

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.

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| 1. | 课程名称 Course Title | 材料力学 B Mechanics of Materials B |
| 2. | 授课院系 Originating Department | 材料科学与工程系 Department of Materials Science and Engineering |
| 3. | 课程编号 Course Code | MSE213 |
| 4. | 课程学分 Credit Value | 3 |
| 5. | 课程类别 Course Type | 专业基础课 Major Foundational Courses |
| 6. | 授课学期 Semester | 春季 Spring |
| 7. | 授课语言 Teaching Language | 英文 English |
| 8. | 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 & Contact (For team teaching, please list all instructors) | 李江宇 讲席教授 材料科学与工程系 lijy@sustech.edu.cn Jiangyu Li Chair Professor Department of Materials Science and Engineering lijy@sustech.edu.cn 唐斌 副教授 生物医学工程系 tangb@sustech.edu.cn Bin Tang Associate Professor Department of Biomedical Engineering tangb@sustech.edu.cn |
| 9. | 实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact | 待公布 To be announced |
| 10. | 选课人数限额(可不填) Maximum Enrolment (Optional) | |

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| 11. 授课方式 Delivery Method | 讲授 | 习题/辅导/讨论 | 实验/实习 | 其它(请具体注明) | 总学时 |
| | Lectures | Tutorials | Lab/Practical | Other (Please specify) | 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 | MSE001 材料科学与工程基础 MSE001 Fundamentals of Materials Science and Engineering MSE002 材料科学与工程基础实验 MSE002 Experiments for Fundamentals of Materials Science and Engineering | | | | |
| 13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite | | | | | |
| 14. 其它要求修读本课程的学系 Cross-listing Dept. | | | | | |

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

本课程将介绍材料科学与工程应用中力学的基本概念，包括应变、应力、拉伸、弯曲、扭转、剪切等。该课程主要为材料科学的应用提供完整的力学和机械性能框架。

This course will introduce the basic concepts of mechanics in materials science and engineering's applications, including strain, stress, tensile, bending, torsion, shear, etc. The objectives of this course is to provide a complete framework of mechanics in materials science applications as well as the mechanical behavior of materials.

16. 预达学习成果 Learning Outcomes

1. 学习基础材料力学知识，掌握各类应力条件下，包括拉伸，扭转，剪切等，的相应的力学分析方法。
 2. 能够应用所学力学分析方法对结构稳定性进行设计，具备根据结构及具体需要，选择合适的工程材料或构件的能力。
 3. 具备分析结构件受力状态，各类受力条件下材料形变，是否失效的基本能力。
- (1).Clearly understand follow concepts: strain, stress, tensile, bending, torsion, shear, and know how to do the analysis on the mechanical behavior listed.
- (2).Understand the mechanical behavior of materials, including elastic deformation, plastic deformation, viscoelastic deformation.
- (3).Well understand the working principle of following techniques: tensile test, torsion test, indentation test, bending test.

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.)

第一讲、绪论（2学时） Introduction (2 Credit Hours)

1. 材料力学的历史 Development of mechanics of materials
2. 材料力学在社会发展中的重要性 Importance of mechanics of materials in social development
3. 本课程的性质和要求 Nature and requirements of this course

第二讲、应力（2学时） Stress (2 Credit Hours)

1. 力稳态 Stress equilibrium
2. 应力分类及基本定义 Classification and basic definition of stress

第三讲、应变（2学时） Strain (2 Credit Hours)

1. 应变的分类及基本定义 Classification and basic definition of Strain
2. 结构杆件中应变的计算方法 Calculation method of strain in structural members

第四讲、轴向拉伸（6学时） Axial load (6 Credit Hours)

1. 轴向拉伸相关的力学概念及受力分析 Mechanical concept and force analysis related to axial load
2. 具体工程问题中拉伸应力及应变的力学分析及计算 Mechanical Analysis and Calculation of Tensile Stress and Strain in Engineering Problems
3. 拉伸过程中的应力集中 Stress concentrations in axial load

第五讲、扭转变形（6学时） Torsion (6 Credit Hours)

1. 扭转相关的力学概念及受力分析 Mechanical concept and force analysis of torsion
2. 具体工程问题中扭转应力及应变的力学分析及计算 Mechanical analysis and calculation of torsional stress and strain in engineering problems

第六讲、弯曲（4学时） Bending (4 Credit Hours)

1. 弯曲相关的力学概念及受力分析 Mechanics concepts and force analysis related to bending
2. 具体工程问题中弯曲相关应力及应变的力学分析及计算 Mechanical analysis and calculation of bending-related stress and strain in engineering problems
3. 弯曲过程中的应力集中 Stress concentrations in bending

第七讲、横向剪切（4学时） Transverse shear (4 Credit Hours)

1. 材料的横向剪切应力，应变的基础知识 Basis for transverse shear stress and strain
2. 相应应力应变的具体分析方法 Analysis method of corresponding stress and strain

第八讲、复合加载（2学时） Combined loadings (2 Credit Hours)

1. 薄壁压力囊的力学分析 Mechanical analysis of thin-walled pressure vessels
2. 复合应力的具体分析方法 Specific analysis method of combined stress

第九讲、应力转换（4学时） Stress transformation(4 Credit Hours)

1. 应力转换的原理及公式 Principle and formula of stress transformation
2. 主应力及最大应力的定义及具体应用 Definition and application of principal stress and maximum stress

第十讲、应变转换（4学时） Strain transformation (4 Credit Hours)

1. 应变转换的原理及公式 Principle and formula of strain transformation

2. 主应变及最大应变的定义及具体应用 Definition and application of principal strain and maximum strain
 第十一讲、杆和梁的设计（4 学时） Design of beams and shafts (4 Credit Hours)
1. 杆和梁设计的基本原理 Basis for beam design
 2. 安全系数的定义 Definition of safety factor
- 第十二讲、杆的位移分析（4 学时） Deflection of beams and shafts (4 Credit Hours)
1. 杆受力位移的基本概念 Basis for the force displacement of shafts
 2. 相关力学分析方法 Related mechanical analysis method for shaft displacement
- 第十三讲、屈曲及力学分析（4 学时） Buckling and mechanics analysis (4 Credit Hours)
1. 屈曲的基本概念及其在工程应用中的影响 Basis for buckling and its influence in engineering applications
 2. 屈曲相关的力学分析方法及公式 Mechanical analysis and formulas related to buckling

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

Text Book: Mechanics of Materials, 5th Edition, R.C. Hibbeler

Reference Book: Mechanical Behavior of Materials- Engineering Methods for Deformation, Fracture and Fatigue, 4th, Norman E. Dowling

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 | | | | |
| 课堂表现 Class Performance | | | | |
| 小测验 Quiz | | 30 | | |
| 课程项目 Projects | | | | |
| 平时作业 Assignments | | | | |
| 期中考试 Mid-Term Test | | 30 | | |
| 期末考试 Final Exam | | 40 | | |
| 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

