课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	**软物质物理基础 Fundamental Physics of Soft Matter**
2.	**课程性质** **Compulsory/Elective**	选修 Elective
3.	**课程学分/学时** **Course Credit/Hours**	3/48 hours
4.	**授课语言** **Teaching Language**	英语 English
5.	**授课教师** **Instructor(s)**	韦齐和（Wei, Qihe）
6.	**是否面向本科生开放** **Open to undergraduates or not**	yes
7.	**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.） Graduate students are required to be in good standing in a graduate program, and undergraduate students need to have taken college physics and advanced mathematics.

8. 教学目标
Course Objectives

Because of its exceptional responsiveness to various chemical and physical stimuli, intelligent soft matter has become indispensable for applications including actuators and sensors, flexible electronics, robotics, 3D/4D printing, and reconfigurable metamaterials/device components. This course will focus on fundamental physics of two particular soft materials: liquid crystals and polymers. This course aims to prepare students with fundamental understanding stimuli-responsive soft matter for their further research on soft matter related topics. The learning objectives for undergraduate students will be focused more on physical concepts.

9. 教学方法
Teaching Methods

This class will be taught in lectures, attendance is required. In addition to homework, students will be assigned to read recent articles of frontier research related to the topics covered in the class, and do presentations to the whole class. Literatures for undergraduate students will be more concept-oriented.

10. 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	Introduction to soft matter
Section 2	Liquid crystals and mesophases
Section 3	Orientational ordering and defects
Section 4	Polymer materials
Section 5	Chain structures and conformations
Section 6	Concentrated polymer solutions, phase separation and diffusion
Section 7	Amorphous polymer states and polymer networks
Section 8	Liquid crystalline polymer states
Section 9	Crystalline polymer states

	Section 10	Polymer viscoelasticity and rheology
	Section 11	Modern topics

11. 课程考核
Course Assessment

Grading will be based on (1) performance in class (raising and answering questions, participating in discussions), 5%; (2) literature reading and presentation, 20%; (3) Homework assignments, 25%; (4) Mid-term exam,25%; (5) Final exam, 25%. Exam questions for undergraduate students will be focused more on physical concepts.

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

(1) Lecture notes by the instructor; (2) The Physics of Liquid Crystals by P. G. de. Gennes and J. Prost; (2) Introduction to Polymer Science by L. H. Spering; (3) Scaling Concepts in Polymer Physics, by P. G. de. Gennes.