

材料成型及控制工程

一、培养目标

本专业培养的是能适应社会主义现代化建设需要的，德智体全面发展的，具备材料加工和模具设计基础知识与应用能力，能在工业生产第一线从事材料开发、材料检测以及材料加工领域内的设计制造、试验研究、运行管理和经营销售等方面的应用型高级专门人才。

二、基本规格要求

本专业学生主要学习材料成型及各类加工工艺的基础理论与技术和有关设备的设计方法，受到现代机械工程师的基本训练，具有从事相应热加工工艺及设备设计、生产组织管理的基本能力。

较系统地掌握本专业领域宽广的技术理论基础知识，主要包括力学、机械学、电工与电子技术、塑性力学及成型基本原理、自动化基础知识；具有本专业必需的制图、计算、测试、文献检索和基本工艺操作等基本技能及较强的计算机和外语应用能力；具有本专业所必需的专业知识，了解科学前沿及发展趋势；具有较强的自学能力、创新意识和较高的综合素质。

三、培养特色

本专业学生要求掌握以下六项核心能力：

1. 具有较扎实的自然科学基础，较好的人文、艺术和社会科学基础的能力；
2. 具有铸造相关的基础理论及工艺设计方面的能力；
3. 具有模具相关的基础理论及工艺设计方面的能力；
4. 具有焊接相关的基础理论及工艺设计方面的能力；
5. 具有塑性成形相关的基础理论及工艺设计方面的能力；
6. 计算机仿真相关的基础理论及工艺设计方面。

四、学制、毕业基本要求及学位授予

1. 本科基本学制 4 年，弹性学习年限 3—6 年，按照学分管理制度管理。

2. 材料成型及控制工程专业学生毕业最低学分数为 170 学分，其中各类别课程及环节要求学分数如下表：

课程类别	通识必修	学门核心	学类核心	专业核心	专业选修	通识选修	集中实践	合计
学分数	27	24	36	19	22	8	34	170

3. 学生修满培养方案规定的必修课、选修课及有关环节，达到规定的最低毕业学分数，并修完规定必修但不记学分的所有课程和环节，德、智、体合格，即可毕业。满足学位授予相关文件要求的，授予工学学士学位。

五、课程设置及学分分布

(一) 通识教育课程 [必修 27 (+6) 学分 + 选修 8 学分]

通识教育课程包括必修和选修两部分。通识选修课程按《湖南大学通识选修（文化素质教育）课程方案》实施，通识必修课程如下：

编码	课程名称	学分	备注
GE01101	毛泽东思想和中国特色社会主义理论体系概论	3 (+3)	
GE01039	思想道德修养与法律基础	1.5 (+1.5)	
GE01100	形势与政策	0.5 (+1.5)	
GE01102	中国近现代史纲要	2	
GE01103	马克思主义基本原理 (上)	2	
GE01104	马克思主义基本原理 (下)	2	
GE01012 (-15)	大学英语	8	
GE01088	计算机基本能力测试	0.5	
GE01093	计算机导论与程序设计	2.5	
GE01107 (-13)	心理素质与生涯发展	1	
GE01089 (-92)	体育	4	

(二) 学门核心 (24 学分)

编码	课程名称	学分	备注
GE03025 (26)	高等数学 A	10	
GE03003	线性代数 A	3	
GE03004	概率论与数理统计 A	3	
GE03005 (06)	普通物理 A	6	
GE03007 (08)	普通物理实验 A	2	
		24	

(三) 学类核心 (36 学分)

编码	课程名称	学分	备注
CH04020	工程图学	3	
GE02010	电子技术	2	
GE02009	电工技术	2	
MS04208	材料力学	3	
MS04209	理论力学 A	4	
MS04201	专业入门	1	
MS04202	冶金传输原理	4	
MS04203	材料成形机械设计原理	4	
MS04204	工程热力学	4	
MS04205	材料工程基础 B	4	
MS04206	材料科学基础 B	4	
MS04207	专业进展 (双语)	1	

(四) 专业核心 (19 学分)

编码	课程名称	学分	备注
MS05201	液态成形原理 A	3	
MS05202	材料测试技术 B	4	
MS05203	材料力学性能	2	
MS05204	金属塑性加工原理	4	
MS05205	金属材料及热处理	4	
MS05206	金属塑性加工工艺学	2	
合计		19	

(五) 专业方向限选课 (8 学分)

编码	课程名称	学分	备注
MS07201	模具设计与制造基础	2	
MS07202	材料成形装备	2	
MS07203	特种材料成形技术	2	
MS07204	铸造工艺学	2	

(六) 专业方向选修课 (以下课程中, 在导师指导下, 任选 14 学分的课程修读, 也可以选修其他专业的课程)

编码	课程名称	学分	备注
MS06101	电子显微技术	2	选修课 要求在导师指导下, 任选 14 学分学修读, 也可以选修其他专业的课程。
MS06102	无损检测	2	
MS06103	材料设计与计算机模拟	2	
MS06104	材料检测与技术	2	
MS06105	计算机在材料科学中的应用 (Matlab)	2	
MS06106	快速凝固技术	2	
MS06107	材料表面工程	2	
MS06108	冲压工艺及模具设计	2	
MS06109	焊接工程基础	2	
MS06110	模具 CAD/CAM	2	
MS06111	塑性加工技术	2	
MS06112	粉末冶金原理与技术	2	
MS06113	生物医用材料	2	
MS06114	复合材料	2	
MS06115	激光在材料加工中的应用	2	
MS06116	数值仿真技术在成形过程中的应用	2	
MS06117	液压与气压传动	2	
MS06118	低塑性材料成形技术	2	
MS06119	材料成型过程测量与控制	2	

(七) 集中实践 (34 学分)

课程编码	课程名称	学分	学时	备注
MS10208	专业写作训练	1	32	材料院
GE09015	程序设计训练 A	1	32	信息院
GE09006	金工实习	4	128	工训中心
GE09021	电工电子实验与实习	2	64	工训中心
MS10201	材料学科基础实验	4	128	材料院
MS10204	模块课程实验	3	96	材料院
MS10205	材料工程设计	2	64	材料院
MS10206	认识实习	1	32	材料院
MS10207	生产实习	2	64	材料院
MS10208	毕业(实习)及论文	12	384	材料院
MS10209	创新实践(含学科竞赛)	2		材料院
合计	创新创业	34	1024	

六、课程责任教师一览表

序号	姓名	职称	学历学位	专业特长	课程 (专业核心、专业选修、通识选修)
1	张 辉	教授	博士	材料加工	金属塑性加工原理、金属塑性加工工艺学、先进装备材料
2	陈 鼎	教授	博士	金属材料、粉末冶金	材料工程基础、材料力学性能、快速凝固技术、特种材料成形技术
3	张福全	教授	博士	铸造	液态成形原理
4	严红革	教授	博士	金属材料	材料科学基础 B
5	肖平安	教授	博士	粉末冶金	金属材料与热处理
6	袁武华	教授	博士	复合材料	金属塑性加工工艺学
7	陈 刚	教授	博士	金属材料	材料科学基础 B
8	郭坤琨	教授	博士	高分子化学物理、生物物理理论	材料热力学
9	傅定发	副教授	博士	材料加工	材料成形机械设计原理、材料成形设备、液压与气压传动
10	陈吉华	副教授	博士	金属材料	材料工程基础 B
11	夏伟军	副教授	博士	材料加工	金属塑性加工原理、金属塑性加工工艺学、冲压工艺及模具设计
12	滕 杰	副教授	博士	材料加工	材料力学性能、模具设计与制造基础
13	高文理	副教授	博士	铸造	冶金传输原理、液态成形原理
14	王 群	副教授	博士	模具及表面处理	金属材料及热处理
15	茶丽梅	副教授	博士	材料加工	材料测试技术、激光在材料加工中的应用、微机原理在材料加工中的应用
16	符立才	副教授	博士	表面处理	工程热力学、材料成型过程测量与控制
17	张 斌	助理教授	博士	金属材料	工程热力学、模具 CAD/CAM
18	黄建平	助理教授	博士	材料热处理	冶金传输原理、焊接工程基础
19	方铁辉	副研究员	博士	金属材料	铸造工艺学、模具设计与制造基础

七、专业责任教授

序号	姓名	职称	学历学位	专业特长	承担授课课程
01	张 辉	教授	博士	材料加工	金属塑性加工原理、金属塑性加工工艺学

Material Modeling and Control Engineering

I . Objectives

This program aims at training senior practical and specialized students who have following abilities: (a) to fit the needs of the socialist modernization construction; (b) all-round development in morals, intelligence and corporeity; (c) with the abilities in basic knowledge and application of materials processing and mold designing; (d) with the abilities in material developing and material testing of industrial production and (e) with the abilities in materials designing and manufacturing, testing and research, operation management and sales in material processing fields.

II . Basic Specifications

This major mainly involves material processing, basic theory, technology and related design methods for equipment in various processes. The modern trained mechanical engineer with the basic abilities in hot deformation processing, equipment designing and production organization and management.

The trained students could systematically master: (a) the basic theoretical knowledge in this broad major field, which mainly includes: mechanics, mechanical, electric & electronic technology, principles of plastic mechanics & metal plastic formation and basic knowledge in automatization; (b) basic techniques in this major, such as cartography, computing, testing, literature search and basic technology operations, as well as preferable application abilities in computer and foreign language; (c) obligatory professional knowledge in one special major of this field, and scientific frontier and development and (d) preferable self-study ability, innovative consciousness and comprehensive quality.

III . Characteristics

The undergraduates in this major have to master the following 6 key abilities:

1. Good foundation in science and preferable fundamental abilities in humanities, arts and social sciences;

2. Fundamental theories in casting and related abilities in industry designing;

3. Fundamental theories in mould and related abilities in industry designing;

4. Fundamental theories in welding and related abilities in industry designing;

5. Fundamental theories in plastic formation and related abilities in industry designing;

6. Fundamental theories in computer simulation and related abilities in industry designing.

IV . Length of Schooling, Basic Requirements for Graduation and Degree Conferment

1. General length of studying for undergraduate: 4 years; flexible length of studying: 3—6 years; Administration with credits system.

2. The least credit requirement for graduated student in Material Modeling and Control Engineering are 170 credit hours. And the required credits on various classes and periods are shown below:

Course Category	Required General Education Courses	Introductory Major Courses	Major Survey Courses	Required Core Courses	Restricted Electives	General Education Electives	Intensive Practice	Total
Credits	27	24	36	19	22	8	34	170

3. The undergraduate could only graduate when he/she finish; (a) the required general and compulsory, selective course and requirement in related periods; (b) the least credit requirement; (c) compulsory courses and all course and requirement in special period without credit and (d) eligible in morals, intelligence and corporeity. The graduated student could be granted the Engineering Bachelor's Degree when he/she satisfies the requirements of Bachelor's Degree shown in related documents.

V. Curriculum and Credits

1. General Education Courses [required 27+(6) + elective 8 credits]

The general education courses consist of required courses and elective courses. General education electives are designed according to the *Curriculum Design of General Education Electives of Hunan University*. Required general education courses are illustrated in the following table.

Code	Course Title	Credit(s)	Remarks
GE01101	Introduction to Maoism and Theoretical System of Socialism with Chinese Characteristics	3+(3)	
GE01039	Moral Cultivation and Law Basics	1.5+ (1.5)	
GE01100	Current Situation and Policies	0.5+ (1.5)	
GE01102	Outline of Modern Chinese History	2	
GE01103	Fundamentals of Marxism I	2	
GE01104	Fundamentals of Marxism II	2	
GE01012(-15)	College English	8	
GE01088	Computer Proficiency Test	0.5	
GE01093	Introduction to Computer Science and Programming	2.5	
GE01107(-13)	Psychological Health & Career Planning	1	
GE01089(-92)	Physical Education	4	

2. Introductory Major Courses(24 credits)

Code	Course Title	Credit(s)	Remarks
GE03025(26)	Advanced Mathematics A	10	
GE03003	Linear Algebra A	3	
GE03004	Probability and Statistics A	3	
GE03005(06)	Physics A	6	
GE03007(08)	Physical Experiments A	2	
Total		24	

3. Major Survey Courses(36 credits)

Code	Course Title	Credit(s)	Remarks
CH04020	Engineering Graphics	3	
GE02010	Electronics Technology	2	
GE02009	Electrical Engineering	2	
MS04208	Mechanics of Materials	3	
MS04209	Theoretical Mechanics A	4	
MS04201	Professional Introduction	1	
MS04202	Metallurgy Transport Principle	4	
MS04203	Principle of Materials Processing and Mechanical Designing	4	Added small classes
MS04204	Engineering Thermodynamics	4	
MS04205	Fundamentals of Materials Science B	4	
MS04206	Fundamentals of Materials Engineering B	4	
MS04207	Professional development	1	
Total		36	

4. Required Core Courses (19 credits)

	Code	Course Title	Credit(s)	Remarks
Professional Key course	MS05201	Principles of Liquid Forming A	3	
	MS05202	Materials Testing Technology B	4	
	MS05203	Mechanical Properties of Materials	2	
	MS05204	Principles of Metal Plastic Processing	4	
	MS05205	Metal Materials and Heat Treatment	4	
	MS05206	Process of Metal Plastic Processing	2	
Total			19	

5. Limited Electives (22 credits)

	Code	Course Title	Credit(s)	Remarks
Materials Processing	MS07201	Basic Mold Design and Manufacturing	2	
	MS07202	Material Forming Equipment	2	
	MS07203	Forming Technology of Special Materials	2	
	MS07204	Casting Technology	2	

6. General Education Electives (under the guidance of the tutors, students select courses with totally 14 credits in / out of the following list.)

Code	Course Title	Credit(s)	Others
MS06101	Electron Microscopy	2	Selective course; Selecting any 14 credit hour with the suggestions from supervisor
MS06102	Nondestructive Testing	2	
MS06103	Design and Numerical Simulation of Materials	2	
MS06104	Testing of Materials and Technology	2	
MS06105	The Application of Computer in Materials Science(Matlab)	2	
MS06106	Rapid Solidification Technology	2	
MS06107	Materials Surface Engineering	2	
MS06108	Stamping Process and Die Designing	2	
MS06109	Welding Engineering Foundation	2	
MS06110	Mould CAD/CAM	2	
MS06111	Plastic Processing Technology	2	
MS06112	Principle and Technology of Powder Metallurgy	2	
MS06113	Biomedical Materials	2	
MS06114	Composite Materials	2	
MS06115	Application of Laser in Material Processing.	2	
MS06116	Application of Numerical Simulation Technology in Processing	2	
MS06117	Hydraulic and Pneumatic Transmission	2	
MS06118	Low Plasticity Material Forming Technology	2	
MS06119	Material Molding Process Measurement and Controlling	2	

7. Intensive Practice (34 credits)

Code	Course Title	Credit hour	Class hours	Others
MS10208	Professional Writing Training	1	32	College of Computer Science and Electronic Engineering
GE09015	Program Design Training A	1	32	Information Institute
GE09006	Metalworking Practice	4	128	Engineering Training Center
GE09021	Electric and Electronic Experiment and Practice	2	64	Engineering Training Center
MS10201	Experiment in Materials Science	4	128	College of Materials Science and Engineering
MS10204	Module Curriculum Experiment	3	96	College of Materials Science and Engineering
MS10205	Materials Engineering Designing	2	64	College of Materials Science and Engineering
MS10206	Cognition Practice	1	32	College of Materials Science and Engineering
MS10207	Production Practice	2	64	College of Materials Science and Engineering
MS10208	Graduation (practice) and thesis	12	384	College of Materials Science and Engineering
MS10209	Innovation Practice	2	0	College of Materials Science and Engineering
Total		34	1024	

VI. List of course responsibility Teachers

No.	Name	Title	Academic Degrees and Diplomas	Major	Courses(Required core, Required Electives, General Education Electives)
1	Zhang Hui	Professor	PHD	Materials Processing	Principles of Metal Plastic Processing, Process of Metal Plastic Processing
2	Chen Ding	Professor	PHD	Metal Materials, Powder Metallurgy	Fundamentals of Materials Engineering, Mechanical Properties of Materials, Rapid Solidification Technology, Forming Technology of Special Materials
3	Zhang Fuquan	Professor	PHD	Cast	Principles of Liquid Forming
4	Yan Hongge	Professor	PHD	Metal Materials	Fundamentals of Materials Engineering B
5	Xiao Ping'an	Professor	PHD	Powder Metallurgy	Metal Materials and Heat Treatment
6	Yuan Wuhua	Professor	PHD	Composite	Process of Metal Plastic Processing
7	Chen Gang	Professor	PHD	Metal Materials	Fundamentals of Materials Engineering B
8	Guo Kun	Professor	PHD	Polymer Chemistry Physics and Biological Physics Theory	Materials Thermodynamics
9	Fu Dingfa	Associate Professor	PHD	Materials Processing	Principle of Materials Processing and Mechanical Designing, Material Forming Equipment, Hydraulic and Pneumatic Transmission
10	Chen Jihua	Associate Professor	PHD	Metal Materials	Fundamentals of Materials Engineering B
11	Xia Weijun	Associate Professor	PHD	Materials Processing	Principles of Metal Plastic Processing, Process of Metal Plastic Processing, Stamping Process and Die Designing
12	Teng Jie	Associate Professor	PHD	Materials Processing	Mechanical Properties of Materials, Basic Mold Design and Manufacturing
13	Gao Wenli	Associate Professor	PHD	Cast	Metallurgy Transport Principle, Principles of Liquid Forming
14	Wang Qun	Associate Professor	PHD	Mould and Surface Treatment	Metal Materials and Heat Treatment
15	Cha Limei	Associate Professor	PHD	Materials Processing	Materials Testing Technology, Application of Laser in Material Processing, Application of Numerical Simulation Technology in Processing
16	Fu Licai	Associate Professor	PHD	Surface Treatment	Engineering Thermodynamics, Material Molding Process Measurement and Controlling
17	Zhang bing	Assistant Professor	PHD	Metal Materials	Engineering Thermodynamics, Mould CAD/CAM
18	Huang Jianping	Assistant Professor	PHD	Materials Heat-treatment	Metallurgy Transport Principle, Application of Laser in Material Processing.
19	Fang Tiehui	Associate research fellow	PHD	Metal Materials	Casting Technology, Basic Mold Design and Manufacturing

VII. Professional Liability Professor

Code	Name	Title	Academic Degrees and Diplomas	Major	Courses
01	Zhang Hui	Professor	PHD	Materials Processing	Principles of Metal Plastic Processing, Process of Metal Plastic Processing

(翻译人:蒋福林)