

课程大纲 COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	MAE5021 断裂力学 Fracture Mechanics
2.	课程性质 Compulsory/Elective	专业选修课
3.	课程学分/学时 Course Credit/Hours	3/48
4.	授课语言 Teaching Language	英语 English
5.	授课教师 Instructor(s)	<p>洪伟 教授 力学与航空航天工程系 hongw@sustech.edu.cn</p> <p>Wei Hong, Professor Department of Mechanics and Aerospace Engineering hongw@sustech.edu.cn</p>
6.	是否面向本科生开放 Open to undergraduates or not	是 YES
7.	先修要求 Pre-requisites	MAE202 材料力学 Mechanics of Materials
8.	教学目标 Course Objectives	<p>断裂力学是固体力学的一个分支，研究含裂纹物体的强度和裂纹的扩展规律。它不仅在培养学生系统掌握力学的科学概念、分析方法，构筑完整的力学知识体系方面占据相当重要地位，而且可以培养学生对物理问题建模分析和解决问题的能力。</p> <p>断裂力学教学强调清晰的物理概念以及与工程实际的密切结合。</p> <p>断裂力学的基本内容包括线弹性断裂力学、弹塑性断裂力学、疲劳与应力腐蚀、橡胶与高弹体的断裂力学的基本概念与应用。</p> <p>Fracture mechanics, a branch of solid mechanics, studies the strength and reliability of crack-containing material and structures and the propagation of cracks. It provides training in terms of scientific concepts, analytical skills, as well as the capability of developing and analysing and physical models in real-world problems.</p> <p>Fracture mechanics emphasizes both clear physical concepts and engineering applications.</p> <p>Fracture mechanics covers the topics of linear elastic fracture mechanics, elasto-plastic fracture mechanics, fatigue and stress corrosion, fracture of rubber and elastomers.</p>
9.	教学方法 Teaching Methods	讲授 Lectures
10.	教学内容 Course Contents	

Section 1	断裂力学简介（2 学时） Introduction and overview of fracture mechanics (2 credit hours)
Section 2	Griffith 论文（3 学时） The Griffith paper (3 credit hours)
Section 3	应变能释放率，断裂能（4 学时） Energy release rate, fracture energy (4 credit hours)
Section 4	断裂力学地应用（3 学时） Application of fracture mechanics (3 credit hours)
Section 5	线弹性断裂力学（4 学时） Linear elastic fracture mechanics (4 credit hours)
Section 6	韧性，阻力曲线（3 学时） Toughness, resistance curve (3 credit hours)
Section 7	疲劳（3 学时） Fatigue (3 credit hours)
Section 8	期中复习（2 学时） Midterm review (2 credit hours)
Section 9	应力腐蚀（2 学时） Stress corrosion (2 credit hours)
Section 10	橡胶的断裂（4 学时） Fracture of rubber (4 credit hours)
Section 11	J 积分（3 学时） The J integral (3 credit hours)
Section 12	弹塑性断裂力学（3 学时） Elasto-plastic fracture mechanics (3 credit hours)
Section 13	裂纹桥接，非弹性引起的断裂阻力（4 学时） Crack bridging, Fracture resistance due to inelastic deformation (4 credit hours)
Section 14	混合模态断裂（3 学时） Mixed-mode fracture (3 credit hours)
Section 15	界面断裂（2 学时） Interfacial fracture (2 credit hours)
Section 16	课程项目和口头报告（3 学时） Final project and presentation (3 credit hours)

11. 课程考核

Course Assessment

（① 考核形式 Form of examination; ②. 分数构成 grading policy; ③ 如面向本科生开放，请注明区分内容。
If the course is open to undergraduates, please indicate the difference.）

1. 考查/no final exam

2. 课堂表现 5%

平时作业 35% 抄袭平时作业记 0 分

期中考试 30% 考试作弊本门课程记 0 分

期末报告 30%

3. There is no difference between undergraduate and graduate students.

12. 教材及其它参考资料

Textbook and Supplementary Readings

NA