

课程大纲

COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	Principles of Photonics
2.	课程性质 Compulsory/Elective	选修 Elective
3.	课程学分/学时 Course Credit/Hours	3/48
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.) For graduate students, it is desirable to have taken courses related to optics. For undergraduate students, it is required to have taken college physics (PHY105A-B) and advanced mathematics (MA102B-C).
8.	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.) This class will be taught in lectures, attendance is required. In addition to homework, graduate students will be assigned to read recent articles of frontier research related to the topics covered in the class. Undergraduate students will not be required to read advanced research papers.	
9.	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.) 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. 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	Light: waves or photons; ray or wave optics
	Section 2	Electromagnetic optics: Lorentzian or Drude model, absorption and dispersion
	Section 3	Polarization optics: Jones matrix, Poincare spheres, liquid crystals, polarization devices
	Section 4	Guided-wave optics: waveguides, plasmonics
	Section 5	Resonator optics: 1D/2D/3D resonators, density of states
	Section 6	Photon optics: momentum, radiation pressure, spin/orbital angular momentum
	Section 7	Light and matter: energy levels, interaction of light with atoms
	Section 8	Laser amplifiers: laser amplification, amplifier pumping,

	Section 9	Lasers: laser oscillation, characteristics of lasing
	Section 10	Nonlinear optics: nonlinear optical media, second harmonic generation, parametric amplification, parametric oscillation, frequency upconversion
11.	课程考核 Course Assessment	
	<p>(Ⓛ 考核形式 Form of examination; Ⓞ.分数构成 grading policy; Ⓢ 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.)</p> <p>Grading will be based on (1) performance in class (raising and answering questions, participating in discussions), 10%; (2) Homework assignments, 30%; (3) Mid-term exam, 30%; (4) Final exam, 30%. Exam questions for undergraduate students will be less intensive in mathematics.</p>	
12.	教材及其它参考资料 Textbook and Supplementary Readings	
	<p>(1) Lecture notes by the instructor;</p> <p>(2) Fundamentals of Photonics by Bahaa E A Saleh and Malvin Carl Teich</p> <p>(3) Optical Waves in Crystals, by Amnon Yariv, Pochi Yeh</p>	