

机械设计制造及其自动化专业辅修学士学位培养方案

Training Plan for Minor Bachelor's Degree in Mechanical Design, Manufacturing and Automation

一、培养目标 Objectives

本专业以培养德智体美劳全面发展的社会主义建设者和接班人为目标，立足于轨道交通装备行业，面向机械工程领域，培养掌握数学、自然科学和工程科学的基础理论以及机械设计制造及其自动化专业知识，具有良好的人文素养、职业素养、国际视野、创新精神和社会责任感，具备综合运用知识和技能解决机械工程领域的复杂工程问题的能力，能够在机械工程特别是轨道交通装备行业从事产品设计、生产制造、自动控制、智能运维、试验和科学研究等相关工作的复合型工程技术人才。毕业后通过专业实践和学习深造，成为卓越的工程师、优秀的研究人员以及轨道交通装备领域的行业领军人才。

This major aims to cultivate socialist builders and successors with all-round development of knowledge, ability and quality. Based on the requirements of the rail transit equipment industry and the mechanical engineering discipline, this speciality aims to cultivate excellent engineers and technicians who understand the basic theories of mathematics, natural science and engineering sciences as well as the professional knowledge of the mechanical engineering, who has good humanistic quality, professional quality, international perspective, innovative spirit and social responsibility, who has the ability to solve complex engineering problems in the fields of mechanical engineering and rail transit equipment by making comprehensive use of the knowledge and skills, and who are able to conduct engineering design, manufacturing, automation, testing, scientific researches and other works relevant to the mechanical engineering and rail transportation equipment industries. He or she would become a distinguished engineer, an excellent researcher, or an industry leader of the rail transportation equipment field after graduation by pursuing professional practices and further studies.

毕业5年应达到的目标：在专业能力和职业素养方面达到工程师水平，能够以工程师、技术骨干或者团队领导者的身份解决机械工程领域的复杂工程问题，

并具备成长为卓越工程师、行业专家或优秀领导者的潜力。

The goal to achieve in the 5 years of graduation: achieving the professional skills and professionalism of the engineer level, solving complex engineering problems in the field of mechanical engineering as engineers, technical backbones or leaders, and becoming a candidate to be senior engineers, industry experts and outstanding leaders.

二、毕业要求 Graduation Requirements

为达成本专业的培养目标，学生毕业时在知识、能力和素质三个方面应达到规定的要求。知识结构方面需要掌握数学、自然科学、工程科学和机械工程专业的的基础理论和方法，并具备某一特色专业方向（机械制造、机械电子、工程机械、起重运输机械）系统的专业知识和技能。能力结构方面应具备在考虑多种外部因素的情况下，对机械工程领域的设计、制造和控制等技术问题进行分析、设计、研究的能力，学生还应具备较强的系统观念、国际视野、创新思维、沟通交流和组织领导能力。职业素质方面应具备优良的思想品德、人文素养、职业规范和社会责任意识，能通过自主学习以适应社会发展和技术进步。

In order to achieve the training objectives of this major, students should meet the required requirements in knowledge, ability and quality when they graduate. In terms of knowledge structure, students need to master the basic theories and methods of mathematics, natural science, engineering science and mechanical engineering, and have the professional knowledge and skills of a specific professional direction (mechanical manufacturing, mechanical electronics, engineering machinery, lifting and transportation machinery). In terms of ability structure, students should have the ability to analyze, design and research technical problems such as design, manufacturing and control in mechanical engineering field, taking into account various external factors. Students should also have strong system concept, international vision, innovative thinking, communication and organizational leadership. In terms of vocational quality, students should have excellent ideological and moral character, humanistic quality, professional norms and social responsibility consciousness, and be able to adapt to social development and technological progress through independent learning.

1.问题分析能力。能够应用数学、自然科学和工程科学的基本原理和方法，对机械工程领域的设计、制造、控制、运维等复杂工程问题进行识别、表达、分析，结合文献研究获得有效结论。

1. Analytical ability. The graduates can apply the basic principles and methods of mathematics, natural sciences and engineering sciences to identify, express and analyze complex engineering problems such as design, manufacturing and control, and obtain effective conclusions based on literature research.

2.设计/开发能力。能够为机械工程领域的复杂工程问题提出解决方案，设计满足需求的系统、部件或工艺流程，并能够在设计中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

2. Design/development capability. Students can provide solutions to complex engineering problems in mechanical engineering, design systems, components or processes to meet their needs, and embody innovative ideas in the design, taking into account social, health, safety, legal, cultural and environmental factors.

3.研究能力。能够基于科学原理并采用科学方法对机械工程领域的复杂工程问题开展研究，包括实验设计、实验实施和实验数据处理与分析，并通过信息综合获得有效结论。

3. Research ability. The graduates can conduct research on complex engineering problems in mechanical engineering based on scientific principles and methods, including experimental design, experimental implementation and experimental data processing and analysis, and get effective conclusions through information synthesis.

4.现代工具使用能力。能够针对机械工程领域的复杂工程问题，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，包括对设计、制造、控制、运维等复杂工程问题进行预测和数值模拟，并能够理解其局限性。

4. Ability to use modern tools. The graduates can develop, select and use appropriate technology, resources, modern engineering tools and information technology tools to predict and simulate complex engineering problems such as design, manufacturing and control, and understand their limitations.

5.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。

5. Engineering and society. The graduates can make rational analysis based on relevant background knowledge of mechanical engineering, evaluate the impact of the professional engineering practice and solutions to complex engineering problems on environment, society, health, safety, law, culture, understand and clarify their

responsibilities.

6.环境与可持续发展。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，并能在工程实践中履行相关职责。

6. Environment and sustainable development. The graduates can understand and evaluate the impact of engineering practice for complex engineering problems on environment and sustainable development, and be able to perform related duties in engineering practice.

7.职业规范。具有良好的思想政治素质、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。

7. Professional norms. The graduates have humanities and Social Sciences literacy and sense of social responsibility. They can understand and abide by engineering professional ethics and norms in engineering practice and fulfill their responsibilities.

8.个人与团队。具有良好的团队合作意识和组织协调能力，能够在多学科背景下的技术团队中承担个体、团队成员以及负责人的角色。

8. Individuals and teams. Cooperation and organizational capacity. Good sense of teamwork and organizational coordination, able to assume the role of individual, team members and leaders in a multi-disciplinary technical team.

9.沟通能力。具备良好的沟通表达、人际交往能力，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。

9. Communication skills. The graduates have good communication and interpersonal skills, can effectively communicate and communicate with peers in the industry and the public on complex engineering problems, including writing reports and designing manuscripts, presenting speeches, clearly expressing or responding to instructions, and have a certain international vision, and can communicate and respond to cross-cultural background. Communication.

10.学习能力。具有自主学习与终身学习的意识，具备不断学习，适应社会和技术发展的能力。

10. Learning ability. The graduates have the consciousness of autonomous learning and lifelong learning, and the ability to learn continuously and adapt to the development of society and technology.

三、学分要求 Credits Requirements

选本机械设计制造及其自动化专业为双学位的学生第一专业必须掌握必要的数学、自然科学的基础理论，并按照本培养方案修完全部课程，61 学分，其中在第一学位专业已修过的课程，可以申请替代，替代课程的总学分不能超过本培养方案的 20%。修完全部课程并通过毕业设计环节，符合《西南交通大学学士学位授予工作细则》和《西南交通大学本科生辅修与双学位管理办法》规定者，可授予机械设计制造及其自动化专业双学位证书。

Students choosing Mechanical Design, Manufacturing and Automation as the dual degree, should master the basic theories of mathematics and natural science, and complete the courses (61 credits) study according to this undergraduate program. If they have completed some courses study listed in this program in their majors of first degree, they can apply to make a replacement for the courses, and the total credits of the replaced courses cannot exceed 20% of the total credits of this undergraduate program. If the students complete all the required courses study and pass the graduation design, and meet the requirements of the Rules for the Granting of Bachelor's Degrees in Southwest Jiaotong University and the Regulations for the Administration of Supplementary and Double Degrees for Undergraduates in Southwest Jiaotong University, they can be granted the double degree certificate of Mechanical Design, Manufacturing and Automation.

四、学位 Degree

学位：工学学士

Degree: Bachelor of Engineering

五、课程设置 Course Programs

课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	学分 Credits	开课学期 Semester	开课学院 School	备注 Notes
学科基础课程 8 学分 Discipline Foundational Courses 8 Credits	理论力学 B Theoretical Mechanics B	必修 Compulsory	4	秋季 Autumn	力学 Sch. of Mechanics	
	材料力学 B Mechanics of Materials B	必修 Compulsory	4	春季 Spring	力学 Sch. of Mechanics	

专业基础课程 26 学分 Professional Foundational Courses 26 Credits	机械工程制图 I Mechanical Engineering Drawing I	必修 Compulsory	2	秋季 Autumn	机械 Sch. of Mech. Eng.	
	机械工程制图 II Mechanical Engineering Drawing II	必修 Compulsory	3	春季 Spring	机械 Sch. of Mech. Eng.	
	机械原理 A Mechanisms and Machine Theory A	必修 Compulsory	4	春季 Spring	机械 Sch. of Mech. Eng.	
	机械设计 A Mechanical Design A	必修 Compulsory	4	秋季 Autumn	机械 Sch. of Mech. Eng.	
	测试技术 Testing Technology	必修 Compulsory	3	春季 Spring	机械 Sch. of Mech. Eng.	
	控制工程基础 Control Fundamental	必修 Compulsory	3	秋季 Autumn	机械 Sch. of Mech. Eng.	
	制造技术 A Manufacturing Technology A	必修 Compulsory	4	秋季 Autumn	机械 Sch. of Mech. Eng.	
	流体传动与控制 Fluid Transmission and Control	必修 Compulsory	3	春季 Spring	机械 Sch. of Mech. Eng.	
专业核心课程 9 学分 Specialized Core Courses 9 Credits	机电传动与控制 Electromechanical Transmission and Control	必修 Compulsory	3	春季 Spring	机械 Sch. of Mech. Eng.	
	智能制造基础 Fundamentals of Intelligent Manufacturing	必修 Compulsory	2	秋季 Autumn	机械 Sch. of Mech. Eng.	
	有限元法及应用 Finite Element Method and Application	必修 Compulsory	2	春季 Spring	机械 Sch. of Mech. Eng.	
	机械振动 Mechanical Vibration	必修 Compulsory	2	春季 Spring	机械 Sch. of Mech. Eng.	
专业方向课程 限修一组 8 学分 Specialized Courses Distributional Elective 1 group 8 credits	工程机械理论与设计 Theory and Design of Construction Machinery	限修 Distributional Electives	3	秋季 Autumn	机械 Sch. of Mech. Eng.	工程机械方向 Major of Construction Machinery
	工程机械构造学 Construction Machinery Tectonics	限修 Distributional Electives	3	秋季 Autumn	机械 Sch. of Mech. Eng.	
	铁路线路机械 Railway Line Machinery	限修 Distributional Electives	2	秋季 Autumn	机械 Sch. of Mech. Eng.	
	起重机金属结构 Crane Metal Structure	限修 Distributional Electives	3	秋季 Autumn	机械 Sch. of Mech. Eng.	起重运输机 械方向 Major of Lifting and Transporting Machinery
	起重运输机械 Lifting and Transporting Machinery	限修 Distributional Electives	3	秋季 Autumn	机械 Sch. of Mech. Eng.	
	起重机电气控制系统 Electrical Control System of Crane	限修 Distributional Electives	2	秋季 Autumn	机械 Sch. of Mech. Eng.	

	机械制造工艺学 Mechanical Manufacturing Technology	限修 Distributional Electives	3	秋季 Autumn	机械 Sch. of Mech. Eng.	机械制造方向 Major of Mechanical Manufacturing
	机床数控及加工技术 CNC and Machining Technology of Machine Tools	限修 Distributional Electives	2	秋季 Autumn	机械 Sch. of Mech. Eng.	
	机械制造工艺装备设计 Mechanical Manufacturing Process Equipment Design	限修 Distributional Electives	2	秋季 Autumn	机械 Sch. of Mech. Eng.	
	自动化制造系统 Automated Manufacturing System	限修 Distributional Electives	1	秋季 Autumn	机械 Sch. of Mech. Eng.	
	机电系统建模与仿真 Modeling and Simulation of electromechanical systems	限修 Distributional Electives	2	秋季 Autumn	机械 Sch. of Mech. Eng.	机械电子方向 Major of Mechanical and Electronic
	机电系统故障诊断 Fault Diagnosis of Electromechanical System	限修 Distributional Electives	2	秋季 Autumn	机械 Sch. of Mech. Eng.	
	机电一体化系统设计 Mechatronics System Design	限修 Distributional Electives	2	秋季 Autumn	机械 Sch. of Mech. Eng.	
	机器人技术 Robot Technology	限修 Distributional Electives	2	秋季 Autumn	机械 Sch. of Mech. Eng.	
实践环节 10 学分 Practice Courses 10 Credits	机械原理课程设计 Mechanical Principles Curriculum Design	必修 Compulsory	1	短 2 Short Semester 2	机械 Sch. of Mech. Eng.	
	机械设计课程设计 Mechanism Curriculum Design	必修 Compulsory	1	春季 Spring	机械 Sch. of Mech. Eng.	
	毕业设计（论文） Graduation Design (Thesis)	必修 Compulsory	8	春季 Spring	机械 Sch. of Mech. Eng.	
总学分 Total Credits			61			