

课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	课程名称 Course Title	光学基础 FUNDAMENTALS OF OPTICS
2.	授课院系 Originating Department	电子与电气工程系 Department of Electrical and Electronic Engineering
3.	课程编号 Course Code	EE210
4.	课程学分 Credit Value	3
5.	课程类别 Course Type	专业基础课 Major Foundational Courses
6.	授课学期 Semester	春季 Spring
7.	授课语言 Teaching Language	中英双语 English & Chinese (English with DETAILED EXPLANATIONS in Chinese)
8.	授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	刘言军, 副教授, 电子与电气工程系 办公室: 第二科研楼 523 室 Email: yjliu@sustc.edu.cn 电话: 0755-8801-8520 LIU Yanjun, Assoc. Prof., Department of Electrical and Electronic Engineering Office: Room No. 520, No.2 Research Building Email: yjliu@sustc.edu.cn Telephone: 0755-8801-8520
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	无 NA
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	100

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
学时数 Credit Hours	48				48
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无 None				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	本课程为电子与电气工程系光电专业基础课，主要阐述应用光学和物理光学；其它专业学生如果想学习相关知识也可选修本课程。 This course should be taken by everyone in Optoelectronics Science and Technology, and it includes the basic principle of Applied Optics and Physical Optics. It should however also be suitable for non-specialists, i.e. for all those students who show interests in optics to gain a certain amount of relevant knowledge.				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无 None				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

通过对本课程的学习，使同学首先牢固掌握光学的基本概念、原理和规律，并能利用其解决具体的光学问题。

Through the course of learning, students need to firmly grasp the basic concepts of optics, principles and laws, therefore can apply them to solve specific problems related to optics.

16. 预达学习成果 Learning Outcomes

本课是光电信息科学与技术专业的基础课，学生将对光学的发展概况、研究方法以及在科研、生产和实践上的应用有所了解，具有一定的解决问题和创新思维能力；最主要的乃是为学好后继课程打下良好基础及适应今后科学技术飞速发展的需要。

This course is the basic course for students in Optoelectronics Science and Technology. Students need to understand the development and the research on optics, as well as their applications in scientific research, production and practical applications. Moreover, students need to have certain problem-solving and innovative thinking ability. The most important is to lay the foundation about the knowledge of optics for subsequent courses and meet the requirements of the rapid development of science and technology in the future.

17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

Chapter 1. Introduction of Optics: A brief history of optics; Wave motion: 1D waves, harmonic waves, phase and phase velocity, complex representation, plane waves, the 3D differential wave equation, spherical waves and cylindrical waves.

Chapter 2. Electromagnetic Theory, Photons and Light: Basic laws of electromagnetic theory, electromagnetic waves, energy and momentum, radiation, light in bulk matter, the electromagnetic-photon spectrum, and quantum field theory.

Chapter 3. The Propagation of Light: Introduction, Rayleigh scattering, reflection, refraction, Fermat's principle, the electromagnetic approach, total internal reflection, optical properties of metals, familiar aspects of the interaction of light and matter, the Stokes treatment of reflection and refraction, photons, waves and probability.

Chapter 4. Geometrical Optics: introductory remarks, lenses, stops, mirrors, prisms, fiber optics, optical systems, wavefront shaping, gravitational lensing, thick lenses and lens systems, analytical ray tracing, aberrations, GRIN systems, concluding remarks.

Chapter 5. The Superposition of Waves: the addition of waves of the same frequency, the addition of waves of different frequency, anharmonic periodic waves, nonperiodic waves.

Chapter 6. Polarization: the nature of polarized light, polarizers, dichroism, birefringence, scattering and polarization, polarization by reflection, retarders, circular polarizers, polarization of polychromatic light, optical activity, induced optical effects-optical modulators, liquid crystals, a mathematical description of polarization.

Chapter 7. Interference: general considerations, conditions for interference, wavefront-splitting interferometers, amplitude-splitting interferometers, types and localization of interference fringes, multiple-beam interference, applications of single and multilayer films, applications of interferometry.

Chapter 8. Diffraction: preliminary considerations, Fraunhofer diffraction, Fresnel diffraction, Kirchhoff's scalar diffraction theory, boundary diffraction waves.

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

指定教材: 1) Eugene Hecht, Optics (4th Edition), Addison-Wesley Publishing Company, 2001

2) Eugene Hecht, 张存林 译, 光学 (Optics) 第四版, 高等教育出版社, 2005 年

推荐参考资料: 赵凯华, 钟锡华, 光学, 北京大学出版社, 1984 年

Required: 1) Eugene Hecht, Optics (4th Edition), Addison-Wesley Publishing Company, 2001

2) Zhang Cunlin, Optics (4th Edition, Chinese Edition), Higher Education Press, 2005

Recommended: Zhao Kaihua and Zhong Xihua, Optics, Peking University Press, 1984

课程评估 ASSESSMENT

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance		10		
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments		10		

期中考试 Mid-Term Test	40		
期末考试 Final Exam	40		
期末报告 Final Presentation			
其它（可根据需要 改写以上评估方式） Others (The above may be modified as necessary)			

20. 记分方式 **GRADING SYSTEM**

<input checked="" type="checkbox"/> A. 十三级等级制 Letter Grading <input type="checkbox"/> B. 二级记分制（通过/不通过） Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过
This Course has been approved by the following person or committee of authority

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