

## 课程详述

### COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	<b>课程名称 Course Title</b>	机械设计 Mechanical Design
2.	<b>授课院系 Originating Department</b>	机械与能源工程系 Department of Mechanical and Energy Engineering
3.	<b>课程编号 Course Code</b>	ME311
4.	<b>课程学分 Credit Value</b>	3
5.	<b>课程类别 Course Type</b>	专业核心课 Major Core Courses
6.	<b>授课学期 Semester</b>	秋季 Fall / 春季 Spring
7.	<b>授课语言 Teaching Language</b>	中英双语 English & Chinese
8.	<b>授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation &amp; Contact (For team teaching, please list all instructors)</b>	责任教师/Principal Instructor: 宋超阳 / Song Chaoyang 秋季 / Fall: 宋超阳 / Song Chaoyang   机械与能源工程系/MEE songcy@sustech.edu.cn 春季 / Spring: 邓辉/Deng Hui   机械与能源工程系/MEE dengh@sustech.edu.cn
9.	<b>实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact</b>	助教 / 待公布 To be announced
10.	<b>选课人数限额(可不填) Maximum Enrolment (Optional)</b>	无

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
学时数 Credit Hours	48				48
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	无				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无				

### 教学大纲及教学日历 SYLLABUS

#### 15. 教学目标 Course Objectives

机械设计是一门培养学生具有机械设计能力的专业技术基础课，是机械类各专业培养方案中的主干课程。本课程在教学内容方面应着重传授基本知识、基本理论和基本方法。

Mechanical design is a professional technical foundation course to cultivate students with mechanical design ability, is the main course in the training program of mechanical majors. This course should focus on teaching the basic knowledge, basic theory and basic methods.

本课程的主要任务是通过课程教学培养学生：机械工程科学知识的应用能力；设计机械系统、部件和零件的能力；对于机械工程问题进行系统表达、建立模型、分析求解和论证的能力；在机械工程实践中初步掌握并使用各种技术、技能和现代化设计工具的能力。

The main task of this course is to cultivate students through the course teaching: the application of mechanical engineering scientific knowledge; the ability to design mechanical systems, components and parts; for mechanical engineering problems for the systematic expression, modeling, analysis and demonstration of the ability to solve; in the mechanical engineering practice and the initial mastery of various technologies, skills and modern design tools.

#### 16. 预达学习成果 Learning Outcomes

本课程主要面向机械工程、机器人工程及力学与航空航天专业本科生开设，预达学习成果如下：

This course is intended for undergraduate students in mechanical engineering, robotics engineering, and mechanics and aerospace, with the following learning outcomes.

- 能够通过应用工程、科学和数学原理识别、制定和解决复杂的工程问题；  
an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;
- 能够应用工程设计来产生满足特定需求的解决方案，并考虑到公共健康、安全和福利，以及全球、文化、社会、环境和经济因素；  
an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors;
- 具有与各种受众有效沟通的能力；  
an ability to communicate effectively with a range of audiences;

4. 能够认识到工程情况下的道德和专业责任，并作出明智的判断，必须考虑工程解决方案在全球、经济、环境和社会背景下的影响；

an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts;

5. 有能力在一个团队中有效运作，其成员共同提供领导，创造一个合作和包容的环境，建立目标，计划任务，并达到目标；

an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;

6. 有能力开发和进行适当的实验，分析和解释数据，并使用工程判断来得出结论；

an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions;

7. 有能力使用适当的学习策略，根据需要获取和应用新知识；

an ability to acquire and apply new knowledge as needed, using appropriate learning strategies;

8. 有能力将现代计算机工程工具的使用融入工程实践中。

an ability to integrate the use of modern computer-based engineering tools into engineering practice.

17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

**Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)**

6 课时：第 01 章 - 机械设计总论，结合零件演示，介绍机器的构成及其功能结构、机械设计的概念及其特点、机械设计中的创新和优化、机械的组成及运动副、平面机构运动简图的绘制、机械设计中的两个问题、机械设计中的约束、机械设计中的强度问题、机械设计中的摩擦、磨损和润滑问题。

6 credit hours: Chapter 01 - General Theory of Mechanical Design, with parts demonstration, introduces the composition of machines and their functional structure, the concept of mechanical design and its characteristics, innovation and optimization in mechanical design, the composition of machines and motion pairs, the drawing of motion sketches of plane mechanisms, two problems in mechanical design, constraints in mechanical design, strength problems in mechanical design, friction, wear and lubrication problems in mechanical design.

6 课时：第 02 章 - 平面连杆机构，结合零件演示，介绍平面四杆机构的基本形式、演变及其应用、平面四杆机构设计中的共性问题、平面四杆机构的设计、平面连杆机构的解析综合。

6 credit hours: Chapter 02 - Planar Linkage Mechanisms. Introduction to the basic forms of planar four-bar mechanisms, their evolution and their applications, common problems in the design of planar four-bar mechanisms, design of planar four-bar mechanisms, and analytical synthesis of planar linkage mechanisms with parts demonstration.

6 课时：第 03 章 - 齿轮传动设计，结合零件演示，介绍齿轮机构、齿轮传动、蜗杆传动、齿轮系及其设计。

6 credit hours: Chapter 03 - Gearing Design, with parts demonstration, introduction to gear mechanism, gearing, worm gearing, gear train and its design.

6 课时：第 04 章 - 轴承及轴设计，结合零件演示，介绍滑动轴承、滚动轴承、轴、润滑、密封的设计。

6 credit hours: Chapter 04 - Bearing and Shaft Design, with parts demonstration, introduction to the design of sliding bearings, rolling bearings, shafts, lubrication, and seals.

6 课时：第 05 章 - 连接及连接件，结合零件演示，介绍连接、焊接与胶接、联轴器、离合器、离合器和制动器的设计。
6 credit hours: Chapter 05 - Connections and Connectors, with parts demonstration, introduces the design of connections, welding and gluing, couplings, clutches, clutches and brakes.
6 课时：第 06 章 - 挠性传动设计，结合零件演示，介绍挠性传动设、弹簧设计。
6 credit hours: Chapter 06 - Flexible Transmission Design, with parts demonstration, introduces the design of flexible transmission devices and springs.
6 课时：第 07 章 - 支承零件设计，结合零件演示，介绍结构设计的方法和准则、典型零部件的结构设计。
6 credit hours: Chapter 07 - Design of support parts, with parts demonstration, introduction to structural design methods and guidelines and structural design of typical components.
6 课时：第 08 章 - 其他机械设计，结合零件演示，介绍机械系统的组成、机械系统的总体方案设计。
6 credit hours: Chapter 08 - Other mechanical design, with parts demonstration, introduction to the composition of mechanical systems and the general scheme design of mechanical systems.

**18. 教材及其它参考资料 Textbook and Supplementary Readings**

<ul style="list-style-type: none"> <li>- 华中科技大学，机械设计（第三版），Textbook by HUST on Mechanical Design</li> <li>- 华中科技大学，机械原理（第二版），Textbook by HUST on Mechanism Design</li> </ul>
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**课程评估 ASSESSMENT**

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance		10		
课堂表现 Class Performance				Southern University of Science and Technology
小测验 Quiz		30		
课程项目 Projects				
平时作业 Assignments		30		
期中考试 Mid-Term Test				
期末考试 Final Exam		30		
期末报告 Final Presentation				
其它（可根据需要 改写以上评估方式） Others (The above may be modified as necessary)				



20. 记分方式 **GRADING SYSTEM**

- A. 十三级等级制 **Letter Grading**  
 B. 二级记分制（通过/不通过） **Pass/Fail Grading**

课程审批 **REVIEW AND APPROVAL**

21. 本课程设置已经过以下责任人/委员会审议通过  
**This Course has been approved by the following person or committee of authority**