

课程大纲

COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	MSE5003 材料力学行为 Mechanical Behaviours of Materials																		
2.	课程性质 Compulsory/Elective	专业核心课																		
3.	课程学分/学时 Course Credit/Hours	3/48																		
4.	授课语言 Teaching Language	英文/English																		
5.	授课教师 Instructor(s)	余鹏 副教授																		
6.	是否面向本科生开放 Open to undergraduates or not	否																		
7.	先修要求 Pre-requisites	Foundation of Materials, Mechanics of Materials																		
8.	教学目标 Course Objectives	<p>In this course, the mechanical behavior of structures and materials will be systematically introduced. It is expected that, after finishing this course, the students should have an overall understanding of mechanical behavior of materials, from the continuum description of properties to the atomistic and molecular mechanisms that confer those properties to all materials.</p> <p>This course will cover elastic, plastic and viscoelastic deformation, the fracture and fatigue behaviors of materials including crystalline and amorphous metals, semiconductors, ceramics, and polymers, etc. The techniques on the design and processing of materials from the atomic to the macroscale to achieve desired mechanical behaviors will be emphasized.</p> <p>Certain cut-edge topics in mechanical behavior for material systems will also be introduced and discussed.</p>																		
9.	教学方法 Teaching Methods	<p>本课程主要以理论授课形式进行，但课时的40%以上时间为针对特定相关研究领域的小组讨论及论文答辩。本课程在考核形式上有所创新，初步拟定为期末研究计划书撰写及答辩，及本课程学生需要在期末时提交一份在材料力学行为领域的研究计划书，并针对所提出的计划书进行答辩，此考核方式将综合考核学生对课程内容的掌握，对相关研究领域的理解。</p>																		
10.	教学内容 Course Contents	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Section 1</td> <td>Overview of crystal/defect structure and mechanical properties</td> </tr> <tr> <td>Section 2</td> <td>Defect structure and mechanical properties</td> </tr> <tr> <td>Section 3</td> <td>Basic definitions of stress and strain</td> </tr> <tr> <td>Section 4</td> <td>Introduction to elastic behavior</td> </tr> <tr> <td>Section 5</td> <td>Introduction to plasticity</td> </tr> <tr> <td>Section 6</td> <td>Introduction to dislocation mechanics</td> </tr> <tr> <td>Section 7</td> <td>Dislocations and Plastic deformation</td> </tr> <tr> <td>Section 8</td> <td>Dislocation strengthening mechanisms</td> </tr> <tr> <td>Section 9</td> <td>Introduction to composites</td> </tr> </table>	Section 1	Overview of crystal/defect structure and mechanical properties	Section 2	Defect structure and mechanical properties	Section 3	Basic definitions of stress and strain	Section 4	Introduction to elastic behavior	Section 5	Introduction to plasticity	Section 6	Introduction to dislocation mechanics	Section 7	Dislocations and Plastic deformation	Section 8	Dislocation strengthening mechanisms	Section 9	Introduction to composites
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	Section 10	Further topics in composites
	Section 11	Fundamentals of fracture mechanics
	Section 12	Mechanisms of fracture
	Section 13	Toughening mechanisms
	Section 14	Fatigue of Materials
	Section 15	Fatigue of Materials
	Section 16	Introduction to viscoelasticity, creep and creep crack growth
	Section 17	Final exam
11.	课程考核 Course Assessment	
	课程日常表现 40% 期末研究计划书撰写及答辩 60%	
12.	教材及其它参考资料 Textbook and Supplementary Readings	
	Mechanical Properties of Engineered Materials (Mechanical Engineering (Marcel Dekker)) 1st Edition , Wole Soboyejo , CRC Press, 2002, ISBN-10: 0824789008, ISBN-13: 978-0824789008 Mechanical Properties of Materials, Joshua Pelleg , ISBN: 978-94-007-4341-0 (Print) 978-94-007-4342-7 (Online) Mechanical Behavior of Materials. 2nd ed. Long Grove, IL: Waveland Press Inc., 2005. ISBN: 9781577664253.	