

材料成型及控制工程专业辅修培养方案

Materials Forming and Control Engineering

一、培养目标 Objectives

培养具有良好的综合素养，掌握机械、材料、电气控制、信息等学科基础知识和材料成形原理、工艺、结构、质量控制及装备设计等专业知识，能够在装备制造、工程建设特别是交通运输装备制造及铁路工程建设等领域，从事科技研发、设计制造、生产组织与管理的复合型高级工程技术人才。

目标 1：具备良好的人文、科学素养，职业操守和社会责任感；

目标 2：能够综合运用机械、材料、电气控制、信息等学科基础知识和材料成形原理、工艺、结构、质量控制及装备设计等专业知识制定材料成型加工工艺，开展工艺评定；

目标 3：能够在装备制造特别是交通运输装备制造及铁路工程建设等行业，胜任技术开发、设计制造、生产组织与管理等工作，具备从事科研工作的基本能力；

目标 4：具有较强的工程实践能力和创新能力，并具备随社会和科技的进步不断学习以适应社会和职业发展的能力。

Students are nurtured to be compound senior engineering and technical talents with good comprehensive quality. They are expected to master the basic knowledge of mechanical, materials, electrical control, information, etc, as well as the professional knowledge of material forming principles, processes, structures, quality control and equipment design. Moreover, they are expected to be able to engage in scientific research, design and manufacturing, production organization and management in the field of equipment manufacturing, engineering construction, especially transportation equipment manufacturing and railway engineering construction.

Objective 1: Good humanistic and scientific quality, professional ethics and social responsibility.

Objective 2: Enable to comprehensively apply basic knowledge of mechanical, material, electrical control, information and other disciplines, as well as professional knowledge

of material forming principle, process, structure, quality control and equipment design to formulate material forming process and carry out process evaluation.

Objective 3: Capable of technical development, design and manufacturing, production organization and management in equipment manufacturing, especially transportation equipment manufacturing, railway engineering construction and other industries, and basic ability to engage in scientific research.

Objective 4: Strong engineering practice ability and innovation ability, and the ability to adapt to society and professional development with the progress of society, science and technology.

二、培养要求 Requirement

(1) 素质结构要求

1) 热爱社会主义祖国，拥护中国共产党的领导，掌握马克思主义、毛泽东思想和邓小平理论的基本原理；

2) 具有良好的思想品德和较强的事业心、责任感和艰苦务实、团结合作的精神；

3) 具备健康的体魄、健全的心理和良好的卫生习惯，具有科学的人生观、价值观和世界观；

(2) 知识结构要求

1) 掌握计算机基本知识，具备较强的操作能力和计算机应用能力，熟练应用 AutoCAD 等专业必需软件，具有较强的母语表达能力和良好的外语知识；

2) 具有良好的人文艺术和社会科学基础，较强的分析、思维和想象力，自觉的批判意识及创新精神；具有一定的市场经济、管理、法律法规知识，具有良好的人际交往能力和团队合作精神；

3) 系统地掌握本专业所需的机械、材料、电气控制等自然科学基础理论，掌握专业所需的机械设计、制图、电气控制、材料开发及性能评价、实验等基本知识；

4) 系统掌握材料成形原理、材料成形工艺、材料成形结构、材料成形质量控制及装备设计等专业领域知识。

(3) 能力结构要求

- 1) 能利用数据库、图书馆、网络查阅专业及专业相关文献；
- 2) 能够自学专业相关知识，能正确分析工程实际问题和开展工程设计；
- 3) 能够独立设计实验方案，具有良好的实践动手能力、创新能力和组织协调能力；
- 4) 能够根据工程需要，正确的设计材料成型结构、合理地选择材料成形方法、制定切实可行的材料成形工艺、能够制定材料成形质量控制措施、设计材料成形过程中必需的装备。

(1) Requirement of quality structure

- 1) Love the socialist motherland, support the leadership of the communist party of China, master the basic principles of Marxism, Mao Zedong thought and Deng Xiaoping theory.
- 2) Good ideology and morality, strong enterprise, sense of responsibility, and spirits of arduous struggle, union and cooperation.
- 3) Possess of healthy body, sound psychology and good health habits, scientific philosophy, values and worldview.

(2) Requirement of knowledge structure

- 1) Master the basic computer knowledge, possessing strong abilities of computer operation and application, skilled use of AutoCAD and other professional necessary software, and strong native language expression ability and good foreign languages knowledge.
- 2) Good foundation of humanities, arts and social sciences, strong analysis, thinking and imagination, self-conscious critical consciousness and innovative spirit, good knowledge of market economy, management, laws and regulations, good interpersonal skills and teamwork spirit.
- 3) Systematically master the basic theory of natural science, such as machinery, materials and electrical control, and the basic knowledge of machine design, drawing, electrical control, material development as well as performance evaluation and experiments.
- 4) Systematic master the professional field knowledge of material forming principles,

material forming processes, material forming structures, material forming quality control and equipment design.

(3) Requirement of ability structure

- 1) Enable to use database, library and network to consult professional and relevant professional literatures.
- 2) Enable to self-study professional knowledge, correctly analyze engineering problems and carry out engineering design.
- 3) Enable to independently design experimental schemes with good abilities of manipulation, innovation, organization and coordination.
- 4) According to the engineering needs, correctly design material forming structures, reasonably select material forming methods, formulate feasible material forming processes and quality control measures, as well as necessary equipment design in material forming processes.

三、学分要求 Credits Requirements

30 学分，学制 3 年

四、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
学科与专业 基础课程 Discipline and Specialty foundation al Courses	材料科学基础 BI Fundamentals of Materials Science BI	必修 Compulsory	3	第 4 学期 Semester 4	材料科学与工 程 学院 School of Materials Science and Engineering	
	材料科学基础 BII Fundamentals of Materials Science BII	必修 Compulsory	2	第 5 学期 Semester 5	材料科学与工 程 学院 School of Materials Science and Engineering	
	材料科学基础实验方法 I Experiments in Material Science I	必修 Compulsory	0.5	第 4 学期 Semester 4	材料科学与工 程 学院 School of Materials Science and Engineering	

	材料科学基础实验方法 II Experiments in Material Science II	必修 Compulsory	0.5	第 5 学期 Semester 5	材料科学与工程学院 School of Materials Science and Engineering	
专业核心课程 Specialized Core Course	轨道交通材料导论 Introduction to Rail Transit Materials	必修 Compulsory	2	第 2 学期 Semester 2	材料科学与工程学院 School of Materials Science and Engineering	
	材料成型加工基础 (双语) Fundamentals of Materials Forming and Processing(bilingual teaching)	必修 Compulsory	2	第 5 学期 Semester 5	材料科学与工程学院 School of Materials Science and Engineering	
	焊接方法与设备 B Welding methods and equipment B	必修 Compulsory	2	第 6 学期 Semester 6	材料科学与工程学院 School of Materials Science and Engineering	
	弧焊电源 Power source of arc welding	必修 Compulsory	2	第 6 学期 Semester 6	材料科学与工程学院 School of Materials Science and Engineering	
	焊接结构 B Welded structure B	必修 Compulsory	2	第 6 学期 Semester 6	材料科学与工程学院 School of Materials Science and Engineering	
	焊接冶金 B Welding Metallurgy B	必修 Compulsory	2	第 6 学期 Semester 6	材料科学与工程学院 School of Materials Science and Engineering	
	材料焊接性 Welding Metallurgy	必修 Compulsory	2	第 7 学期 Semester 7	材料科学与工程学院 School of Materials Science and Engineering	
	传热及传质 Heat and Mass Transfer	必修 Compulsory	2	第 5 学期 Semester 5	材料科学与工程学院 School of Materials Science and Engineering	
	无损检测 (双语) Nondestructive Test (bilingual teaching)	必修 Compulsory	2	第 7 学期 Semester 7	材料科学与工程学院 School of Materials Science and Engineering	

专业限修课程 Specialized Restricted Courses	智能焊接技术模块 Intelligent welding technology	材料成型控制基础 Fundamental of Material Forming and Control	限修 Distributional Elective	2	第 6 学期 Semester 6	材料科学与工程学院 School of Materials Science and Engineering	三个课程体系中选修一个限修 6 学分 Choose one of the three course systems。 Limited to 6 credits		
		材料成型数值模拟 Simulation of Material Forming	限修 Distributional Elective	2	第 7 学期 Semester 7	材料科学与工程学院 School of Materials Science and Engineering			
		智能焊接基础 Fundamentals of Intelligent Welding	限修 Distributional Elective	2	第 7 学期 Semester 7	材料科学与工程学院 School of Materials Science and Engineering			
	增材制造技术模块 Additive manufacturing technology	增材制造工艺方法与原理 Additive manufacturing process methods and principles	限修 Distributional Elective	2	第 6 学期 Semester 6	材料科学与工程学院 School of Materials Science and Engineering			
		增材制造检测技术 Additive manufacturing testing technology	限修 Distributional Elective	2	第 7 学期 Semester 7	材料科学与工程学院 School of Materials Science and Engineering			
		增材制造材料 Additive manufacturing materials	限修 Distributional Elective	2	第 7 学期 Semester 7	材料科学与工程学院 School of Materials Science and Engineering			
	电子封装及微纳连接技术模块 Electronic packaging and micro connection technology	微连接原理及方法 Principles and methods of microconnection	限修 Distributional Elective	2	第 6 学期 Semester 6	材料科学与工程学院 School of Materials Science and Engineering			
		微纳加工技术 Micro nano processing technology	限修 Distributional Elective	2	第 7 学期 Semester 7	材料科学与工程学院 School of Materials Science and Engineering			
		电子封装可靠性数值模拟 Numerical simulation of electronic packaging reliability	限修 Distributional Elective	2	第 7 学期 Semester 7	材料科学与工程学院 School of Materials Science and Engineering			
	总学分 Total Credits				30				