课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	**超快光谱学基础 Fundamentals of Ultrafast Spectroscopy**
2.	**课程性质** **Compulsory/Elective**	专业选修课
3.	**开课单位** **Offering Dept.**	材料科学与工程系
4.	**课程学分/学时** **Course Credit/Hours**	3
5.	**授课语言** **Teaching Language**	英语
6.	**授课教师** **Instructor(s)**	钟锦辉　助理教授
7.	**开课学期** **Semester**	秋季学期
8.	**是否面向本科生开放** **Open to undergraduates or not**	否
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.） 无

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.）

超快光谱学是利用超短脉冲飞秒激光研究光与物质相互作用的重要技术手段，对材料、化学、物理等方向的发展起重要作用。本课程注重培养学生掌握超快光学和光谱学的基本原理、实验技术及前沿应用，包括光与物质相互作用的基本原理、线性与非线性光学效应、超短激光脉冲的制备与表征方法、主要超快光谱方法简介（超快荧光、泵浦-探测、二维光谱等）、超快光谱学在材料、化学、物理等领域中的典型应用等。课程内容将为学生利用超快光谱学方法开展光电信息和光电转换等领域的研究提供基础，也为相关领域培养人才。

Ultrafast spectroscopy is an important method to study the light-matter interaction using ultrashort femtosecond laser pulses, which plays an important role in the development of the materials science, chemistry, and physics. In this course, students are expected to learn the fundamentals of ultrafast optics and spectroscopy, related experimental techniques, and the frontiers of the applications with ultrafast spectroscopy. The contents of the course include the fundamentals of light-matter interaction, linear and nonlinear optical effects, the generation and characterization of ultrashort laser pulses, several typical ultrafast spectroscopic methods including ultrafast fluorescence, pump-probe spectroscopy, and two-dimensional spectroscopy, and important applications of ultrafast spectroscopy in materials science, chemistry, and physics. By attending this course, the students will gain basis knowledge of ultrafast spectroscopy, which will be beneficial not only for performing relevant experiments in scientific research but also for working in the field/industry of optoelectronic technology and information, solar energy conversion, and laser instrumentation.

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.）

以授课为主，注重将基本原理讲解和实验技术介绍相结合，同时辅以简单的理论模拟计算训练，让学生以虚拟实验的方式加深对超快光谱学原理的理解。

The course will be given in a series of lectures, with emphasize on the combination of the introduction

	of fundamentals and the experimental techniques. The lecturers will also present simple simulations, which will help the students to deepen the understanding of the principle of ultrafast spectroscopy.

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	超快光谱学导论 Introduction of ultrafast spectroscopy
Section 2	光与物质相互作用基础 Fundamental of light-matter interaction
Section 3	线性与非线性光学效应 Linear and nonlinear optical effects
Section 4	超短脉冲的制备与表征方法 Generation and characterization of ultrashort laser pulses
Section 5	超快光谱方法 Ultrafast spectroscopic methods
Section 6	超快光谱学在材料、化学、物理等领域的应用实例 Examples of the applications of ultrafast spectroscopy in materials science, chemistry, and physics
Section 7	超快光谱学的未来发展趋势 Perspective of ultrafast spectroscopy

13. 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.）

出勤 Attendance（10%）、课堂表现 Class Performance（10%）、小测验 Quiz（20%）、平时作业 Assignments（20%）、课程项目 Projects（20%）期末报告 Final Presentation（20%）

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

Ultrafast Optics (by Andrew Weiner)