

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.	课程名称 Course Title	材料失效与断裂力学 Failure Analysis and Fracture Mechanics of Engineering Materials				
2.	授课院系 Originating Department	机械与能源工程系 Department of Mechanical and Energy Engineering				
3.	课程编号 Course Code	ME463				
4.	课程学分 Credit Value	3				
5.	课程类别 Course Type	专业选修课 Major Elective Course				
6.	授课学期 Semester	秋季学期 Fall				
7.	授课语言 Teaching Language	中英双语 English & Chinese				
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)	朱强 机械与能源工程系 慧园 5-407 88018131, 13811482782 Qiang Zhu, Department of Mechanical and Energy Engineering, Wisdom Valley 5-407, phone: 88018131, mobile: 13811482782				
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)					
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	MSE305 或 MAE202 材料力学 Mechanics of Materials
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.	材料科学与工程, Materials Science and Engineering, 力学与航空航天 Mechanics and Aerospace Engineering

教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

中国制造 2025 作为国家战略已经开始实施，机械制造是实现中国制造的核心，《材料失效与断裂力学》是机械制造基础的重要组成部分，可以通过结构失效分析，确认失效机制，从而改进和优化制造技术，实现高端制造。本课程将教授具有一定先期学习基础的研究生和本科高年级学生断裂力学理论和材料失效技术。重点涉及到材料力学与机械性能理论、材料力学性能测试技术、材料失效分析技术以及基于失效分析的机械制造过程设计与质量控制等。通过课程学习，学生可以掌握基本的材料失效分析技术与断裂力学理论和测试技术，为未来在机械工程领域进一步深造研究或企业技术研发和管理打下好的基础。

China Manufacturing 2025 program has launched as a national development strategy. Mechanical manufacturing is the key to implement this program. This course will teach technology of Failure Analysis and theory of Fracture Mechanics of Engineering Materials, which is an important part of the mechanical manufacturing fundamentals. This teaching course is designed for graduate or of later year undergraduate students. The students should have passed basic knowledge of manufacturing of materials as mentioned in section 12. The students are expected after the course learning to know well the basis of failure analysis technology and fracture mechanics theory, so to be able to use those for further study or working as an engineer in industry.

16. **预达学习成果 Learning Outcomes**

通过社会实践活动，学生能加深对本专业的了解，确认适合的职业，为向职场过渡做准备，增强就业竞争优势。

Through the practice, students can have a further understanding to their future career, to prepare for the transition to work, and enhance the competitive advantage of employment.

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.)



该课程包括：材料失效与断裂力学概论（2学时）、断裂失效形式（4学时）、裂纹与断口的分析手段（4学时）、裂纹分析（4学时）、断口分析（8学时）、线弹性断裂力学（4学时）、弹塑性断裂力学（4学时）、时间效应断裂行为（4学时）、疲劳断裂行为（6学时）、断裂与环境交互作用（4学时）、失效分析与断裂力学的工程应用（4学时）。

为了培养学生具有国际视野和立足国内的全面能力，将采用双语教学模式，书面英语口头汉语。

The course contents include introduction of material failure and fracture mechanics (2 hours), failure forms of fracture (4 hours), analysis method of cracks and fracture (4 hours), crack analysis (4 hours), fracture analysis (8 hours), linear elastic fracture mechanics (4 hours), elastic-plastic fracture mechanics (4 hours), fracture behaviour of time effect (4 hours), fracture behaviour of fatigue (4 hours), the interaction of fracture and the environment (4 hours), engineering applications of failure analysis and fracture mechanics (4 hours).

Chinese-English bilingual teaching (teaching materials in English oral teaching in Chinese), in order to train the students to have international visual and comprehensive abilities.

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

《Metal Failures - Mechanisms, Analysis, Prevention》, Arthur J. McEvily, John Wiley & Sons
《Fracture Mechanics: Fundamentals and Applications》, T.L. Anderson, CRC Press

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		5		
课堂表现 Class Performance		5		
小测验 Quiz				
课程项目 Projects		20		
平时作业 Assignments		20		
期中考试 Mid-Term Test				
期末考试 Final Exam		50		
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)

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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

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