



Bachelor Program of Mechanical Engineering
(In English)

“机械工程专业”本科培养方案（英文授课）

培养方案

*(This document is the text compression version of the same major taught in Chinese
and only for international students)*

School of Mechanical Engineering and Automation & International School

Beihang University, Beijing, China

北京航空航天大学机械工程及自动化学院 & 国际学院

September, 2015

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一、 学院简介

I. Introduction of School of Mechanical Engineering and Automation

北京航空航天大学机械工程及自动化学院历史悠久，可追溯到 1952 年北航建校时创建的飞机工艺、发动机工艺专业教研室，1978 年后建立了制造工程系和机电工程系，1998 年 4 月 28 日，制造工程系和机电工程系合并，组建成立了机械工程及自动化学院，是北京航空航天大学最具实力的学院之一。学院学科覆盖了 5 个一级学科：机械工程、航空宇航科学与技术 and 材料科学与工程 3 个国家重点一级学科，船舶与海洋工程、设计学 2 个一级学科。下设有机械制造及其自动化、机械电子工程、机械设计及其理论、工业与制造系统工程、航空宇航制造工程和材料加工工程、船舶与海洋结构物设计制造和工业设计等 7 个二级学科。学院设有机械工程和工业设计 2 个本科专业。

With a rich history, the School of Mechanical Engineering and Automation was originally from the Departments of Aeroplane Technology and Engine Technology since Beihang University was established in 1952. In 1978, Department of Manufacturing Engineering and Department of Electronic Engineering were built, which were then merged together on April 28th 1998 to form the School of Mechanical Engineering and Automation, one of the most powerful school at Beihang University. The school has five first-level disciplines including three key national first-level disciplines (Mechanical Engineering, Aeronautical and Astronautical Science and Technology, Material Science and Engineering) and two ordinary first-level disciplines (Naval Architecture and Marine Engineering, and Science of Design). Those first-level disciplines cover seven second-level disciplines, In addition, the school has two undergraduate programs, which are Mechanical Engineering and Industrial Design.

学院师资力量雄厚，在编在岗教职工有 170 人，其中教授 49 人，副高 63 人，博导 43 人。目前学院全日制在校学生近 2000 人，其中本科生 800 余人、硕士生 750 余人、博士生 350 余人、留学生 20 余人。培养目标定位于面向国防科技工业和现代制造业、面向未来发展，具有创新品质、综合素质高、适应能力强的高级专门人才。本科教学强调理论与实践结合，注重培养学生的工程实践与创新能力；本科课程突出航空航天特色，形成了机电信相融合的教学体系。2006 年国内率先通过了“机械工程专业工程教育认证”。2008 年以来，机械工程专业获得教育部“专业综合改革试点”、“卓越工程师教育培养计划”、“国家级与北京市特色专业”、以及“工信部重点专业”等。《工程图学》为国家级精品课程，《机械设计》等 3 门为北京市精品课程，《测试技术基础》等 6 门为校级精品课程。

The school has a strong and competent faculty team which is composed of 170 academic staffs including 49 professors, 63 associate professors, of which 63 are PhD supervisors, and 85.5% have PhD degrees. The school has a capacity about of 2000 students that include 800 undergraduates, 750 postgraduates and 350 PhD students, of which 20 are international students. The school's academic program is targeting at training high-grade special talented persons with innovative character, high overall

quality and high adaptability, facing the future development of defense science & technology industry and modern manufacturing. Undergraduate lecturing is highlighted in the combination of theory and practice, with a particular emphasis in engineering practice and innovation ability. Undergraduate curriculum features aviation and aerospace, forming a systematic integration of mechanical engineering, electrical and electronic engineering, and information engineering. In 2006, the school first passed the "Accreditation in Mechanical Engineering Professional Engineering Education" in China. Since 2008, the major of Mechanical Engineering has achieved several honors conferred by the Department of Education, such as "Professional comprehensive reform experimental unit", "Excellent engineer education and training program", "National and Beijing's characteristic specialty" and "Key majors of MIIT" etc. Engineering Graphics is a national fine course, Mechanical Design and other two courses are Beijing's fine courses, and Fundamentals Measurement Technology and other 5 courses are fine courses in Beihang University.

学院以人才培养为核心，坚持教学与科研紧密结合，在现代机构学及先进机器人技术、航空先进制造技术及工艺装备、高性能整体构件一体化成形及连接技术、机电控制及检测技术、数字化集成制造与信息化管理、以及微纳制造与生物加工等学科交叉前沿理论与技术等方向上形成了自己的特色和优势。已建有数字化设计与制造技术北京市重点实验室、飞行器装配机器人装备北京市重点实验室、国防科技工业高效数控加工技术研究应用中心、机械工业数控加工工艺技术与装备工程实验室、中国机械工业联合会机械工业服务机器人技术重点实验室等一批重点实验室/研究中心；

The school adheres to the combination of teaching and research focusing on training the talented-person. It has formed its own features and advantages in interdisciplinary cutting-edge theories and technologies such as Modern Mechanisms and Advanced Robotics, Aviation Technology and Advanced Manufacturing Technology and Process Equipment, High-performance Whole-part Monolithic Forming and Connection Technology, Mechatronic Control and Detection Technology, Digital Integrated Manufacturing and Information Management, and Micro-/Nano- Manufacturing and Bioprocessing. The school has established a series of key laboratories and research centers such as the Digital Design and Manufacturing Technology Key Lab in Beijing City, Aircraft Assembly Robot Equipment Key Lab in Beijing City, Defense Industry and Efficient CNC Machining Technology Research and Application Center, Machinery Industry CNC Machining Technology and Equipment Engineering Laboratory, Machinery Industry Service Robotics Laboratory of China Machinery Industry Federation.

二、 培养目标

II. Educational Objectives

针对留学生的教育背景、认知特点及发展需求，培养具有良好的科学、人文素养，掌握扎实的自然科学基础知识、必备的机械工程专业知识与技能，具有从事设计制造、科技开发、工程应用及经济管理等方面的工作能力，敢于面对未来挑战，富有创新潜质，具备团队精神，善于学习实践的高级工程技术人才。

Aiming at the educational background, cognitive characteristics and development requirement of international undergraduates, this program aims to develop students with good science and human quality who can firmly grasp the basic theory, specialized knowledge and basic skills of mechanical engineering to have the work ability in related fields of mechanical engineering including designing and manufacturing, technology development, engineering applications and economic management and so on. Students have innovative potential and team-work spirit to face future challenges and they are good at study and practice who will be senior engineering and technical personnel.

三、 毕业要求

III. Degree Requirements

来华留学生应具有一定的基础汉语水平，了解中国法律法规、传统文化和风俗习惯等，热爱母校，亲华、知华、优华。

Foreign students in China should have a certain level of basic Chinese, Understanding of Chinese laws and regulations, traditional culture and customs etc., and loving alma mater, knowing China, and loving China.

专业方面，

As regarding the professional skills

(1) 掌握从事机械工程专业相关工作所需的数学、自然科学、工程基础知识，能够将所学知识用来分析及解决复杂机械工程问题；

Capable of mastering knowledge in mathematics, natural science, basic engineering and professional knowledge and capable of applying mathematics, natural sciences basic principles to analyze and solve complicated mechanical engineering problems.

(2) 掌握机械工程专业的基本理论和工程基础知识，了解本专业的前沿发展现状和趋势；掌握现代设计理论与技术、先进机械制造技术与装备以及机电液控技术等本专业科学理论；

Capable of solving complex mechanical engineering problems using scientific methods based on scientific principles, including experiments design, data analysis and information synthesis to obtain reasonable and valid conclusions.

(3) 能够运用各种设计、分析等现代化工程工具软件和信息技术手段；可以综合运用所学的基础知识、专业知识和工程技能设计、组织和实施工程实验，并能够利用科学方法对实验结果进行分析、总结和归纳，得出合理有效的结论；

Capable of developing, selecting and applying reasonable and effective technology, resources, modern engineering tools and information technology tools with understanding their limitations during the practice of mechanical engineering.

(4) 具有追求创新的态度和意识，掌握基本的创新方法，以及综合运用理论和技术手段设计复杂机械系统与过程的能力；设计过程中能够综合考虑社会、经济、文化、环境、法律、安全、健康、伦理等制约因素；

Pursue innovative attitude and consciousness, master the basic innovation methods, capable of designing complex mechanical systems and processes using operational theory and techniques methods, by

considering social, economic, cultural, environmental, legal, security, health and ethical constraint factors during the design process.

(5) 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;

Capable of analyzing rationally, evaluating professional engineering practice, and designing solutions for complex mechanical engineering problems while considering the background knowledge relating to mechanical engineering.

(6) 具有人文社会科学素养、社会责任感, 能够在机械工程实践中理解并遵守工程职业道德和规范;

Possess humanities social science literacy, social responsibility; have good physical and mental qualities.

(7) 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, 并具备较强的国际视野;

Capable of performing effective communication and exchange on complex mechanical engineering problems with industry peers and the public, both written and verbal, and have international perspective ability to work as part in a multi-disciplinary team.

(8) 能够在跨文化背景下进行沟通和交流;

Capable of completing communication under multicultural environments.

(9) 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。

Possess consciousness of self-learning and lifelong learning in order to adapt the development.

四、 学制、学位

IV. Study Period

学制: 四年

Study Period: 4 Years, Maximum: 6 Years (not including military service time)

授予学位: 工学学士

Degrees Conferred: Bachelor of Engineering

五、 专业特色

V. Characteristics

本专业按机械工程大类培养“科学型与工程型相结合”的宽口径人才, 秉承“研教融合”的办学理念, 依托学校、学院已有教学、科研优势资源, 注重系统级知识体系的建立并强调“大机械”通识教育, 鼓励学生跨专业跨学科学习。本专业重视未来高水平人才所应具有的人文素养, 强化数理知识及学科基础理论; 专业课程以机为主、机电结合, 突出航空航天特色, 注重工程实践能力的培养。

This program aims to train science and engineering combined type of adaptable talent in terms of a unified mechanical engineering category. It emphasizes humanities that high-level professional personnel, strengthens mathematical knowledge and discipline basic theory, adheres to the Research & Teaching philosophy, relies on existing courses advantages to construct and optimize professional courses, focuses on the establishment of system-level knowledge systems and emphasizes the "big machines" general education, encourages students to interdisciplinary learning, which reflect the characteristics of research universities.

六、 主干学科

VI. Main Disciplines

- ◆ 力学
Mechanics
- ◆ 机械工程
Mechanical Engineering

七、 课程体系

VII. Program Structure and Modules

共分为三个课程模块：基础课程、语言及文化课程、通识课程和专业课程。

There are three course modules: Foundation Courses, General Education (GE) Courses and Major Courses.

表 1 课程体系及各课程类别的最低学分要求示意图

Table 1 The Credit Requirement (Minimum) of each Course Type for Bachelor in Mechanical Engineering

课程模块 Course Module	Order	课程类别 Course Type	学分 Credits
I 基础课程 Foundation Courses (FC)	A	数学与自然科学类 Mathematics and Natural Sciences (MNA)	31.0
	B	工程基础类 Engineering Fundamentals (EF)	12.5
	C	语言和文化 Language and Culture (LC)	10.0
II 通识课程 General Education Courses (GE)	D	思政类 Ideology and Politics (IP)	---
		军理类 Military Theory (MT)	---
	E	体育类 Physical Education (PE)	--
	F	核心通识课程 Core GE Courses (C-GE)	2.0
	G	一般通识课程 General GE Courses (G-GE)	2.0
II 通识课程	H	博雅类	--

General Education Courses (GE)		Liberal Arts (LA)	
III 专业课程 Major Courses (MC)	I	核心专业基础课 Core Major Course (C-MC)	70.0
	J	一般专业课 General Major Course (G-MC)	
	L	专业实践课 Practical Major Course (PMC)	

基础课程模块，主要包括数学与自然科学类（如数学、物理等）、工基础类（如机械和电子工程训练、C语言编程等），以及语言类。其中，《汉语》和《中国概况》是来华留学英文授课本科生的必修课。通识课程模块，旨在培养和提高学生在人文、社科等方面的知识和修养。

Foundation Courses (FC) include Mathematics and Natural Sciences courses (Mathematics, Physics, etc.), Engineering Fundamentals courses (Mechanism, Electronics Engineering, C language, etc.). Language courses include Chinese courses for overseas student studied in China. General Education courses are courses to improve knowledge and cultivation in humanities and social sciences.

博雅类主要含暑期学校和社会实践

Liberal Arts (LA) mainly include summer school course and social practice course.

专业课程模块，分为专业基础课程、实践课程（含毕业设计）、专业核心课程以及一般专业选修课程。学生可根据个人的兴趣及发展方向，在学业指导老师的指导下学习。

Major courses are divided into Fundamental Major Course, Major-oriented Course, General Major Courses and Practical Major Courses (including Graduation Project). The students can select based on their own interest and direction under the guidance of school academic advisors.

八、 主要课程

VIII. Main Major courses

理论力学、材料力学、电工电子技术、工程材料学、画法几何、机械制图、机械原理、机械设计、热工基础、制造工程基础、流体传动、机电控制工程基础、机电传动控制、机电一体化系统设计与实践、测试技术基础、机械设计综合实践。

Theoretical Mechanics, Mechanics of Materials, Electrical and Electronics, The Science of Engineering Materials, Descriptive Geometry, Machine Drawing, Theory to Machines and Mechanisms, Mechanical Design, Fundamentals of Thermodynamics and Heat Transfer, Fundamentals of Manufacturing Engineering, Hydraulic Transmission, Fundamental of Electromechanical Control Engineering, Electromechanical Transmission Control, Mechatronics Design and Practice, Fundamental of Measurement Technology, Practice of Mechanical Design.

九、 主要实践教学环节及安排

IX. Main Internship and Practical (Including experiments)

基础物理实验、机械工程技术训练、电子工程技术训练、C 语言程序设计与实践、机械设计综合实践、机电一体化系统设计与实践、专业综合实践、毕业设计

Fundamental Physics Experiments, Mechanical Technology Practice, Electronic Technology Practice, C Programming Language Design and Practice, Practice of Mechanical Design, Mechatronics Design and Practice, Comprehensive Specialty Practice, Graduation Thesis.

表 2 实践课程清单
Table2 Practical Courses

序号 No.	课程名称 Course Title	课程类别 Course Type	开课学期 Semester	学分 Credits	总学时 Hours
1	C 语言程序设计与实践 C Programming Language Design and Practice	B (EF)	2	2.5	48
2	机械工程技术训练 A Mechanical Technology Practice A	B(EF)	2	3.5	140
3	基础物理实验 B (1) Fundamental Physics Experiments B (1)	A(MNA)	3	1.5	28
4	电子工程技术训练 Electronic Technology Practice	B(EF)	4	1.5	80
5	基础物理实验 B (2) Fundamental Physics Experiments B (2)	A(MNA)	4	1.5	24
6	机械设计综合实践 A Practice of Mechanical Design A	C-MC	6	3.0	3weeks
7	机电一体化系统设计与实践 Mechatronics Design and Practice	C-MC	6	2.0	2weeks
8	专业综合实践 Comprehensive Specialty Practice	C-MC	7	2.0	2weeks
9	毕业设计 Graduate Project	PMC	8	8.0	16 weeks

十、 毕业最低学分

X. Minimum Required for Graduation

毕业最低学分要求：在满足各课程类别最低学分的要求下，总学分不低于 125 学分。

Minimum Required for Graduation=125 credits, and meet the credit requirement of each Course Type at the same time.

十一、 教学进程计划

XI. Education Curriculum

the 1st Semester

Code	Title	Hours	Credits	Note	Type	Evaluation
A09A101I	工科高等数学 (1) Advanced Mathematics for Engineering (1)	90	6.0	Compulsory	MNA	Examination
B25D111I	中国概况 Introduction to China	32	2.0	Compulsory	LC	Examination
B1C251131L	汉语 (1) Chinese (1)	64	4.0	Compulsory	LC	Examination
C05D101I	航空航天概论 B Introduction to Aeronautics and Astronautics B	32	2.0	Compulsory	C-GE	Examination
C06D101I	大学计算机基础 University Computer Foundation	44	2.0	Compulsory	G-GE	Examination
E07D101I	机械工程导论 Introduction to Mechanical Engineering	32	2.0	Compulsory	G-MC	Examination
E05B1030	工程图学 B	64	4.0	Compulsory	C-MC	Examination
	学期学分小计 Semester Credits		22.5			

the 2nd Semester

Code	Title	Hours	Credits	Note	Type	Evaluation
A09A102I	工科高等数学 (2) Advanced Algebra for Engineering (2)	86	5.0	Compulsory	MNA	Examination
A09A103I	工科高等代数 Advanced Algebra	90	6.0	Compulsory	MNA	Examination
A19A101I	工科大学物理 (1) University Physics for Engineering (I)	64	4.0	Compulsory	MNA	Examination
B1C251141L	汉语 (2) Chinese (2)	64	4.0	Compulsory	LC	Examination
B1B071210	C 语言程序设计与实践 C Programming Language Design and Practice	48	2.5	Compulsory	EF	Examination
	学期学分小计 Semester Credits		21.5			

the 3rd Semester

Code	Title	Hours	Credits	Note	Type	Evaluation
A09B204I	概率统计 A Probability Statistics B	48	3.0	Compulsory	MNA	Examination
A19A202I	工科大学物理 (2) University Physics for Engineering (2)	64	4.0	Compulsory	MNA	Examination
A19A103I	基础物理实验 B(1) Fundamental Physics Experiments B(1)	28	1.5	Compulsory	MNA	Examination
B3I032060	电工电子技术 Electrical and Electronics	72	4.5	Compulsory	C-MC	Examination
E05B201I	理论力学 A(1) Theoretical Mechanics A(I)	64	4.0	Compulsory	C-MC	Examination

G32A201I	机械工程技术训练 A Mechanical Technology Practice A	140	3.5	Compulsory	EF	Test
	学期学分小计 Semester Credits		20.5			

the 4th Semester

Code	Title	Hours	Credits	Note	Type	Evaluation
A19A104I	基础物理实验 B(2) Fundamental Physics Experiments B(II)	24	1.5	Compulsory	MNA	Examination
E05B204I	材料力学 A Mechanics of Materials A	64+16	5.0	Compulsory	C-MC	Examination
E05B202I	理论力学 A(2) Theoretical Mechanics A(II)	26	1.5	Compulsory	C-MC	Examination
E07B203I	机械设计基础 A(1) Fundamentals of Mechanical Design A(1)	54	2.5	Compulsory	C-MC	Examination
E07B211I	工程材料学 The Science of Engineering Materials	34	2.0	Compulsory	C-MC	Examination
B31072110	热工基础 Fundamentals of Thermodynamics and Heat Transfer	32	2.0	Compulsory	C-MC	Examination
G32A204I	电子工程技术训练 Electronic Technology Practice	80	2.0	Compulsory	EF	Test
	学期学分小计 Semester Credits		16.5			

the 5th Semester

Code	Title	Hours	Credits	Note	Type	Evaluation
B31073410	机电控制工程基础 Fundamental of Electromechanical Control Engineering	40	2.5	Compulsory	C-MC	Examination
E07B304I	机械设计基础 A(2) Fundamentals of Mechanical Design A(1)	64	3.0	Compulsory	C-MC	Examination
E07B313I	制造工程基础 Fundamentals of Manufacturing Engineering	48	3.0	Compulsory	C-MC	Examination
E07D321I	流体传动 Hydraulic Transmission	38	2.5	Compulsory	C-MC	Examination
B31073420	机电传动控制 Electromechanical Transmission Control	40	2.0	Compulsory	C-MC	Examination
	学期学分小计 Semester Credits		13.0			

the 6th Semester

Code	Title	Hours	Credits	Note	Type	Evaluation
E07B314I	机器人技术基础 Fundamentals of Robotics	46	2.5	Compulsory	G-MC	Examination
E07D309I	机械设计综合实践 A Practice of Mechanical Design A	120	3.0	Compulsory	C-MC	Examination
E07B316I	测试技术基础 Fundamental of Measurement Technology	34	2.0	Compulsory	C-MC	Examination
E07B315I	机电一体化系统设计与实践 Mechatronics Design and Practice	32	2.0	Compulsory	C-MC	Examination
F07C422I	先进加工技术及装备 Advanced Processing Technology and Equipment	48	3.0	Compulsory	G-MC	Examination

	学期学分小计 Semester Credits		12.5			
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the 7th Semester

Code	Title	Hours	Credits	Note	Type	Evaluation
F07C412I	机械设计学 Philosophy of Mechanical Design	32	2.0	Compulsory	C-MC	Examination
F07C443I	计算机辅助制造 Computer Aided Manufacturing	48	3.0	Compulsory	C-MC	Examination
F07C321I	机械制造工艺 Machine-Building Technology	48	3.0	Compulsory	C-MC	Examination
F07C881I	计算机控制系统 Computer Control System	32	2.0	Compulsory	C-MC	Examination
G07D412I	专业综合实践 Comprehensive Specialty Practice	80	2.0	Compulsory	PMC	Examination
	学期学分小计 Semester Credits		12.0			

the 8th Semester

Code	Title	Hours	Credits	Note	Type	Evaluation
G07D4010	毕业设计 Graduation Thesis	16weeks	8.0	Compulsory	PC	Test

备注:

(1) 只列出各学期必修课程目录

Only compulsory courses are listed

(2) 课程类别的相关说明

Explanation of course type:

数学与自然科学类 Mathematics and Natural Sciences (MNA)

工程基础类 Engineering Fundamentals (EF)

语言和文化 Language and Culture (LC)

核心通识课程 Core GE Courses (C-GE)

一般通识 General GE Courses (G-GE)

核心专业基础课 Core Major Courses(C-MC)

一般专业课 General Major Course(G-MC)

专业实践课 Practical Major Course (PMC)

如下课程留学生可选修:

Other courses student can select

Course Type	Title	Credits	Note
PE	体育课(1) Physical Education	0.5 Credit/Semester	International students can select from the 2 nd semester.
LA	文化素质拓展 Culture Quality Developing	1.0 Credit/Semester	International students can select from the 3 rd semester.



G-GE	暑期学校系列课程 Courses in Summer Camp	Max 6.0 Credits /Summer Semester	International students can select the courses in summer semester (3 rd semester) during the 2 nd or the 3 rd academic year.
G-GE	专业英语阅读与写作 Professional English Reading and Writing	2.0 Credits/Semester	International student can select since 5 th semester.
	社会实践 Social Practice	1.0 Credit	
	汉语水平考试 HSK	1.0 credit	One credit will be offered if the international student passed HSK 3 or over.
	其他课程 Other Courses		See the time-table at the beginning of each semester.

十二、 联系方式

XII. Contact Detail

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