society: The graduates should have the ability to access and use the related policy, policies, laws and regulations ability of mechanical engineering, with considering the society, health, safety, law and culture influence under complex mechanical engineering problem analysis ability;
 - (7) Environmental Protection and Sustainable Development: The graduates should understand and aware the relationship between mechanical engineering professional and social development, environment protection and social sustainable development, and have the ability to analyze the impact between environmental and social of the complex mechanical engineering solutions;
 - (8) Professional Norms: The graduates should have good quality of humanities and social sciences, strong sense of responsibility for society and proper engineering profession ethics;
 - (9) Individuals and Teams: The graduates should be able to do their own role in the team, to communicate effectively with other members of the team, to listen to opinions or suggestions and to make a reasonable response;
 - (10) Communication: The graduates should have the ability to describe complex engineering problems in the field of mechanical engineering, with the ability to communicate effectively with the community and the public, and to cross cultural communication and exchange;
 - (11) Project Management: The graduates should have the basic project management skills, and be able to take effective project action, continuous improvement of engineering practice;
 - (12) Lifelong Learning: The graduates should be able to adapt to social development and can study in a lifelong term.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 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、控制工程基础、测试技术、机电传动控制、流体力学与液压传动、机械制造技术基础、数控技术、机械制造装备设计。

Core Courses: Theoretical Mechanics, Mechanics of Materials, Principle of Mechanics, Mechanical Design, Fundamental of Control Engineering, Measuring and Testing Technique, Transmission and Control of Electric Machine, Fluid Mechanics and Hydraulic Transmission, Foundation of Mechanical Manufacturing Technology, Numerical Control Technique, Machine Equipment Design.

(二) 专业特色课程:

工艺与装备课程设计、机电系统测控综合性实践、CAD/CAM 及数控加工技术综合实践。

Characteristic Courses: Course design of manufacturing process and equipment, Practice of Measure and control of Mechanical System, Practice of CAD/CAM and NC Machining.

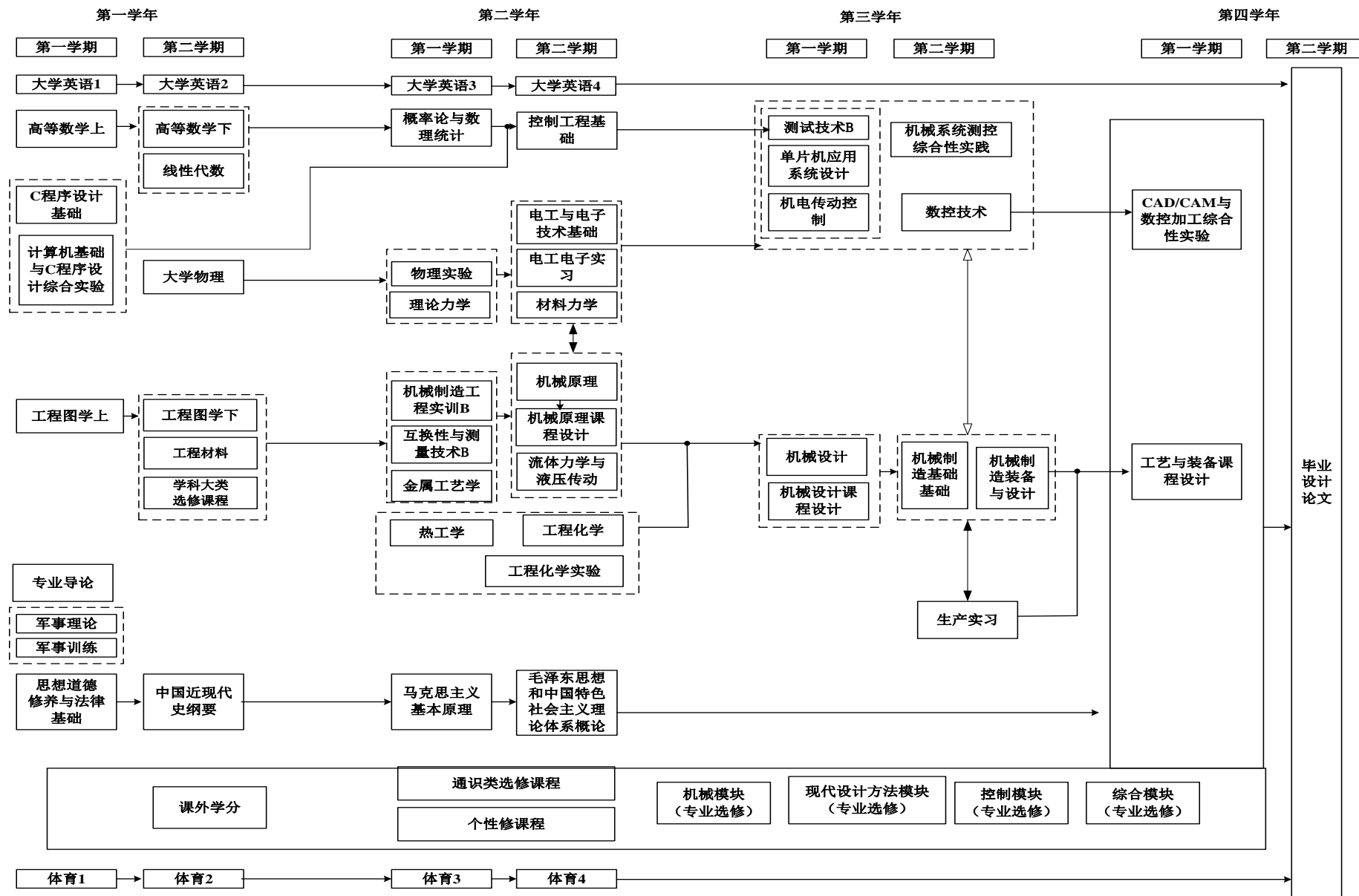
附：毕业要求实现矩阵：

专业 核心 课程	专业 特色 课程	课程 类型	课程名称	机械工程专业毕业要求												
				(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
		通识 教育 必修 课程	思想道德修养与法律基础			L			√		√					
			中国近现代史纲要													√
			毛泽东思想和中国特色社 会主义理论体系概论									√				
			马克思主义基本原理									√				√
			军事理论									√				
			大学体育									√	L			
			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						√							
			通识 选修 课程	艺术体育类									√			
		创新创业类				L										√
		人文社科类									√	√	L			
		经济管理类								√	√				√	
		科学技术类								L						√

专业 核心 课程	专业 特色 课程	课程 类型	课程名称	机械工程专业毕业要求													
				(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
√			机电传动控制		√	√											
		专业 选修 课程	机械模块		L				√	√							
			控制模块		L				√	√							
			现代方法应用模块				√	√									
			综合模块						√	√							
			军事训练								L	√					
			机械制造工程实训								√	√					
			电工电子实习	L	L		L	√				L					
			机械原理课程设计	L	L	√								L			
			机械设计课程设计	L	√	√								L			
			生产实习			L	L		√	√	√	√	√	√			L
	√		工艺与装备课程设计	√		√	√	√	L			L	√	√	√		L
	√		机电系统测控综合性实践		√		√	√	L			L	√	√	√		L
	√		CAD/CAM 及数控加工技术综合实践				L	L	L		L	√	L	√	√	√	
			毕业设计（论文）			√	√	√	L	L	L	L	√	√	√	√	

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 Crts	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									
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		1	
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					2	
4220003110	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		4	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003130	军事理论 Military Theory	1	32				16	1	
4210001170	体育 1 Physical Education I	1	26					1	
4210002170	体育 2 Physical Education II	1	34					2	
4210003170	体育 3 Physical Education III	1	34					3	
4210004170	体育 4 Physical Education IV	1	34					4	
4030002180	大学英语 1 College English I	3	60				12	1	
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3
4120335170	C 程序设计基础 C Language Programming	2	32					1	
4120336170	计算机基础与 C 程序设计综合实验 Foundations of Computer and C Language Programming Experiments	1	32	32				1	
小 计 Subtotal		29	640	32	0	48	64		

课程编号 Course Number	课程名称 Course Title	学分 Crts	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，在每个模块中均须至少选择一门，其中艺术体育类课程中的艺术类相关课程要求取得至少 2 个学分。 All 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 every category.						
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									
4050229110	线性代数 Linear Algebra	2.5	40					1	
4050063110	高等数学 A 上 Advanced Mathematics 1	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics 2	5	80					2	
4080371170	工程图学 A 上 Engineering Graphics I	3	56				8	1	
4080372170	工程图学 A 下 Engineering Graphics II	2.5	56				16	2	
4080034110	工程材料 A Engineering Material	2.5	40	4				2	
4050463130	大学物理 B Physics	5	80					2	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4080367170	金属工艺学 B Engineering Material	2	32	2				3	
4080054110	互换性与测量技术 B Interchangeability and Measurement	2	32	4				3	
4050129110	理论力学 A Theoretical Mechanics	4.5	72					3	
4090330170	热工学 A Heat and Thermodynamics	2	32					3	
4050058110	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	

课程编号 Course Number	课程名称 Course Title	学分 Crts	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		
4200375170	工程化学实验 Engineering Chemistry Experiment	0.5	16	16				4	
4100012110	电工与电子技术基础 C Fundamentals of electrical and electronic technology	4	64	10				4	
4050018110	材料力学 C Mechanics of Materials	4	64	4				4	
4080062110	机械原理 Principle of Mechanics	3.5	56	4				4	
4080423170	控制工程基础 A Basis of Control Engineering	2	32	4				4	
4080424170	流体力学与液压传动 B Fluid Mechanics and Hydraulic	2	32	4				4	
4080338140	单片机应用系统设计 B Micro-Controller Unit Application System Design	3	48	6				5	
4080064110	机械制造技术基础 A Fundamentals of Mechanical Manufacturing Technology	4	64	6				6	
4080425170	数控技术 B Numerical Control Technique	2	32	2				6	
小 计 Subtotal		65	1088	98	0	0	24		
(四) 专业教育选修课程 Specialized Elective Courses									
机械模块 《机械设计》、《机械制造装备设计》为必选课程，其他课程三选一									
4080390170	机械设计 Mechanical Designing	3.5	56	4				5	
4080426170	机械制造装备设计 Machine Equipment Design	2	32					6	
4080202120	工业机器人 Industry Robot	2	32					5	
4080088110	模具设计与制造 B Mould Design and Manufacture	2	32					7	
4080080110	精密加工与特种加工 Technology of Special Machining and Precision Machining	2	32					7	
控制模块 《机电传动控制》为必选课程，其他课程三选一									
4080198110	机电传动控制 B Transmission and Control of Electric Machine	2	32	4				5	

课程编号 Course Number	课程名称 Course Title	学分 Crts	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		
4080427170	传感器原理及应用 A Fundamentals & Application of Sensors	2	32	4				5	
4120067110	物联网工程概论 Internet of Things	2	32					7	
4080083110	可编程控制器原理及应用 B Fundamentals & Application of Programmable Logic Controller B	2	32	4				7	
现代方法应用模块 《测试技术》为必选课程，其他课程三选一									
4080428170	测试技术 C Measuring & Testing Technology	2	32	4				5	
4080429170	计算机仿真 B Computer Simulation	2	32		4			5	
4080110110	现代设计技术 Modern Design Technology	2	32					5	
4080058110	机械 CAD/CAM Machinery CAD/CAM	2	32		6			7	
综合模块 《机械工程专业创新创业导论》、《工程化学》为必选课程，其他课程三选一									
4080430170	机械工程专业创新创业导论 Introduction of Innovation and Entrepreneurship of Mechanical Engineering	1	16					3	
4200374170	工程化学 Engineering Chemistry	1.5	24					4	
4080057110	机电一体化系统设计 B Mechatronics System Design	2	32					7	
4080048110	工艺过程自动化 Process Automation	2	32					7	
4170075110	技术经济及企业管理 A Economic Theory and Enterprise Management	2	32					7	
小 计 Subtotal		26.5	424	16	10	0	0		
修读说明：要求至少选修 20 学分。 NOTE: Minimum subtotal credits:20.									
(五) 个性课程 Personalized Elective Courses									
4080284130	振动与噪声基础 Fundamentals of Vibration and Noise	2	32			16		6	
4080431170	现代制造技术 Advanced Manufacturing Technology	2	32	10				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		
4080432170	先进制造工艺技术及其装备 AMT and its Equipment	2	32					6	
4080433170	制造企业数字化管理技术及应用 Digital Management and its Application of Manufacturing Enterprise	2	32					6	
小 计 Subtotal		8	128	10	0	16	0		
修读说明：1) 个性课程累计修学不少于 6 学分；2) 从以上推荐课程仅可选修 2 学分；3) 从学校发布的其它个性课程目录中选课至少 4 个学分； NOTE:1) Minimum subtotal credits 6; 2) Students can select courses from above and get 2 credits; 3) students can select courses from the other personalized courses in catalog, and are required to obtain at least 4 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
1060002110	军事训练 Military Training	1.5	3	1
4080150110	机械制造工程实训 B Machinery Manufacturing Engineering Practice	4	4	3
4100069110	电工电子实习 B Practice in Electrical Engineering & Electronics	1	1	4
4080149110	机械原理课程设计 Curricula Design of Mechanical Principles	1.5	1.5	4
4080147110	机械设计课程设计 Course Practice of Machinery Design	3	3	5
4080434170	机械工程专业生产实习 Production Practice	2	2	6
4080435170	机电系统测控综合性实践 Practice of Mechanical and Electronic System	3	3	6
4080436170	工艺与装备课程设计 Course Practice of processing and equipment	3	3	7
4080122110	CAD/CAM 及数控加工技术综合实践 A Practice of CAD/CAM and NC Machining	2	2	7
4080437170	毕业设计 Graduation Design	10	17	8
小 计 Subtotal		31	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：胡 剑
专业培养方案责任人：李益兵