课程大纲
COURSE SYLLABUS

1.	课程代码/名称 **Course Code/Title**	软材料学科前沿 Frontiers of Soft Materials Science
2.	课程性质 **Compulsory/Elective**	专业课 **Elective**
3.	课程学分/学时 **Course Credit/Hours**	3 分/48 学时 3 credits/48 hr
4.	授课语言 **Teaching Language**	英文 English
5.	授课教师 **Instructor(s)**	刘吉 Ji Liu
6.	是否面向本科生开放 **Open to undergraduates or not**	是 Yes
7.	先修要求 **Pre-requisites**	基础的材料学科相关教育或研究背景 fundamental background and/or reserach experience in material science
8.	教学目标 **Course Objectives**	
	多学科交叉的软材料科学是材料学和工程学最为活跃的领域之一。课程将从介绍软物质的基本知识和共性问题出发，阐述软材料的研究方法；并结合前沿实例，介绍高分子材料在生物医用、环境、信息和能源科学中重要作用，在回答"软材料有什么用"和"软材料怎么用"的同时，阐述通过对软材料的设计和工程化去解决生活中的关键问题。 Soft materials are one of the most active fields in material science and engineering science. This course (Frontiers of Soft Materials Science) will systematically introduce the basic principles, common problems and experimental methods of soft materials. This course is supposed to introduce the important and frontier applications of soft materials in biomedical, environmental science, information science and energy science with specific examples. Students are supposed to understand "what are soft materials for?" "how are soft materials used?" by learning to solve those grand challenges via the design and engineering of emerging soft materials.	
9.	教学方法 **Teaching Methods**	
	主要以授课为主，分组中期报告和期末报告为辅 It is mainly based on lectures, accompanied with subgroup mid-term and final-term presentations.	
10.	教学内容（需要写到 section 16） **Course Contents**	
	Section 1	软材料概论(3 课时) Introduction to soft materials (3 hr)
	Section 2	软材料的物理性质(3 课时) Physical aspects of soft materials (3 hr)
	Section 3	软材料的化学性质(3 课时) Chemical aspects of soft materials (3 hr)
	Section 4	用于生物医用的软材料 I (3 课时)

		Soft materials for biomedical applications-Part I (3 hr)
	Section 5	用于生物医用的软材料 II (3 课时) Soft materials for biomedical applications-Part II (3 hr)
	Section 6	用于生物传感的软材料 I (3 课时) Soft materials for biosensor-Part I (3 hr)
	Section 7	用于生物传感的软材料 II (3 课时) Soft materials for biosensor-Part II (3 hr)
	Section 8	形状记忆及自修复软材料 I (3 课时) Shape memory and self-healable soft materials-Part I (3 hr)
	Section 9	期中报告(3 课时) Mid-term subgroup presentations (3 hr)
	Section 10	形状记忆及自修复软材料 II (3 课时) Shape memory and self-healable soft materials-Part II (3 hr)
	Section 11	用于软体机器人的软材料(3 课时) Soft materials for soft robotics (3 hr)
	Section 12	用于储能的软材料 I (3 课时) Soft materials for energy storage-Part I (3 hr)
	Section 13	用于储能的软材料 II (3 课时) Soft materials for energy storage-Part II (3 hr)
	Section 14	生物活性软材料(3 课时) Bioactive soft materials (3 hr)
	Section 15	用于高效吸附/分离的软材料(3 课时) Soft materials for high-performance absorption/separation (3 hr)
	Section 16	期末报告(3 课时) Final-term subgroup presentations (3 hr)

11.	课程考核 Course Assessment
	请在此注明：①考查/考试；②分数构成（可包含 **attendance, quiz, midterm, final exam,**各项可设置一定比例，由任课教师自行决定）。 考查: 出勤率 30%，中期报告占考试总成绩百分比为 30%，期末报告占考试总成绩百分比为 40%. Assessment criteria: attendance 30%, mid-term presentation 30%, and final-term presentation 40%

12.	教材及其它参考资料 Textbook and Supplementary Readings
	1. 何天白,胡汉杰.功能高分子与新技术(2000). 2. 赵文元，王亦军，功能高分子材料(2013). 3. Michael Rubinstein, Ralph H. Colby. Polymer Physics (2003). 4. Paul J. Flory. Principles of Polymer Chemistry (1962). 5. Ali Khademhosseini, Joseph P. Vacanti and Robert Langer. Progress in Tissue (2009). 6. X. Zhao, Hydrogel bioelectronics, Chem. Soc. Rev., 48, 1642-1667 (2019). 7. T. Xie, Recent progress in shape memory polymer: New behavior, enabling materials, and mechanistic understanding. Progress in Polymer Science, 49, 79-120 (2015). 8. C. Majidi, Untethered soft robotics. Nature Electronics, 1, 102 (2018).