

机械设计制造及其自动化专业培养方案

一、专业培养目标

本专业致力于培养具有工程科学基础、工程专业技术及管理知识，具有分析问题、解决问题、组织管理、合作交流和自主学习的能力，具有创新意识、社会责任感、职业道德及人文素养，能在机械工程及其相关领域从事生产运行与技术管理、工程设计、技术开发和科学研究等工作，能解决复杂机械工程问题的工程技术人才，期待毕业生五年左右达到以下目标：

(1) 具备良好的人文社会科学素养、职业道德及社会责任感，能够正确理解和评价复杂机械工程问题解决方案和机械工程实践对社会、安全、法律、文化及环境与可持续发展的影响，具备建设可持续发展社会的责任感。

(2) 能有效应用机械工程学科领域工程科学基础、工程专业技术及管理知识，解决复杂工程问题；具备较丰富的工程经验，深刻了解所属工程部门的特点、管理体系和质量标准，能提出专业独立技术见解，能承担机械工程复杂问题研究、机械系统设计与开发、工程管理工作；

(3) 具备管理工作团队及协调项目的活动能力，能正确认识项目团队中的角色定位，能够组织制定工作计划并有效实施；

(4) 能应对科技发展挑战，掌握新兴技术，实施技术创新，具备可持续发展理念和国际化视野。

二、毕业要求

本专业主要学习机械工程的基础理论、专业技术和工程技能，接受工程实践训练，注重实践能力和工程创新能力的培养，达到下列培养要求：

(1) 工程知识：能够将数学、自然科学、工程基础和专业知识用于解决复杂机械工程问题。

(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、表达、并通过文献研究分析复杂机械工程问题，以获得有效结论。

(3) 设计 / 开发解决方案：能够设计针对复杂机械工程问题的解决方案，设计满足特定需求的系统、单元（部件）或工艺流程，并能够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。

(4) 研究：能够基于科学原理并采用科学方法对复杂工程问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

(5) 使用现代工具：能够针对复杂机械工程问题，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，包括对复杂工程问题的预测与模拟，并能够理解其局限性。

(6) 工程与社会：能够基于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机械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。

(7) 环境和可持续发展：能够理解和评价针对复杂机械工程问题的工程实践对环境、社会可持续发展的影响。

(8) 职业规范：具有人文社会科学素养、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。

(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。

(10) 沟通：能够就复杂机械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。

(11) 项目管理：理解并掌握工程管理原理与经济决策方法，并能在多学科环境中应用。

(12) 终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

三、主干学科

机械工程。

四、学制与学位

学制四年。学生修满所规定的最低毕业学分，达到毕业后，授予工学学士学位。

五、核心课程

高等数学、大学物理、大学英语、机械制图、理论力学、材料力学、机械原理、机械设计、机械制造工程、电工电子技术、机械工程控制基础、机电系统设计基础、工程机械传动系统设计。

Undergraduate Program in Mechanical Design, Manufacturing and Automation

1. Academic Objectives

This major is dedicated to cultivating engineering and technical professionals who have knowledge of engineering science, engineering expertise, and management. They have the ability to analyze problems, solve problems, management, communication, and independent learning. In addition, they have a sense of innovation, social responsibility, professional ethics, and humanities. They can be engaged in production operation and technical management, engineering design, technology development, and scientific research in mechanical engineering and related fields. Complex mechanical engineering problems can be solved by them. The students are expected to achieve the following goals in five years after they graduated:

(1) Possess good humanities and social science literacy, professional ethics, and a sense of social responsibility. Can correctly understand and evaluate the impact of complex mechanical engineering problem solutions and mechanical engineering practices on society, safety, law, culture, environment, and sustainable development. Have a sense of social responsibility for sustainable development.

(2) Be able to effectively apply knowledge of engineering science foundation, engineering expertise and management in mechanical engineering to solve complex engineering problems; have rich engineering experience, have a deep understanding of the characteristics of the engineering department, management system and quality standards, and be able to propose professional independent technologies insights, be able to study complex problems of mechanical engineering, mechanical system design and development, and engineering management.

(3) Have the ability to manage work teams and coordinate project activities, be able to understand the role positioning in the project team correctly, be able to organize and formulate work plans and implement them effectively.

(4) Be able to deal with the challenges of technological development, master emerging technologies, implement technological innovation, and possess the concept of sustainable development and a global vision.

2. Graduation Requirements

This major mainly teaches the fundamental theories, professional technology, and engineering skills of mechanical engineering. Students will undergo engineering practice training. The teaching process focuses on the cultivation of practical ability and engineering innovation ability. The following training requirements will be achieved:

(1) Engineering knowledge: be able to use mathematics, natural sciences, engineering foundations, and professional knowledge to solve complex mechanical engineering problems.

(2) Problem analysis: be able to apply basic mathematics, natural sciences, and engineering sciences to identify, express, and analyze complex mechanical engineering problems through literature research to obtain practical conclusions.

(3) Design/development solutions: be able to design solutions to complex mechanical engineering problems, design systems, units (components), or technological processes that meet specific needs; and be able to reflect the sense of innovation in the design process, considering society, health, safety, law, cultural and environmental factors.

(4) Research: be able to study complex engineering problems based on scientific principles and using scientific methods, including designing experiments, analyzing and interpreting data, and obtaining reasonable and practical conclusions through information synthesis.

(5) Use modern tools: be able to develop, select and use appropriate technologies, resources, modern engineering tools, and information technology tools for complex mechanical engineering problems, including the prediction and simulation of complex engineering problems, and be able to understand their limitations.

(6) Engineering and society: be able to conduct rational analysis based on engineering-related background knowledge, evaluate the impact of professional engineering practices and complex mechanical engineering problem solutions on society, health, safety, law, and culture, and understand the responsibilities to be undertaken.

(7) Environment and sustainable development: be able to understand and evaluate the impact of engineering practice on complex mechanical engineering problems on society's environment and sustainable development.

(8) Professional norms: Have humanities and social science literacy, a sense of social responsibility; understand and abide by engineering professional ethics and standards in engineering practice, and perform responsibilities.

(9) Individuals and teams: be able to play the roles of individuals, team members, and leaders in a team with a multi-disciplinary background.

(10) Communication: be able to effectively communicate and communicate with industry colleagues and the public on complex mechanical engineering issues, including writing reports and design manuscripts, making statements, expressing clearly, or responding to instructions. And have a specific international perspective, able to communicate and exchange in a cross-cultural context.

(11) Project management: understand and master the principles of engineering management and economic decision-making methods and apply them in a multi-disciplinary environment.

(12) Lifelong learning: Have the consciousness of independent learning and lifelong learning, and have the ability to learn and adapt continuously.

3. Main disciplines

Mechanical engineering.

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Engineering when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

Advanced Mathematics, College Physics, College English, Mechanical Drawing, Theoretical Mechanics, Material Mechanics, Theory of Machines and Mechanisms, Mechanical Design, Mechanical Manufacturing Engineering, Electrical and Electronic Technology, Control Principle of Mechanical Engineering, Fundamentals of Mechanical and Electrical System Design, Design of Transmission System of Engineering Machinery.

六、最低毕业总学分要求及学分分配 (Minimum Required Credits and Distribution)

课程模块 Course module	课程类别 Course Classification	学时数 Hours	学分 Credits	学期 Semester										
				1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education	730	40	11.25	13.25		4.25	5.25	1	3.25	1.25		0.25	0.25
	通识教育选修课程 Selective Courses of General Education	192	12											
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses	976	61	13	12		10	14		5	5		2	
	专业核心课程 Specialized Fundamental Courses	432	27					4		10	7		6	
	专业拓展课程 Specialized Development	64	4											
实践教育 Practical Education	课程实践 Course Practice	32 周+ 176 学时	34		3	5	1	4	3	3	2	5	2	6
	课外实践 Extracurricular practice	96	6											
必修课总学分 Required course credits												162		
选修课总学分 Elective course credits												22		
最低毕业总学分 Total Credits												184		

七、课程设置 (Curriculum)

1、通识教育必修课程 (Required Courses of General Education): 730 学时 (730 Hours), 40 学分 (40 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR183004	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	64	4	48	16		考试 Exam	4	
GR181012	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	32	2	28	4		考试 Exam	5	
GR181013	形势与政策 (1) Situation and Policy(1)	4	0.25	4			考查 Term Paper	1	
GR181014	形势与政策 (2) Situation and Policy(2)	4	0.25	4			考查 Term Paper	2	
GR181015	形势与政策 (3) Situation and Policy(3)	4	0.25	4			考查 Term Paper	3	
GR181016	形势与政策 (4) Situation and Policy(4)	4	0.25	4			考查 Term Paper	4	
GR181017	形势与政策 (5) Situation and Policy(5)	4	0.25	4			考查 Term Paper	5	
GR181018	形势与政策 (6) Situation and Policy(6)	4	0.25	4			考查 Term Paper	6	
GR181019	形势与政策 (7) Situation and Policy(7)	4	0.25	4			考查 Term Paper	7	
GR181020	形势与政策 (8) Situation and Policy(8)	4	0.25	4			考查 Term Paper	8	
GR301004	大学生职业生涯规划与就业指导 (1) Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR303005	大学生职业生涯规划与就业指导(2) Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301005	大学生心理素质教育(1) Mental Health (1)	16	1	16			考查 Term Paper	1	
GR303005	大学生心理素质教育(2) Mental Health (2)	16	1	16			考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36			考试 Exam	2夏	
GR081071	大学英语(1) College English (1)	64	4	64			考试 Exam	1	
GR081072	大学英语(2) College English (2)	32	2	32			考试 Exam	2	
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32			考试 Exam	2	
GR141005	体育(1)(系列课程) Physical Education (1)	32	1		32		考试 Exam	1	
GR141006	体育(2)(系列课程) Physical Education (2)	32	1		32		考试 Exam	2	
GR142007	体育(3)(系列课程) Physical Education (3)	32	1		32		考试 Exam	3	
GR142008	体育(4)(系列课程) Physical Education (4)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	40	492	222	16			

2、通识教育选修 (Selective Courses of General Education): 192 学时 (192Hours), 12 学分 (12 Credits)

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类 (含在线课程) Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分, 其中,《大学生安全教育》(1 学分) 必选。
2	自然科学类 (含在线课程) Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and Health Courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类 (含在线课程) Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5-6	3	考查 Term Paper	2-8	选修 3 个学分, 其中《新生研讨课》(1 学分) 必选。
6	审美与艺术类 Aesthetics and Art Courses	见附件 7	2	考查 Term Paper	2-4	
	总计 Total		12			

3、学科基础课程 (Disciplinary Fundamental Courses): 976 学时 (976 Hours), 61 学分 (61 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR020006	机械设计制造及其自动化专业导论 Introduction to Mechanical major	16	1	16			考查 Term Paper	1	
DR191001	高等数学 A (1) Advanced Mathematics A (1)	96	6	96			考试 Exam	1	
DR191002	高等数学 A (2) Advanced Mathematics A (2)	96	6	96			考试 Exam	2	
DR191008	大学物理 (1) College Physics (1)	48	3	48			考试 Exam	2	
DR192009	大学物理 (2) College Physics (2)	48	3	48			考试 Exam	3	
DR191010	大学化学 College Chemistry	48	3	48			考试 Exam	1	
DR192005	线性代数 Linear Algebra	32	2	32			考试 Exam	3	
DR192006	概率论与数理统计 Probability and Mathematical Statistics	48	3	48			考试 Exam	4	
DR022201	理论力学 B Theoretical Mechanics B	48	3	48			考试 Exam	3	
DR022202	材料力学 B Mechanics of Materials B	48	3	44	4		考试 Exam	4	
DR022005	工程流体力学 Engineering Fluid Mechanics	32	2	28	4		考试 Exam	4	
DR022203	热力学 Thermodynamics	32	2	32			考试 Exam	3	
DR023020	机械工程控制基础 Control Principle of Mechanical Engineering	48	3	44	4		考试 Exam	6	
DR023204	工程材料 A Engineering Materials A	48	3	42	6		考试 Exam	5	
DR021021	机械制图 (1) Mechanical Drawing (1)	48	3	48			考试 Exam	1	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR021205	机械制图(2) Mechanical Drawing (2)	48	3	48			考试 Exam	2	
DR023023	数控技术与系统 Numerical Controlled Machines and Processing Techniques	32	2	28	4		考试 Exam	6	
DR023026	互换性与测量技术 Tolerance and Verification of Geometrical Quantity	32	2	24	8		考查 Term paper	5	
DR024027	材料成型技术基础 Foundation of Material Forming Technology	32	2	24	8		考查 Term paper	7	
DR022024	计算机辅助机械设计 Computer Aided Mechanical Design	32	2	32			考试 Exam	4	
DR042126	电工电子技术 A Electrical and Electronic Technology A	64	4	50	14		考试 Exam	4	
总计 Total		976	61	924	52				

4、专业核心课程 (Specialized Core Courses): 432 学时 (432 Hours), 27 学分 (27 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SR023258	机械设计 A Mechanical Design A	64	4	56	8		考试 Exam	5	
SR023078	机械制造工程 Mechanical Manufacture Engineering	64	4	58	6		考试 Exam	5	
SR023207	机械原理 A Theory of Machines and Mechanisms A	64	4	58	6		考试 Exam	4	
SR023080	摩擦学及表面工程 Tribology and Surface Engineering	32	2	26	6		考试 Exam	6	
SR024208	机电系统设计基础 Fundamentals of Mechanical and Electrical System Design	48	3	44	4		考试 Exam	7	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SR024209	工程机械传动系统设计 Design of Transmission System of Engineering Machinery	48	3	48			考试 Exam	7	
SR023083	液压与气动传动 Hydraulic and Pneumatic Transmission	32	2	28	4		考试 Exam	5	
SR023210	测试技术 A Measuring and Testing Technology A	48	3	40	8		考试 Exam	6	
SR023211	先进制造与智能制造技术 Advanced Manufacturing and Intelligent Manufacturing Technology	32	2	32			考试 Exam	6	
总计 Total		432	27	390	42				

5、专业拓展课程 (Specialized Development Courses): 任选 64 学时 (64 Hours), 4 学分 (4 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR024025	机械工程专业英语 Specialty English for Mechanical Engineering	32	2	32			考查 Term paper	7	
DR022028	金属工艺学 Metal Technology	32	2	32			考查 Term paper	4	
SS024212	工程伦理 Engineering Ethics	16	1	16			考查 Term paper	7	
SS023213	机械工程项目管理 Mechanical Engineering Project Management	16	1	16			考查 Term paper	6	
SS022214	信息化与智能制造 Information and Intelligent Manufacturing	32	2	32			考查 Term paper	4	
SS020023	机械创新设计及理论 Mechanical Innovative Design and Theory	16	1	16			考查 Term paper	6	
SS020069	绿色制造学科前沿 Green Manufacturing Discipline Frontier	16	1	16			考查 Term paper	5	
SS024215	工程机械设计 Engineering Machine Design	32	2	32			考查 Term paper	7	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SS023216	机器人技术 Robotics	32	2	26	6		考查 Term paper	6	
SS022217	单片机与接口技术 Single Chip and Interface Technology	32	2	26	6		考查 Term paper	3	
SS024218	物联网与大数据 Internet of Things and Large Data	32	2	32			考查 Term paper	7	
总计 Total		64	4						

6、课程实践 (Course Practice): 32 周 +176 学时 (32 weeks and 176 hours), 34 学分 (34 Credits)

课程代码 Course Code	课程名称 Course Name	周数 (学时) Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Theory and Practice	2 周	2	考查 Term Paper	1 夏	
PR181010	思想政治社会实践 Political Social Practice	32 学时	2	考查 Term Paper	1 夏	
PR191045	实验物理 (1) Physics Experiments (1)	24 学时	1	考查 Term Paper	2	
PR192046	实验物理 (2) Physics Experiments (2)	24 学时	1	考查 Term Paper	3	
PR191047	实验化学 Chemistry Experiments	48 学时	2	考查 Term Paper	2	
PR022219	机械 CAD 绘图 Mechanical CAD Drawing	48 学时	2	考查 Term Paper	4	
PR021131	金工实习 (1) Metal Processing Practice (1)	1 周	1	考查 Term Paper	1 夏	
PR022152	金工实习 (2) Metal Processing Practice (2)	3 周	3	考查 Term Paper	2 夏	
PR023132	机械设计课程设计 Course Design of Mechanical Design	1 周	1	考查 Term Paper	5	

课程代码 Course Code	课程名称 Course Name	周数(学时) Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR023220	专业实习(机械) Production Practice (Mechanical Engineering)	5周	5	考查 Term paper	3夏	
PR023133	液压传动课程设计 Course Design of Hydraulic Transmission	1周	1	考查 Term paper	5	
PR024134	机电系统综合实践 Comprehensive Practice of Electromechanical System	1周	1	考查 Term paper	5	
PR024135	传动系统课程设计 Course Design of Transmission System	1周	1	考查 Term paper	7	
PR022136	机械原理课程设计 Course Design of Mechanical Principle	2周	2	考查 Term paper	4	
PR023137	先进制造综合实践 Comprehensive Practice of Advanced Manufacturing	1周	1	考查 Term paper	6	
PR024221	机械创新设计综合实践 Comprehensive Practice of Mechanical Innovative Design	1周	1	考查 Term paper	7	
PR023222	传感器与电子技术综合实践 Comprehensive Practice of Sensor and Electronic Technology	1周	1	考查 Term paper	6	
PR024110	机械工程毕业设计(论文) Mechanical Engineering Graduation Project (Thesis)	12周	6	考查 Term paper	8	
总计 Total		32周+176学时	34			

7、课外实践 (Extracurricular practice): 6 学分 (6 Credits)

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等,其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.