

机械设计制造及其自动化专业培养方案

Programme Specification for Mechanical Engineering

I. 专业介绍 Introduction

西南交通大学的机械类专业始建于1919年，历史悠久，学风严谨，面向轨道交通机车车辆、大型施工装备领域，为我国培养了大批优秀人才。利兹学院机械专业综合西南交通大学与利兹大学的办学优势，将机械工程技术与新兴的电子信息技术相结合，专业化的机械装备和综合化的设计、制造、控制技术相渗透，培养具有国际视野和开拓精神的专业人才。专业人才培养以“厚基础、强分析、重能力”为特色，注重培养学生工程设计分析能力、创新综合能力、计算机应用能力和外语应用能力。

The mechanical programme of Southwest Jiaotong University founded in 1919 has a long history and rigorous academic atmosphere. It focuses on the field of the rail transit rolling stock and large-scale construction equipment, and has nurtured a large number of outstanding talents for our country up to now. Integrating the advantages of Southwest Jiaotong University and Leeds University, the Mechanical Engineering programme in the Joint School aims to train professional talents with international vision and pioneering spirit by combining the mechanical engineering technology with the emerging electronic information technology and permeating the specialized mechanical equipment with the integrated design, manufacturing and control technology. The professional talent training of this programme is characterized by "strong foundation, excellent analyzing capability and good comprehensive ability". Hence, it concentrates on cultivating the design & analysis ability, the comprehensive innovative ability, the computer application ability and the foreign language application ability of the students.

专业代码: 080202H

Programme Code: 080202H

专业名称: 机械设计制造及其自动化

Programme Name: Mechanical Engineering

II. 培养目标 Objectives

本专业学习机械设计制造及其自动化的基本原理和基础知识，注重培养学生的工程技能、创新能力和英语语言读写能力，综合应用机械工程技术与电子信息技术解决工程实际问题。培养具有国际视野、批判性思维、自我发展能力，具备从事机械工程领域设计制造、科研开发和经营管理工作能力的开拓型高级工程技术人员。

Students of this programme learn the basic principles and elementary knowledge about the mechanical design, manufacturing and automation engineering. Special attentions are paid to cultivating their engineering skills, innovative ability and English reading & writing capabilities, and to applying the comprehensive knowledge of mechanical engineering and electronic information to solve practical engineering problems. The programme aims to cultivate pioneering senior engineering and technical personnel with an international vision, critical thinking, self-development capability and the ability to engage in design and manufacturing, scientific research and management in the field of mechanical engineering.

III. 专业毕业要求 **Graduation Requirements**

在专业学习结束时，学生应：

1. 理解机械设计、制造和自动化工程的基本原理，包括：机械装置和制造工艺、无过度振动和过大应力的机构有效使用方法、低环境污染和交通能耗的能源利用技术。
2. 结合批判性思维、解析法和实践技能，理解并应用固体力学、热流体学、材料学、设计学、制造学和计算学等核心学科知识，以及数学和电子学的辅助学科知识。
3. 在最后一年的专业学习中，通过选择和开展利兹大学-西南交通大学活跃于各领域学者指定的系列设计题目，以确保掌握前沿的知识。
4. 理解工程业务问题，包括：财务、法律、市场营销、成本、风险和管理等。
5. 理解工程师对社会的责任，并能够处理环境、健康和安全管理相关的问题。
6. 具有参加工业研讨会和参观活动的经历。
7. 具备独立学习、实践、团队合作和沟通能力。
8. 准备好就业于广大工程领域，或攻读工程相关的研究生学位，以便获得特许工程师认证。
9. 精通英语，可作为机械工程师参与国际合作相关工作。

At the end of the programme students should:

Understand the basic principles of Mechanical Design, Manufacturing and Automation Engineering. It includes machinery and manufacture, the efficient use of mechanisms without excessive vibrations and stresses, energy utilization with minimal pollution of the environment and transport.

Understand and apply with critical, analytical and practical skills, the core subject areas of solid mechanics, thermo-fluids, materials, design, manufacture and computing, together with supporting subjects in mathematics and electronics.

Specialise in the final year by selecting from a range of subjects that are led by active researchers in the field in both Leeds and SWJTU, ensuring state of the art knowledge.

Understand issues of engineering business matters such as: finance, law, marketing, cost, risk and management.

Understand the responsibilities of an engineer to society and to deal with issues such as the environment and health and safety.

Be exposed to industrial seminars and visits.

Develop independent study, practical, team working and communication skills.

Be prepared for employment within a wide range of engineering disciplines, or to study for a postgraduate degree in engineering, and to obtain accreditation as a Chartered Engineer (CEng).

Be proficient in the English language in order to be able to work internationally as Mechanical Engineers.

IV. 学制与学位 **Duration and Degree**

学制：

四年制 Duration: 4 Years

学位：

西南交通大学 Southwest Jiaotong University

工学学士 Degree: Bachelor of Engineering

利兹大学 University of Leeds

分级荣誉工学学士学位 Degree: Bachelor of Engineering with Classified Honours

V. 主干学科与专业核心课程 Main Subject and Specialized Core Course

主干学科：机械工程、力学

Main Subject: Mechanical Engineering, Mechanics

专业核心课程: 物理1：力学与波、物理2：热学和电磁学、数学1、数学2、英语、设计与制造1、工程分析中的计算机应用、热流体1、固体力学、工程材料、工程数学、经济与管理、设计与制造2、振动与控制、工程力学、机电一体化和测量系统、热流体2、增材制造、有限元分析、车辆设计与分析、热流体3

Specialized Core Course: Physics 1: Mechanics and Waves, Physics 2: Thermodynamics and Electricity, Mathematics 1, Mathematics 2, English for Engineering, Design and Manufacture 1, Computers in Engineering Analysis, Thermofluids 1, Solid Mechanics, Engineering Materials, Engineering Mathematics, Economics and Management, Design and Manufacture 2, Vibration and Control, Engineering Mechanics, Mechatronics and Measurement Systems, Thermofluids 2, Additive Manufacturing, Finite Element Methods of Analysis, Vehicle Design and Analysis, Thermofluids 3

VI. 毕业学分基本要求 Basic Requirements of Credits for Graduation

课程体系 Curriculum System		学分要求 Credits Requirements						
		必修 Compulsory		限修 Distributional Electives		任选 Free Electives		小计 Subtotal
		理论 Theory	实践 Practice	理论 Theory	实践 Practice	理论 Theory	实践 Practice	
学科与专业基础课程 Discipline and Specialty Foundational Courses	数学与自然科学基础课 Foundational Courses on Mathematics and Natural Science (专业核心课程 Specialized Core Course)	16	2					18
	专业基础课 Professional Foundational Courses (专业核心课程 Specialized Core Course)	18	0					18
专业课程 Specialized Courses	专业核心课程 Specialized Core Course	7	11	41	19			78
实习实践教学 Practice Courses	专业实践 Specialty Practices	0	0					0
	毕业设计 Graduation Design	0	12					12
附加环节 Additional Part	跨学科课程 Interdisciplinary Courses					0	0	0

公共基础课程 Public Basic Courses	思想政治类 Ideological Politics Courses	15	2					17
	军事类 Military Courses	2	2					4
	体育类 Physical Education Courses		4					4
必修环节 Compulsory Part	大学生综合素质提升、学生体质达标测评 Comprehensive Quality Improvement Courses for College Students, Assessment of Students' Physical Fitness	0	0					0
总 计 Total								151

VII. 课程设置细化表 Course Programs Table

学科与专业基础课程 Discipline and Specialty foundational Courses 共 36 学分，其中必修 36 学分，限选 0 学分，任选 0 学分 A total credits of 36, including 36 for compulsory courses, 0 for distributional electives and 0 for free electives								
课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实践 学分 In-class Practice Credits	开课学期 Semester	开课学院 School	支撑毕业要求 指标点 Indicators which Support Graduation Requirements	备注 Notes
数学与自然科学 基础课 Foundational Courses on Mathematics and Natural Science (专业核心课程 Specialized Core Course)	物理 1: 力学与波 Physics 1: Mechanics and Waves	必修 Compulsory	4.5	1	第 1 学期 1St semester	利兹学院 SWJTU-Leeds Joint School	2	升级课程
	物理 2: 热学和电磁学 Physics 2: Thermodynamics and Electricity	必修 Compulsory	4.5	1	第 2 学期 2Nd semester	利兹学院 SWJTU-Leeds Joint School	2	升级课程
	数学 1 Mathematics 1	必修 Compulsory	4.5	0	第 1 学期 1St semester	利兹学院 SWJTU-Leeds Joint School	2	升级课程
	数学 2 Mathematics 2	必修 Compulsory	4.5	0	第 2 学期 2Nd semester	利兹学院 SWJTU-Leeds Joint School	2	升级课程

专业基础课 Professional Foundational Courses (专业核心课程 Specialized Core Course)	英语 English for Engineering	必修 Compulsory	18	0	第 1-2 学期 1St -2Nd semester	利兹学院 SWJTU- Leeds Joint School	9	升级课程
专业课程 Specialized Courses 共 78 学分, 其中必修 18 学分, 限选 60 学分 (第 3,4 学期限选至少 4 门 24 学分, 第 5,6 学期限选至少 4 门 24 学分, 第 7,8 学期限选至少 2 门 12 学分), 选修 0 学分 A total credits of 78, including 18 for compulsory courses, 60 for distributional electives and 0 for optional electives								
课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实践学分 In-class Practice Credits	开课学期 Semester	开课学院 School	支撑毕业要求 指标点 Indicators which Support Graduation Requirements	备注 Notes
专业核心课程 Specialized Core Course	设计与制造 1 Design and Manufacture 1	必修 Compulsory	6	5	第 3-4 学期 3Rd-4Th semester	利兹学院 SWJTU- Leeds Joint School	1, 5, 7	升级课程
	工程分析中的 计算机应用 Computers in Engineering Analysis	限修 Distributional	6	4	第 3-4 学期 3Rd-4Th semester	利兹学院 SWJTU- Leeds Joint School	1, 2	
	热流体 1 Thermofluids 1	限修 Distributional	6	2	第 3-4 学期 3Rd-4Th semester	利兹学院 SWJTU- Leeds Joint School	2	
	固体力学 Solid Mechanics	限修 Distributional	6	3	第 3-4 学期 3Rd-4Th semester	利兹学院 SWJTU- Leeds Joint School	2	
	工程材料 Engineering Materials	限修 Distributional	6	1	第 3-4 学期 3Rd-4Th semester	利兹学院 SWJTU- Leeds Joint School	2	
	工程数学 Engineering Mathematics	限修 Distributional	6	2	第 3-4 学期 3Rd-4Th semester	利兹学院 SWJTU- Leeds Joint School	2	
	经济与管理 Economics and Management	必修 Compulsory	6	3	第 5-6 学期 5Th-6Th semester	利兹学院 SWJTU- Leeds Joint School	4	升级课程
	设计与制造 2 Design and Manufacture 2	限修 Distributional	6	4	第 5-6 学期 5Th-6Th semester	利兹学院 SWJTU- Leeds Joint School	1, 5, 7	
	振动与控制 Vibration and Control	限修 Distributional	6	3	第 5-6 学期 5Th-6Th semester	利兹学院 SWJTU- Leeds Joint School	1	
	工程力学 Engineering Mechanics	限修 Distributional	6	2	第 5-6 学期 5Th-6Th semester	利兹学院 SWJTU- Leeds Joint School	2	

专业核心课程 Specialized Core Course	机电一体化和测量系统 Mechatronics and Measurement Systems	限修 Distributional	6	1	第 5-6 学期 5Th-6Th semester	利兹学院 SWJTU-Leeds Joint School	1, 2	
	热流体 2 Thermofluids 2	限修 Distributional	6	2	第 5-6 学期 5Th-6Th semester	利兹学院 SWJTU-Leeds Joint School	2	
	增材制造 Additive Manufacturing	必修 Compulsory	6	3	第 7-8 学期 7Th-8Th semester	利兹学院 SWJTU-Leeds Joint School	1	升级课程
	有限元分析 Finite Element Methods of Analysis	限修 Distributional	6	3	第 7-8 学期 7Th-8Th semester	利兹学院 SWJTU-Leeds Joint School	1, 2	
	车辆设计与分析 Vehicle Design and Analysis	限修 Distributional	6	3	第 7-8 学期 7Th-8Th semester	利兹学院 SWJTU-Leeds Joint School	1, 2	
	热流体 3 Thermofluids 3	限修 Distributional	6	2	第 7-8 学期 7Th-8Th semester	利兹学院 SWJTU-Leeds Joint School	2	
	机器人技术和机器智能 Robotics and Machine Intelligence	限修 Distributional	6	1	第 7-8 学期 7Th-8Th semester	利兹大学 University of Leeds		
实习实践教学 Practice Course 共 12 学分，其中必修 12 学分，限选 0 学分，任选 0 学分 A total credits of 12, including 12 for compulsory courses, 0 for distributional electives and 0 for free electives								
课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实践学分 In-class Practice Credits	开课学期 Semester	开课学院 School	支撑毕业要求指标点 Indicators which Support Graduation Requirements	备注 Notes
专业实践 Specialty Practices	数学应用与实践 Application and Practice of Mathematics	必修 Compulsory	0	0	短 1 学期 Short Semester 1	利兹学院 SWJTU-Leeds Joint School		
	专业认知实践 Professional Cognitive Practice	必修 Compulsory	0	0	短 1 学期 Short Semester 1	利兹学院 SWJTU-Leeds Joint School		
	英语进阶 Advanced English	必修 Compulsory	0	0	短 2 学期 Short Semester 2	利兹学院 SWJTU-Leeds Joint School		
	金工实习 Metalworking Practice	必修 Compulsory	0	0	短 2 学期 Short Semester 2	利兹学院 SWJTU-Leeds Joint School		
	智能机械系统实训 Intelligent Mechanical System Training	必修 Compulsory	0	0	短 3 学期 Short Semester 3	利兹学院 SWJTU-Leeds Joint School		

毕业设计 Graduation Design	毕业设计 Individual Engineering Project	必修 Compulsory	12	12	第 7-8 学期 7Th -8Th semester	利兹学院 SWJTU- Leeds Joint School	3	
附加环节 Additional Part 共 0 学分，其中必修 0 学分，限选 0 学分，任选 0 学分 A total credits of 0, including 0 for compulsory courses, 0 for distributional electives and 0 for free electives								
课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实践 学分 In-class Practice Credits	开课学期 Semester	开课学院 School	支撑毕业要求 指标点 Indicators which Support Graduation Requirements	备注 Notes
跨学科课程 Interdisciplinary Courses	工程沟通与交流技巧 Engineering Communication Skills	必修 Compulsory	3	0	第 3-4 学期 3Rd -4Th semester	利兹学院 SWJTU- Leeds Joint School	5, 7	不做毕业学分要求
	工程沟通与交流技巧 2 Engineering Communication Skills 2	必修 Compulsory	1.5	0	第 5-6 学期 5Th-6Th semester	利兹学院 SWJTU- Leeds Joint School	5, 7	不做毕业学分要求
公共基础课程 Public Basic Courses 共 25 学分，其中必修 25 学分，限选 0 学分，任选 0 学分 A total credits of 25, including 25 for compulsory courses, 0 for distributional electives and 0 for free electives								
课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实践 学分 In-class Practice Credits	开课学期 Semester	开课学院 School	支撑毕业要求 指标点 Indicators which Support Graduation Requirements	备注 Notes
思想政治类 Ideological Politics Courses	思想道德修养与法律基础 The Ideological and Moral Cultivation and Legal Basis	必修 Compulsory	3	0.4	第 1 学期 1St semester	马院 School of Marxism	4, 5	
	中国近现代史纲要 Conspectus of Chinese Modern History	必修 Compulsory	3	0.4	第 2 学期 2 Nd semester	马院 School of Marxism	5	
	马克思主义基本原理 The Basic Principles of Marxism	必修 Compulsory	3	0.4	第 3 学期 3Rd semester	马院 School of Marxism	5	
	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 Theoretical System of Socialism with Chinese Characteristics	必修 Compulsory	3	0.4	第 5 学期 5Th semester	马院 School of Marxism	5	
	习近平新时代中国特色社会主义思想概论 Outline of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	必修 Compulsory	3	0.4	第 6 学期 6Th semester	马院 School of Marxism	5	
	形势与政策 I Situation and Policy I	必修 Compulsory	0	0	第 1 学期 1St semester	马院 School of Marxism	4, 5	

	形势与政策 II Situation and Policy II	必修 Compulsory	0	0	第 2 学期 2Nd semester	马院 School of Marxism	4, 5	
	形势与政策 III Situation and Policy III	必修 Compulsory	0	0	第 3 学期 3Rd semester	马院 School of Marxism	4, 5	
	形势与政策 IV Situation and Policy IV	必修 Compulsory	0	0	第 4 学期 4Th semester	马院 School of Marxism	4, 5	
	形势与政策 V Situation and Policy V	必修 Compulsory	0	0	第 5 学期 5Th semester	马院 School of Marxism	4, 5	
	形势与政策 VI Situation and Policy VI	必修 Compulsory	0	0	第 6 学期 6Th semester	马院 School of Marxism	4, 5	
	形势与政策 VII Situation and Policy VII	必修 Compulsory	0	0	第 7 学期 7Th semester	马院 School of Marxism	4, 5	
	形势与政策 VIII Situation and Policy VIII	必修 Compulsory	2	0	第 8 学期 8Th semester	马院 School of Marxism	4, 5	
军事类 Military Courses	军事理论 Military Theories	必修 Compulsory	2	0	第 1 学期 1St semester	武装部 Security Office	5	
	军事技能 Military Skills	必修 Compulsory	2	2	短 1 学期 Short Semester 1	武装部 Security Office	5	
体育类 Physical Education Courses	体育 I Physical Education I	必修 Compulsory	1	1	第 1 学期 1St semester	体育 School of Sports	8	
	体育 II Physical Education II	必修 Compulsory	1	1	第 2 学期 2Nd semester	体育 School of Sports	8	
	体育 III Physical Education III	必修 Compulsory	0.5	0.5	第 3 学期 3Rd semester	体育 School of Sports	8	
	体育 IV Physical Education IV	必修 Compulsory	0.5	0.5	第 4 学期 4Th semester	体育 School of Sports	8	
	体育健康课程 I Diversified Physical Education Courses I	必修 Compulsory	0.5	0.5	第 5 学期 5Th semester	体育 School of Sports	8	
	体育健康课程 II Diversified Physical Education Courses II	必修 Compulsory	0.5	0.5	第 6 学期 6Th semester	体育 School of Sports	8	
必修环节 A compulsory part 共 0 学分, 其中必修 0 学分, 限选 0 学分, 任选 0 学分 A total credits of 0, including 0 for compulsory courses, 0 for distributional electives and 0 for free electives								

课程类型 Course Type	课程名称 Course Name	课程性质 Nature of Course	总学分 Credits	课内实践 学分 In-class Practice Credits	开课学期 Semester	开课学院 School	支撑毕业要求 指标点 Indicators which Support Graduation Requirements	备注 Notes
大学生综合素质提升、学生体质达标测评 Comprehensive Quality Improvement Courses for College Students, Assessment of Students' Physical Fitness	大学生综合素质提升（第二、第三课堂） Comprehensive Quality Improvement Courses for College Students (The Second and Third Classroom)	必修 Compulsory	0	0	1-8 学期 1-8 semester	校团委 Communist Youth League Committee	8, 9	
	学生体质达标测评 Assessment of Students' Physical Fitness	必修 Compulsory	0	0	秋季学期 fall semester	体育 School of Sports	8	
学分总计 Total Credits			151 学分 151 Credits					