

# 2021级机械设计制造及其自动化专业人才培养方案

## Mechanical Design and Manufacturing and Their Automation

### 一、专业基本信息

#### I. Basic information

类型 (Type) : 完全学分制

名称 (Name) : 2021 机械设计制造及其自动化

年级 (Grade) : 2021

教学项目 (Project) : 本科Undergraduate

院系 (Department) : 机电工程学院Mechatronic Engineering

学历层次 (Education) : 本科Bachelor

学生类别 (Student Type) : 本科生Undergraduate

专业 (Major) : 机械设计制造及其自动化Mechanical Design and Manufacturing and Their Automation

方向 (Direction) :

学习形式 (Study Type) :

总学分 (Total Credits) : 174

学科门类 (Field of Study) : 工学Technology

专业类 (Specialized Classification) : 机械类Mechanical

专业代码 (Major Code) : 080202

授予学位 (Degree) : 工学学士Bachelor of Engineering

学制 (Years of Study) : 四年Four years

学期数 (Count of Term) : 8

主干学科 (Primary Discipline) : 机械工程Mechanical Engineering

相关学科 (Related Discipline) : 力学Dynamics , 材料科学与工程Materials Science and Engineering , 控制科学与工程Control Science and Engineering , 计算机科学与技术Computer Science and Technology

大类名称 (Specialty) : 智能制造类

专业概况 (Introduction of Major) :

本专业源自我校1955年开办的“精密机械制造”专业,1982年变更为“机械制造工艺与设备”专业;1988年发展为“机械制造工艺与设备”、“机械电子工程”、“机械设计与制造”三个专业;1998年随国家本科专业目录调整形成了本专业。本专业面向区域经济和国防工业,致力于培养具有高度社会主义核心价值观,德智体美劳全面发展,能适应社会与经济发展需求、可在机械工程领域从事产品的设计开发、生产制造、服务管理等工作的高级专门人才。专业先后获得陕西省名牌专业、国家级特色专业、陕西省专业综合改革试点专业称号,是教育部“卓越工程师教育培养计划”专业、陕西省一流本科专业建设点、首批国家一流专业建设点,2018年通过中国工程教育专业认证。在六十多年的发展过程中,本专业逐步形成了“注重工程实践、突出制造技术”的办学特色,在中西部装备制造业和国防工业形成了良好声誉。 This major originated from the “Precision Machinery Manufacturing” program in 1955, when the our university was built up, and was changed to “Mechanical Manufacturing Technology and Equipment” program in 1982. In 1988, it developed into three majors: “Mechanical Manufacturing Technology and Equipment”, “Mechanical Electronic Engineering” and “Mechanical Design and Manufacturing”. In 1998, it was adjusted with the national catalogue of undergraduate majors to form this major. This major is oriented to the development demand of regional economy and national defense industry, and is committed to cultivating an engineering talent with high-level socialist core values , the comprehensive development of moral, intellectual, physical, art and labor, that can adapt to the development needs of international society and economic, and can engage in digital and intelligent design and development, manufacturing, and service management in the field of mechanical engineering. The program has been awarded the titles of Shaanxi Provincial Famous Specialty, National Characteristic Specialty, Shaanxi Provincial Comprehensive Reform Pilot Specialty. It is the program of “Excellent Engineer Education and Training Plan” of the Ministry of Education, the first-class undergraduate specialty construction site of Shaanxi Province, and the first batch of national

first-class specialty construction sites. In 2018, it passed the China Engineering Education Certification. In the course of more than 60 years of development, the program has gradually formed the characteristics of "paying attention to engineering practice and highlighting manufacturing technology", and has formed a good reputation in the equipment manufacturing industry and national defense industry in central and western China.

备注 (Remark):

## 二、培养目标

### II.Educational Objectives

本专业面向区域经济和国防工业，致力于培养具有社会主义核心价值观，德智体美劳全面发展，能适应社会与经济发展需求、可在机械工程领域从事产品的设计开发、生产制造、服务管理等工作的高级专门人才。毕业后经过五年左右的锻炼，达到：

(1) 具有良好的思想品德、人文科学素养和艰苦奋斗精神，具备深厚的家国情怀，能坚守职业道德规范，具备强烈的社会责任感并能够回报社会。

(2) 能够适应现代机械工程技术发展的要求，综合运用数学与自然科学知识、机械工程知识及现代科学工具系统性解决机械领域复杂工程问题。

(3) 能够独立承担机械工程及相关领域产品的设计、制造、服务和管理工作，并充分考虑环境、可持续性发展因素和社会综合影响。

(4) 具有创新能力、终身学习能力和国际视野，能够不断适应机械产品及其制造过程智能化的发展趋势，并在跨文化背景下进行有效的技术交流与团队协作。

(5) 发展成为与机械工程师相当的青年技术/管理骨干，为国防工业、中西部装备制造业服务。

This major is oriented to the development demand of regional economy and national defense industry, and is committed to cultivating senior specialized talents with socialist core values , the comprehensive development of moral, intellectual, physical, art and labor, that can adapt to the development needs of international society and economic, and can engage in digital and intelligent design and development, manufacturing, and service management in the field of mechanical engineering. Graduates should attain the following abilities and personal qualities after practical exercise of five years.

(1) Have good ideological and moral character, humanistic and scientific quality and hard work spirit, with profound feelings of family and country, can adhere to the professional ethics, with a strong sense of social responsibility and be able to repay the society.

(2)The ability to systematically solve complex engineering problems in the mechanical field by comprehensively employing the knowledge of mathematical and natural sciences, the knowledge of mechanical engineering and modern scientific tools, so as to adapt to the development of modern mechanical engineering technology.

(3) The ability to undertake tasks of digital and intelligent design, manufacturing, service and management mechanical engineering and related fields, including taking into consideration their combined effects on environment, sustainable development and society.

(4) With innovation ability, lifelong learning ability and international vision, able to adapt to the intelligent development trend of mechanical products and its manufacturing process, and carry out effective technical exchanges and teamwork in a cross-cultural context..

(5) The potential to grow into a young technical/management backbone equivalent to mechanical engineers, and serve the defense industry and the equipment manufacturing industry in the central and western regions.

## 三、毕业要求

### III.Program Outcomes

0 思想品德：具有坚定正确的政治方向，热爱祖国，热爱人民，拥护中国共产党的领导；具有正确的世界观、人生观、价值观，具有良好的思想品德、健全的人格、健康的体魄，践行社会主义核心价值观。

0-1拥护中国共产党的领导，忠诚于党的领导事业，有大局意识和奉献精神；热爱祖国，熟悉并认可专业，心怀“制造强国”梦想

0-2具有正确的世界观、人生观和价值观，能明辨是非，倡导公平正义，待人诚信友善；拥有健康的心理和体质，具有具有敬业精神、劳动精神、耐挫能力和开拓精神。

1 工程知识：具备解决机械领域复杂工程问题所需要的数学、自然科学、工程基础和专业知识，并将其应用于解决机械领域复杂工程问题。。

- 1-1 能够将数学、自然科学、工程科学的语言工具用于工程问题的表述。
- 1-2 能够针对复杂工程问题的具体应用对象建立数学模型并求解。
- 1-3 能够将相关知识和数学模型方法用于推演、分析机械领域复杂工程问题。
- 1-4 能够将相关知识和数学模型方法用于机械领域复杂工程问题解决方案的比较与综合。
- 2 问题分析：能够应用数学、自然科学和工程科学的基本原理，识别和表达机械设计制造、检测与控制中的机械领域复杂工程问题，并通过文献研究分析以获得有效结论。
- 2-1能运用数学、自然科学和工程科学的基本原理，识别和判断机械领域复杂工程问题的关键环节。
- 2-2能够基于相关科学原理和数学模型方法，对机械领域复杂工程问题进行表达、建模与求解。
- 2-3 能认识到解决机械领域复杂工程问题有多种方案可选择，会通过文献研究寻求可替代的解决方案。
- 2-4 能运用数学、自然科学和机械工程科学的基本原理，借助文献研究，分析机械设计制造、检测与控制过程中的影响因素，并获得有效结论。
- 3 设计/开发解决方案：能够设计针对机械领域复杂工程问题的解决方案，设计满足特定需求的机电系统、机械零部件及制造工艺，并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。
- 3-1 掌握机电产品设计开发全周期、全流程的方法和技术，了解影响设计目标和技术方案的各种因素。
- 3-2能够设计满足特定需求的机械零部件，并在限定的生产条件下完成其制造工艺流程设计；
- 3-3能够进行机械系统的设计，并在设计环节中体现创新意识。
- 3-4在设计中，能考虑社会、健康、安全、法律、文化及环境等因素的影响与制约。
- 4 研究：能够基于科学原理并采用科学方法对机械领域复杂工程问题进行研究，包括开展有针对性的调研、设计实验方案、搭建实验系统、分析与解释数据、并通过信息综合得到合理有效的结论。
- 4-1能够基于自然科学现象及其原理，通过文献研究或相关方法，调研和分析机械领域复杂工程问题的解决方案；
- 4-2 能够对机械设计、机械制造及控制系统中的科学原理进行研究，选择研究路线，设计实验方案。
- 4-3能够根据实验方案构建实验系统安全的开展实验，正确地采集实验数据。
- 4-4 能够对实验结果进行分析和解释，通过信息综合得到合理有效的结论。
- 5 使用现代工具：能够针对机械领域复杂工程问题，开发、选择与使用恰当的计算机辅助设计、分析、仿真等信息技术工具和现代工程工具以及各类技术、资源，包括对机械领域复杂工程问题的预测与模拟，并能够理解其局限性。
- 5-1 了解机械专业常用的现代仪器、信息技术工具、工程工具和模拟软件的使用原理和方法，并理解其局限性。
- 5-2 能够选择和使用恰当的仪器、信息资源、工程工具和专业模拟软件，对机械领域复杂工程问题分析、计算与设计。
- 5-3能够针对机械领域复杂工程问题，开发或选用满足特定需求的现代工具，模拟和预测机械设计、制造及系统控制中的问题，并能够分析其局限性。
- 6 工程与社会：能够基于机械工程相关背景知识进行合理分析，评价专业工程实践和机械领域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。
- 6-1 了解机械工程相关的技术标准体系、知识产权、产业政策和法律法规，理解不同社会文化对工程活动的影响。
- 6-2能分析和评价机械工程实践对社会、健康、安全、法律以及文化的影响，以及这些制约因素对项目实施的影响，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机械领域复杂工程问题的工程实践对环境、社会可持续发展的影响。
- 7-1知晓和理解环境保护、社会可持续发展的理念和内涵，能分析其对机械工程的指导意义。
- 7-2能够站在环境保护和可持续发展的角度思考机械工程实践的可持续性，评价机电产品全生命周期中可能对人类和环境造成的损害和隐患。
- 8 职业规范：具有正确价值观、社会责任感和人文社会科学素养，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。
- 8-1具有正确价值观和人文社会科学素养，理解个人与社会的关系，了解中国国情，具有家国情怀和“制造强国”理想与抱负。

8-2理解诚实公正、诚信守则的工程职业道德和规范，并在机械工程实践中自觉遵守。

8-3理解机械工程师对公众的安全、健康和福祉，以及环境保护的社会责任，并在机械工程实践中自觉履行责任。

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。

9-1具有团队合作能力，能理解个人在团队中的角色和责任，与团队成员有效沟通，合作共事。

9-2能够承担多学科团队中负责人、团队成员及个体各自的角色和责任，能够组织、协调和指挥团队开展工作并与其他成员有效沟通，合作共事。

10 沟通：能够就机械领域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。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。

10-1能够运用报告、图纸、设计文件等技术语言，通过书面或口头方式准确表达自己的观点、回应质疑，理解与业界同行及社会公众交流的差异性。

10-2了解机械工程领域的国际发展趋势、研究热点，理解和尊重世界不同文化的差异性和多样性。

10-3具有英语听说读写的能力，具有国际视野，能就机械工程问题，在跨文化背景下进行沟通和交流。

11项目管理：理解并掌握机械工程实践中工程管理原理与经济决策方法，并能在多学科环境中应用。

11-1掌握工程项目中涉及的管理与经济决策方法，理解机械工程及产品全周期、全流程的成本构成，理解其中涉及的工程管理与经济决策问题，

11-2能在多学科环境下，将工程管理与经济决策的基本方法应用于机械产品的开发、设计、制造及改进中。

12 终身学习：具有自主学习和终身学习的能力，有不断学习和适应发展的能力。

12-1意识到自主学习和终身学习的必要性，能够通过信息综合独立地归纳、总结和凝练问题，并判断先验的局限性。

12-2掌握跟踪机械工程领域相关知识、技术和工具发展的方法，具有不断学习和适应发展的能力。

## 0 Ideology and morality

Have a firm and correct political direction, have deep love for the motherland and the people, and support the leadership of the Communist Party of China; have a correct view of world, life, and values, have a good ideological and moral character, a sound personality, a healthy body, and practice the core values of socialism.

0-1 Support the leadership of the Communist Party of China, be loyal to the party's leadership, and have a sense of the overall situation and dedication, have deep love for the motherland, be familiar with and recognize the profession, have professionalism, have respect-work spirit, and dream of manufacturing powerhouse.

0-2 Have a correct view of world, life, and values, be able to distinguish between wrongs, advocate justice, and practice the core values of socialism, have a healthy psychology and physique, labor spirit, frustration tolerance and pioneering spirit.

## 1 Engineering knowledge

Graduates should be able to apply mathematics, natural sciences, engineering foundations and professional knowledge to solve complex engineering problems in the mechanical field.

1-1 Be able to use the language tools of mathematics, natural science and engineering science to express engineering problems.

1-2 Be able to establish and solve the mathematical model for the specific application object of complex engineering problems.

1-3 Be able to use relevant knowledge and mathematical model methods to deduce and analyze complex engineering problems in the mechanical field.

1-4 Be able to apply relevant knowledge and mathematical model methods to the comparison and synthesis of solutions to complex engineering problems in the mechanical field.

## 2 Problem analysis

Graduates should have the abilities to identify and express complex engineering problems in the mechanical field in mechanical design, manufacture, inspection and control by employing the fundamental principles of mathematical, natural sciences, engineering science, and obtain

valid conclusions by using literature.

2-1 Graduates are able to use the fundamental principles of mathematics, natural sciences, and engineering sciences to distinguish and diagnose the crucial links of complex mechanical engineering issues.

2-2 Based on relevant scientific principles and mathematical model methods, graduates are able to express, model and solve complex mechanical engineering issues.

2-3 Realize that there are many options to solve complex engineering problems in the mechanical field, and graduates can seek alternative solutions through literature research.

2-4 Graduates are able to use the basic principles of mathematics, natural science and Mechanical Engineering Science, with the help of literature research, analyze the influencing factors in the process of mechanical design, manufacturing, detection and control, and obtain effective conclusions.

### 3 Design/develop solutions

Graduates should be capable of providing solutions for complex engineering problems in the mechanical field, designing electromechanical systems, mechanical parts and manufacturing processes satisfying specific requirements, and presenting innovation consciousness, taking into account social, healthy, safety, legal, cultural and environmental factors during design process.

3-1 Master the methods and technologies of the whole cycle and process of mechanical and electrical product design and development, and understand various factors affecting design objectives and technical schemes.

3-2 Graduates are able to design mechanical parts to meet specific needs, and complete its manufacturing process design under limited production conditions.

3-3 Be able to design mechanical system and have innovative consciousness in the design link.

3-4 Graduates are able to analyze and demonstrate the feasibility of the scheme, and consider social, health, safety, legal, cultural and environmental factors.

### 4 Research

Graduates should be capable of conducting research on complex mechanical engineering issues based on scientific principles and using scientific methods, including conducting targeted investigations, designing experimental plans, building experimental systems, analyzing and interpreting data, and obtaining reasonable and effective conclusions through information synthesis.

4-1 Graduates can investigate and analyze the solutions to complex engineering problems in the mechanical field through literature research or relevant methods based on Natural Science phenomena and principles.

4-2 Graduates are able to study the scientific principles in mechanical design, mechanical manufacturing and control system, select the research route and design the experimental scheme.

4-3 Graduates are able to build the experimental system according to the experimental scheme, carry out the experiment safely and collect the experimental data correctly.

4-4 Graduates can analyze and explain the experimental results, and get reasonable and effective conclusions through information synthesis.

### 5 Utilization of modern tools

Graduates should be able to develop, select and use appropriate computer-aided design, analysis, simulation and other information technology tools and modern engineering tools, utilize various technologies and resources for complex engineering problems in the mechanical field, including the prediction and simulation of complex engineering problems in the mechanical field, and understand its limitations.

5-1 Graduates can understand the use principles and methods of modern instruments, information technology tools, engineering tools and simulation software commonly used in mechanical specialty, and understand their limitations.

5-2 Graduates are able to select and use appropriate instruments, information resources,

engineering tools and professional simulation software to analyze, calculate and design complex engineering problems in the mechanical field.

5-3 Graduates are able to develop or select modern tools to meet specific needs for complex engineering problems in the mechanical field, simulate and predict problems in mechanical design, manufacturing and system control, and analyze their limitations.

#### 6 Engineering and society

Graduates should be capable of reasonably analyzing and evaluating the effects of professional engineering applications and complex engineering problems in the mechanical field solutions on society, health, safety, law and culture based on relevant background knowledge of Mechanical Engineerin, and able to understanding their responsibilities.

6-1 Understand the technical standard system, intellectual property rights, industrial policies, laws and regulations related to mechanical engineering, and understand the impact of different social cultures on engineering activities.

6-2 Graduates are able to analyze and evaluate the impact of mechanical engineering practice on society, health, safety, law and culture, as well as the impact of these constraints on project implementation, and understand the responsibilities to be undertaken.

#### 7 Environment and sustainable development

Graduates should be capable of understanding and evaluating the influences of engineering applications in complex engineering problems in the mechanical field on environment and sustainable development.

7-1 Know and understand the concept and connotation of environmental protection and social sustainable development, and be able to analyze its guiding significance to mechanical engineering.

7-2 Graduates are able to think about the sustainability of mechanical engineering practice from the perspective of environmental protection and sustainable development, and evaluate the possible damage and hidden dangers to human and environment in the whole life cycle of mechanical and electrical products.

#### 8 Professional norms:

Graduates should have correct values, humanities and social sciences literacy and sense of social responsibility, should be capable of understanding, persisting in professional ethics and taking responsibility in the practice of mechanical engineering.

8-1 Graduates should have correct values and humanistic and social science literacy, understand the relationship between individual and society, understand China's national conditions, and have the feelings of home and country and the ideal and ambition of "building a powerful country".

8-2 Graduates can understand the engineering professional ethics and norms of honesty, justice and integrity code, and consciously abide by them in the practice of mechanical engineering.

8-3 Graduates should understand the social responsibility of mechanical engineers for the safety, health and well-being of the public and environmental protection, and consciously perform their responsibilities in the practice of mechanical engineering.

#### 9 Individuals and teams

Graduates should be capable of assuming the any role of individual, team member and people in charge in a multidisciplinary team.

9-1 Have the ability of teamwork, can understand the role and responsibility in the team, be able to work independently or cooperatively in a team.

9-2 Graduates are able to assume the respective roles and responsibilities of principals, team members and individuals in a multidisciplinary team, organize, coordinate and command the team to carry out work, and effectively communicate and cooperate with other members.

#### 10 Communication

Graduates should be capable of communicating and exchanging ideas about complex engineering problems in the mechanical field with industry peers and the public as well as

in cross-cultural background, including clear documentation, presentation, expression and response to commands, and should have a certain international vision.

10-1 Graduates are able to use technical languages such as reports, drawings and design documents to accurately express their views and respond to queries in written or oral ways, and understand the differences in communication with peers in the industry and the public.

10-2 Understand the international development trends and research hotspots in the field of mechanical engineering, and understand and respect the differences and diversity of different cultures in the world.

10-3 Have the ability of listening, speaking, reading and writing in English, have an international vision, and be able to communicate on mechanical engineering issues in a cross-cultural context.

#### 11 Project management

Graduates should be able to understand and master engineering management principles and economic decision-making methods in the practice of mechanical engineering, and apply them to product development, design, manufacturing and service, and can be applied in multi-disciplinary environment.

11-1 Master the management and economic decision-making methods involved in engineering projects, understand the cost composition of mechanical engineering and product cycle and whole process, and understand the engineering management and economic decision-making problems involved.

11-2 Graduates are able to apply the basic methods of engineering management and economic decision-making to the development, design, manufacturing and improvement of mechanical products in a multidisciplinary environment.

#### 12 Lifelong learning

Graduates should have the ability of self-learning and lifelong learning, have the ability of continuous learning and adapting to development.

12-1 Graduates are aware of the necessity of autonomous learning and lifelong learning, be able to summarize, summarize and refine problems independently through information synthesis, and judge the limitations of a priori.

12-2 Master the method of tracking the development of relevant knowledge, technology and tools in the field of mechanical engineering, and have the ability of continuous learning and adapting to development.

### **四、毕业条件及学位授予要求**

#### **IV. Graduation Requirements and Degree Awarding Requirements**

在修业年限内修完本专业规定课程, 获得的总学分不低于174学分、第二课堂学分不低于7学分, 且通过《国家学生体质健康标准》的合格测试、通过《Python语言程序设计》课程考核, 方可准予毕业。达到毕业要求, 且符合《西安工业大学学士学位授予工作细则》, 授予工学学士学位。

Only after completing the required courses within the length of study, and obtaining the total credits of no less than 174 and the second classroom credits of no less than 7, passing the qualification test of "National Student Physical Health Standard" and the examination of "Python Language Programming" course, can be allowed to graduate.

To meet the graduation requirements, and in line with the "Working Rules for the Bachelor Degree Awarding of Xi'an Technological University", can be awarded a bachelor's degree.

### **五、课程体系**

#### **V. Curriculum System**

分类 Course Category	课程 代码 Course Code	课程名称 Course Name	学分 Credit	总学时 Total Semester Hour	周 数 Total Weeks	理论学 时 Semest er Hour of Theory Course	实验学 时 Semeste r Hour of Experim ent	上机学 时 Semest er Hour of Progra m	其他学 时 Rest Semest er Hour	建议修读学期 Recommendation of Study Semester	是否必 修 Required course	考核方 式 Evaluat ion Methods	是否核 心课 Requir ed or Electi ve Course	备注 Remarks
通识 教育 必修	1800 01	1 思想道德与法 治 Morality and the Rule of Law	3	48		40	8			1	是	考试	否	
	2300 06	2 大学生职业生 涯规划 Career Planning of College Students	0.5	20		20				1	是	考查	否	
	2300 18	3 计算思维与人 工智能基础(工) Computational Thinking and Artificial Intelligence Fundamentals (Engineering)	1	32		24		8		1	是	考查	否	
	2300 23	4 Python 语言程 序设计 Python language programming	0	32					32	1	是	考查	否	
	2300 26	5 军事理论 Military Theory	2	36		36				1	是	考查	否	
	4416	6 大学英语 I College English I	4	64		64				1	是	考试	否	
	4417	7 大学英语 II College English II	4	64		64				2	是	考试	否	
	5500 02	8 大学生心理健 康教育 Mental Health Education for College Students	2	32		32				2	是	考查	否	
	9811	9 中国近现代史 纲要 Outline of China's Modern History	3	48		40	8			2	是	考试	否	
	4983	10 马克思主义 基本原理 The Basic Principles of Marxism	3	48		40	8			3	是	考试	否	
	1800 03	11 毛泽东思想 和中国特色社会 主义理论体系概 论 Introduction of Mao Zedong Thought and Theory System of Socialism with Chinese Characteristics	3	48		40	8			4	是			
	1800 04	12 习近平新时 代中国特色社会 主义思想概论 Introduction of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	3	48		40	8			5	是			
	2300 07	13 大学生就业 指导	0.5	18		18				6	是	考查	否	



		Employment Guidance for College Students												
	9884	14 形势与政策 Current Affair and Policy	2	32		4				1, 2, 3, 4, 5, 6, 7, 8	是	考查	否	
		<b>学分小计</b>	<b>31</b>							1(12.5), 2(11), 3(5), 4(5), 5(5), 6(2.5), 7(2), 8(2)				
通识 限选	2300 27	15 体育 I Physical Education I	1	36		36				1	是	考查	否	
	2300 28	16 体育 II Physical Education II	1	36		36				2	是	考查	否	
	2300 29	17 体育 III Physical Education III	0.5	18		18				3	是	考查	否	
	2300 30	18 体育 IV Physical Education IV	0.5	18		18				4	是	考查	否	
	2300 31	19 体育 V Physical Education V	0.5	18		18				5	是	考查	否	
	2300 32	20 体育 VI Physical Education VI	0.5	18		18				6	是	考查	否	
	2300 33	21 大学英语 III College English III	2	64		64				3	否	考试	否	二选一
	2300 08	22 大学英语拓展课 Further-Developing Course for College English	2	32		32				4	否	考试	否	大学英语 III: 针对大学英语四级未通过者 大学英语拓展课: 四级通过在此模块选修 2 学分
		<b>学分小计</b>	<b>6</b>							1(1), 2(1), 3(0.5), 4(0.5), 5(0.5), 6(0.5)				
通识 选修		通识选修-文化传承	0.5											
		通识选修-国际视野	0.5											
		通识选修-社会责任	0.5											必选《工程伦理与安全》(0.25 学分)
		通识选修-美学修养	2											在美学修养模块必选《大学美育》(1 学分), 模块内其余课程任选。
		通识选修-健康生活	0.5											



		Electronic Technology												
	3598	35 材料力学 A Mechanics of Materials A	3.5	56	50	6			4		是	考试		
	1479	36 热工基础 Thermal Engineering	2	32	28	4			5		是	考查	否	
		<b>学分小计</b>	<b>44</b>						1(8), 2(15), 3(12), 4(7), 5(2)					
专业教育	9105	37 机械设计制造及其自动化专业导论 Introduction to mechanical design, manufacturing and automation	1	16	16				2		是	考查	否	
	1130	38 机械制图 Mechanical Drawing	3	48	40		8		4		是	考查		
	1294	39 机械原理 Mechanical Principles	3	48	48				4		是	考试		
	1116	40 控制工程基础 Basis of Control Engineering	2.5	40	40				5		是	考试		
	1483	41 互换性与测量技术 Interchangeability and Measurement Technology	2	32	32				5		是	考查		
	600009	42 工程材料及机械制造基础 Engineering Materials & Fundamentals of Mechanical Manufacturing	2.5	40	40				5		是	考试	否	
	9205	43 机械设计制造及其自动化专业学科前沿讲座 Lectures on Frontiers of the Discipline in Mechanical Design and Automation	1	16	16				5		是	考查	否	
	9732	44 机械设计 Mechanic Design	3	48	48				5		是	考试		
	020049	45 机电系统设计 Electromechanical System Design	3	48	48				6		是	考试		
	020050	46 流体力学与流体传动 Fluid Mechanics and Fluid Transmission	3	48	48				6		是	考试		
	020051	47 机械制造工程学 Machinery Manufacturing Engineering	3	48	48				6		是	考试		
1215	48 现代设计方法 Modern Design Method	2	32	32				6		是	考查			
1248	49 工程测试技术 Engineering Measurement and Testing Technique	2.5	40	40				6		是	考试			

		<b>学分小计</b>	<b>31.5</b>							2(1), 4(6), 5(11), 6(13.5)				
实践必修	210001	50 军训 Military Training	2		3周					1	是	考查	否	
	9014	51 入学教育 Entrance Education	0	8				8		1	是	考查	否	
	230024	52 大学物理实验 I College Physics Experiment I	0.75	24			24			3	是	考查	否	
	2123	53 电工电子实验 Electrical and Electronic Experiments	1	16			16			4	是	考查	否	
	230025	54 大学物理实验 II College Physics Experiment II	0.75	24			24			4	是	考查	否	
	020054	55 毕业实习和毕业设计(论文) Graduation practice and graduation design (thesis)	18		18周					8	是	考查	否	劳动教育依托课程
	9015	56 毕业教育 Graduation Education	0	8		8				8	是	考查	否	
		<b>学分小计</b>	<b>13.5</b>							1(2), 3(0.75), 4(1.75), 8(9)				
实践限选	0310	57 理科创新思维实训 Innovation and Entrepreneurship (Science)	0.5	16		16				2	是	考查	否	
	600001	58 智能制造创新创业实训-智能制造认知训练 Intelligent Manufacturing Innovation and Entrepreneurship Training -- Cognitive Training	0.5	16			16			3	是	考查	否	
	600010	59 智能制造创新创业实训-工业机器人基本操作与虚拟仿真 Intelligent manufacturing innovation and entrepreneurship training-basic operation and virtual simul	0.5	16			16			3	是	考查	否	
	600013	60 智能制造创新创业实训-零件增材制造与智能检测 Intelligent Manufacturing Innovation and Entrepreneurship Training-Parts Additive Manufacturing and	0.25	8			8			3	是	考查	否	
	600014	61 智能制造创新创业实训-智能制造新工场MES认知与数据管理 Intelligent Manufacturing Innovation and Entrepreneurshi	0.25	8			8			3	是	考查	否	



	Manufacturing Technology and Equipment												够4学分, 0865和9747不能同时选)
0865	76 3D打印成型工艺及技术 3D printing process and technology	2	32	32				7		否	考查	否	
1183	77 数控编程技术 NC Programming Technology	2	32	32				7		否	考查	否	数控编程技术: 其中8
1207	78 深孔加工技术与装备 Deep Processing Technology and Equipment	2	32	32				7		否	考查	否	学时在智能制造创新工场授课
1485	79 兵器材料与制造技术 Weapons Materials and Manufacturing Technologies	1	16	16				7		否	考查	否	
9735	80 特种加工及精密加工技术 Special Machining and Precision Machining Technology	2	32	32				7		否	考查	否	
9747	81 增材制造技术原理及应用 Principle and Application of Manufacturing Technology of Additional Material	2	32	32				7		否	考查	否	
020024	74 智能产品设计 Intelligent Product Design	1.5	24	24				7		否	考查	否	机械设计类(选够3学分,
1393	82 计算机辅助分析 CAA of Computer	2	32	32				7		否	考查	否	1432与1434、1467与9736不能同时选)
1432	83 机械CAD/CAM原理与技术(双语) Mechanical CAD / CAM principles and techniques (Bilingual)	2	32	32				7		否	考查	否	
1467	84 工业机器人设计导论 Introduction to Industrial Robot Design	1	16	16				7		否	考查	否	三维CAD/CAM技术及应用: 其中4
1484	85 三维CAD/CAM技术及应用 3D CAD/CAM Technology and Application	2	32	32				7		否	考查	否	学时在智能制造创新工场授课
9736	86 工业机器人设计与应用 Design and Application of Industrial Robot	2	32	32				7		否	考查	否	工业机器人设计与应用: 其中8(4+4)学时在智能制造创新工场授



**六、学分分配**  
VI.Credit Allocation

表1 课程模块学分分配表

课程模块 Course Module	通识教育课程 General Education Courses	学科基础课程 Subject Basic Courses	专业教育课程 Discipline Courses	实践教育课程 Practical Courses	个性化发展课程 Personalized Development Courses	合计 Total
学分 Credits	45.5	44	31.5	40	13	174
占比 (%) Percentage	26.2%	25.3%	18.1%	22.9%	7.5%	100%

**七、教学计划**  
VII.Teaching Schedule

1. 学期周学时分配表  
Weekly Study Hours

学期 Term	一	二	三	四	五	六	七	八
周学时 Weekly Study Hours	23	25.3	20.9	21.1	17.8	19.4	2.1	

2. 教学进程  
Schedule

学年 Academic Year	学期 Term	各学期教学内容 Teaching Activities in Each Term																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
一	1	+	+	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	:	=	=	=	=	=	=	=
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	:	=	=	=	=	=	=	=
二	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	:	=	=	=	=	=	=	=	=
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	:	<	<	=	=	=	=	=	=	=
三	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	:	<	<	=	=	=	=	=	=	=	=
	6	-	-	-	-	-	-	-	-	-	-	-	-	<	<	<	:	@	@	@	=	=	=	=	=	=	=
四	7	<	<	-	-	-	-	-	-	-	-	-	-	-	-	-	:	=	=	=	=	=	=	=	=	=	=
	8	&	&	>	>	>	>	>	>	>	>	>	>	>	>	>	=	=	=	=	=	=	=	=	=	=	=

图例: \* 入学教育      - 理论教学      : 考试      < 课程设计      θ 写生      = 假期  
 S 教学实习      O 金工实习      \$ 社会调查      X 学年论文      ! 测绘  
 @ 生产实习      J 机动      + 军训      > 毕业设计      & 毕业实习      B 毕业教育  
 Z 专业实训

Legend: \* Orientation    - Theory Teaching    : Examination    < Course Project    θ Sketch    = Vacation  
 S Teaching Practice    O Metalworking Practice    \$ Social Survey    X Term Paper    ! Mapping  
 @ Production Practice    J Mobility    + Military Training    > Graduation Project/Paper  
 & Graduation Internship    B Graduation Education    Z Professional Training



## 八、毕业要求支撑培养目标矩阵图

VIII. Matrix of Graduation Requirements Supporting Training Objectives

培养目标 毕业要求	预期目标1 品德修养	预期目标2 分析应用	预期目标3工程 能力	预期目标4 工程素养	预期目标5发 展能力
毕业要求0: 思想品德	√				
毕业要求1: 工程知识		√			
毕业要求2: 问题分析		√	√		
毕业要求3: 设计/开发解决方案			√	√	
毕业要求4: 研究		√			√
毕业要求5: 使用现代工具		√			
毕业要求6: 工程与社会	√		√		
毕业要求7: 环境和可持续发展	√		√		
毕业要求8: 职业规范	√			√	
毕业要求9: 个人和团队				√	√
毕业要求10: 沟通				√	√
毕业要求11: 项目管理			√		√
毕业要求12: 终身学习		√		√	√

注：表格中毕业要求对培养目标的支撑用√表示。

## 九、课程体系支撑毕业要求矩阵图

IX. Matrix diagram of Graduation Requirements Supported by Curriculum System

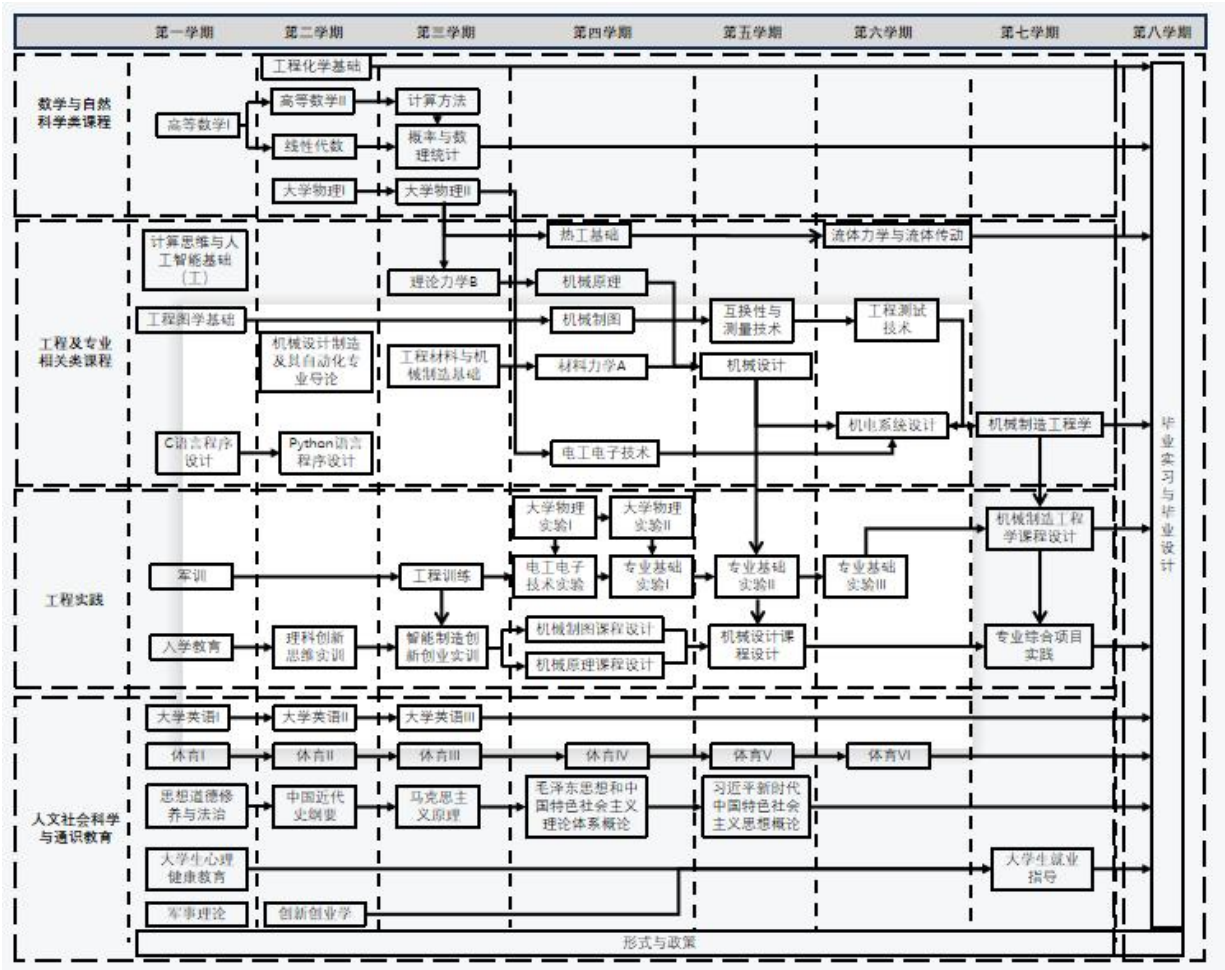
分类	课程名称	0 思想品德	1 工程知识			2 问题分析			3 设计/开发解决方案			4 研究			5 使用现代工具			6 工程与社会			7 环境和可持续发展			8 职业规范			9 个人和团队			10 沟通			11 项目管理			12 终身学习		
		0-10	21-11	21-31	42-12	22-32	43-13	23-33	44-14	24-34	45-15	25-35	46-16	27-17	28-18	28-38	39-19	210-110	210-311	111-111	112-112	2																
通识教育必修	1 思想道德与法治	H	H												L				M	L																		
	2 大学生职业生涯规划	L	M																	L												L						
	3 计算思维与人工智能基础(工)	L	L											M																								
	4 Python 语言程序设计	L	L												L	L																						
	5 军事理论	L	L																																			
	6 大学英语 I	L	L																								H											
	7 大学英语 II	L	L																								H	M										
	8 大学生心理健康教育	L	M																																			
	9 中国近现代史纲要	H	H																		H																	
	10 马克思主义基本原理	H	H																		H																	
	11 毛泽东思想和中国特色社会主义理论体系概论	H	H																			L		H														

分类	课程名称	0 思想品德	1 工程知识		2 问题分析		3 设计/开发解决方案		4 研究		5 使用现代工具		6 工程与社会		7 环境和可持续发展		8 职业规范		9 个人和团队		10 沟通		11 项目管理		12 终身学习			
		0-10-21	1-11-21	1-31-42	2-22-32	2-43-13	2-23-33	3-44-14	3-24-34	4-45-15	4-25-36	5-16-27	5-17-28	6-18-28	6-28-39	7-19-210	7-110-210	8-311-111	8-212-112	9-212-112	10-212-112	11-212-112	12-212-112	13-212-112	14-212-112	15-212-112		
通识限选	12 习近平新时代中国特色社会主义思想概论	H	H											M	H													
	13 大学生就业指导	L	M																	L	M							
	14 形势与政策	M	M												L	L												
	15 体育 I	L	H																	L	L							
	16 体育 II	L	H																	L	L							
	17 体育 III	L	H																	L	L							
	18 体育 IV	L	H																	L	L							
	19 体育 V	L	H																	L	L							
	20 体育 VI	L	H																	L	L							
	21 大学英语 III	L	L																			M	H					
	22 大学英语拓展课	L																				M	H					
	通识选修-文化传承																											
	通识选修-国际视野																											
	通识选修-社会责任																											
	通识选修-美学修养																											
	通识选修-健康生活																											
	通识选修-科技革新																											
	通识选修-创新创业																											
	通识选修-国防军工																											
	通识选修-劳动教育																											
通识选修-“四史”教育																												
学科基础课程	23 高等数学 A I	L	L	H	M			L																				
	24 工程图学基础		M							M	H										M							
	25 高等数学 A II	L	L	H	M			L																				
	26 大学物理 I	L	L	H	M			L																				
	27 线性代数			H	M																							
	28 工程化学基础	L	L	H				L					L															
	29 C 语言程序设计	L	L								H	H																
	30 概率与数理统计	L	L	H	M			L																				
	31 大学物理 II	L	L	H				L																				
	32 计算方法	L		H				H																				
33 理论力学 B	L		H			H																						
34 电工电子技术	L		H																									
35 材料力学 A	L		H			H			H	M																		
36 热工基础	L		H			M			H	L																		
专业教育	37 机械设计制造及其自动化专业导论	H												H			H				H					H		
	38 机械制图	L	M								H	M									M							
	39 机械原理	M		H	H	M		H																				
	40 控制工程基础	L		H	H		H																					

分类	课程名称	0 思想品德	1 工程知识			2 问题分析			3 设计/开发解决方案			4 研究			5 使用现代工具			6 工程与社会			7 环境和可持续发展			8 职业规范			9 个人和团队			10 沟通			11 项目管理			12 终身学习				
		0-10	21-11	21-31	42-12	22-32	43-13	23-33	44-14	24-34	45-15	25-35	46-16	27-17	28-18	28-39	19-210	110-210	311-111	212-112	2-2																			
	41 互换性与测量技术			M								M	H	H													M													
	42 工程材料及机械制造基础	L	H	H					M						L	H																								
	43 机械设计制造及其自动化专业学科前沿讲座	M										M	H	L														L	H					H						
	44 机械设计	L		H	M				H	H																														
	45 机电系统设计	L			H	M		H	L			H																												
	46 流体力学与流体传动	L	H	H		H	H				M																													
	47 机械制造工程学	M			H			H			H								H																H					
	48 现代设计方法	L			H					H		H						H																		L				
	49 工程测试技术	L			H			L				M																												
实践教育	50 军训	L	M																																					
	51 入学教育	M	M																																			L		
	52 大学物理实验 I	L	L																																					
	53 电工电子实验	L											H	L	L	H																								
	54 大学物理实验 II	L	L											L	M	H	M																							
	55 毕业实习和毕业设计(论文)	L							H			H					M	H																		H	H			
	56 毕业教育	M	M																																			M		
	57 理科创新思维实训	L	L	M			L	L																														H		
	58 智能制造创新创业实训-智能制造认知训练	L	L													H																								
	59 智能制造创新创业实训-工业机器人基本操作与虚拟仿真	L	L																																					
	60 智能制造创新创业实训-零件增材制造与智能检测	L	L																																					
	61 智能制造创新创业实训-智能制造新工场 MES 认知与数据管理	L	L									L																												
	62 工程训练—基础训练 2	L	L																																					
	63 工程训练—数控加工 1	L	L									L																												
64 专业基础实验 I	M												H	H																										
65 机械制图课程设计	L	M																																						
66 机械原理课程设计	L							H				H																												
67 专业基础实验 II	L												M	H	M	H																								
68 机械设计课程设计	L																																					L		
69 专业基础实验 III	L																																							
70 机电系统设计课程设计	L																																							
71 生产实习	M																																							



十、专业课程拓扑图  
X.Course Topology



十一、培养方案对标情况表  
XI. Benchmarking Form

培养方案与《国标》对应情况

	国标要求	本方案	是否满足标准 (是/否)
总学分	150-190	174	是
数学与自然科学类课程学分(比例)	无	15.5%	是
人文社会科学类课程学分(比例)	无	21%	是
学科基础和专业课程学分(比例)	无	33.7%	是
实践教学环节学分比例	20%	22.9%	是
选修课程学分比例	无	11.9%	是
核心课程		线性代数, 材料力学A, 高等数学A I, 高等数学A II, 大学物理 I, 大学物理 II, 电工电子技术, 流体力学与流体传动, 机械原理, 互换性与测量技术, 机械制图, 控制工程基础, 机电系统设计, 工程测试技术	

注：（1）国标中未规定的项目填写无即可。（2）“核心课程”一栏逐项罗列国标规定课程和方案中与之对应的课程。

培养方案与工程教育认证通用标准对应情况

	工程教育认证通用标准要求	本方案	是否满足标准 (是/否)
总学分	无	174	是
数学与自然科学类课程学分(比例)	15%	15.5%	是
人文社会科学类课程学分(比例)	15%	21%	是
学科基础和专业课程学分(比例)	30%	33.7%	是
实践教学环节学分比例	20	22.9%	是
选修课程学分比例	无	11.9%	是
核心课程		线性代数,材料力学A,高等数学A I,高等数学A II,大学物理 I,大学物理 II,电工电子技术,流体力学与流体传动,机械原理,互换性与测量技术,机械制图,控制工程基础,机电系统设计,工程测试技术	

注：（1）专业认证标准中未规定的项目填写无即可。（2）“核心课程”一栏逐项罗列规定课程和方案中与之对应的课程。