

课程大纲

COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	软材料力学 Mechanics of Soft Materials
2.	课程性质 Compulsory/Elective	选修 Elective
3.	开课单位 Offering Dept.	力学与航空航天工程系 Department of Mechanics and Aerospace Engineering
4.	课程学分/学时 Course Credit/Hours	3 学分/48 学时 3/48 hours
5.	授课语言 Teaching Language	英语/中文（辅助） English/Chinese (subsidiary)
6.	授课教师 Instructor(s)	杨灿辉 Canhui Yang
7.	开课学期 Semester	春季学期 Spring semester
8.	是否面向本科生开放 Open to undergraduates or not	是 Yes
9.	先修要求 Pre-requisites	（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.） 线性代数 (MA 107A or MA 113)、材料力学 (MAE 202) Linear algebra (MA 107A or MA 113)、Mechanics of materials (MAE 202)
10.	教学目标 Course Objectives	
		（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.） 通过本门课程的学习，学生将对软材料的大变形、非线性的力学行为有基本的认识，掌握其本构行为的连续介质力学描述方法和问题的求解；了解经典的软材料物理和唯象本构模型；以及对软材料的前沿研究问题（高强度、粘接、断裂、疲劳等）有初步的认识。 Through the course, the students are expected to grasp the basic knowledge about the non-linear large-deformation behaviors and classic physical/phenomenological constitutive models of soft materials, and get to know about several research frontiers, such as mechanical robustness, adhesion, fracture, and fatigue, of soft materials.
11.	教学方法 Teaching Methods	
		（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.） 理论授课 In theory
12.	教学内容 Course Contents	
		（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.）
	Section 1	Overview
	Section 2	Mathematical preliminaries
	Section 3	Introduction of polymer physics
	Section 4	Rubber elasticity

	Section 5	Linear viscoelasticity
	Section 6	Poroelasticity
	Section 7	Fracture of polymers
	Section 8	Adhesion of soft materials
	Section 9	Fatigue of soft materials
	Section 10	Designing soft materials of extraordinary properties
13.	课程考核 Course Assessment	
	<p>(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.) 考勤 (15%) + 期中考试 (40%) + 期末报告 (45%) Attendance(15%) + mid-term examination(40%) + Final presentation(45%)</p>	
14.	教材及其它参考资料 Textbook and Supplementary Readings	
	M. Rubinstein, R.H. Colby, Polymer physics, 2003. L. Treloar, The physics of rubber elasticity, 1975. D.I. Bower, An introduction to polymer physics, 2002. J. D. Ferry, Viscoelastic properties of polymers, 1980 Z. Suo, Finite deformation: general theory (http://imechanica.org/node/538)	