

Introduction to Optics (PHYS:4720) Fall 2017

Instructor: John Prineas, Professor

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Department: Department of Physics and Astronomy

Department Office is in 203 Van Allen

Department Executive Officer is Professor Fred Skiff, available for appointment via Heather Mineart, 203 Van Allen, 335-1688

Course location & times: 70 Van Allen, Tu Th 9:30 am to 10:45 am

Course website: icon.uiowa.edu

Course description: Geometrical and physical optics; interference; diffraction; polarization; microscopic origins of macroscopic optical properties of matter; optical activity; electro-optical, magneto-optical, acousto-optical phenomena; spontaneous Brillouin, Raman, Rayleigh scattering. We will follow these topics sequentially through chapters in Hecht's Optics. This course will deepen your understanding of how light interacts with matter, and how light propagates through optical components, systems and physical structures; and the course will give you a practical base of knowledge for setting up and analyzing optical experiments in the lab. You will also spend some time familiarizing yourself with current topics of interest in optics.

Recommended Prerequisites: Physics I-III (PHYS:1701,1702,2703) or the equivalent.

Required Texts: Hecht, Optics, 5th Ed.

Homework: You will be assigned weekly homework on Thursdays which is due the following Thursday. Homework solutions for all assigned problems will be available on the course webpage via ICON. Your worst homework will be dropped.

Class work:

I encourage you to read along in the text as we make our way through topics in class. We will work through the whole textbook, though I will not have time to cover every topic in class. I will lecture on a subset of key topics, and try to use plenty of classroom demonstrations to illustrate concepts.

Each Th you will begin class by working problems based on the homework and the previous week's topics, which you will turn in for grading. This will give you additional practice, allow you to check your understanding, and help motivate you to keep up with topics in class. Your worst in-class quiz will be dropped.

You will make a fifteen minute Powerpoint presentation on a topic in optics. I will provide a list of suggested topics, but you are also allowed to choose your own topic, subject to my approval. Presentations will be given in-class near the end of term.

Exams: There will be two in-class exams and final. The in-class exams will be given on Th Oct 5 and Th Nov 16. The final exam time is to be announced when it becomes available.

Make-up exams: A make-up exam may be allowed in exceptional circumstances such as illness, mandatory religious obligations, certain University activities, or unavoidable circumstances. Students participating in University activities are expected to provide a statement before the absence signed by a responsible official that specifies the dates and times the student will miss

class. Authorized activities include participation in athletic teams, the marching band and pep band, debate teams, and other recognized University groups, as well as participation in University field trips, service with the National Guard, and jury duty. Details may be found at: <https://clas.uiowa.edu/students/handbook/attendance-absences> . A UI absence form is available at the Registrar [student forms](#) link.

Grading: Weighting of the different components of the course are as follows: Exam 1: 20% Exam 2: 20% Final: 25% Homework: 15% Class work: 15% (in-class work)+5% (presentation). You can check your scores on exams on the course webpage via ICON. Grading for the course will approximately follow [College of Liberal Arts grading guidelines](#). Pluses and minuses will be used in this course.

Administrative Home

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at <https://clas.uiowa.edu/students/handbook>.

Electronic Communication

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences (Operations Manual, III.15.2, k.11).

Accommodations for Disabilities

The University of Iowa is committed to providing an educational experience that is accessible to all students. A student may request academic accommodations for a disability (which includes but is not limited to mental health, attention, learning, vision, and physical or health-related conditions). A student seeking academic accommodations should first register with Student Disability Services and then meet with the course instructor privately in the instructor's office to make particular arrangements. Reasonable accommodations are established through an interactive process between the student, instructor, and SDS. See <https://sds.studentlife.uiowa.edu/> for information.

Nondiscrimination in the Classroom

The University of Iowa is committed to making the classroom a respectful and inclusive space for all people irrespective of their gender, sexual, racial, religious or other identities. Toward this goal, students are invited to optionally share their preferred names and pronouns with their instructors and classmates. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University's Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity, diversity@uiowa.edu, or visit diversity.uiowa.edu.

Academic Honesty

All CLAS students or students taking classes CLAS offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

CLAS Final Examination Policies

The final examination schedule for each class is announced by the Registrar generally by the fifth week of classes. Final exams are offered only during the official final examination period. No

exams of any kind are allowed during the last week of classes. All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar's web site and will be shared with instructors and students. It is the student's responsibility to know the date, time, and place of a final exam.

Making a Suggestion or a Complaint

Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS Academic Policies Handbook).

Understanding Sexual Harassment

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Office of the Sexual Misconduct Response Coordinator for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Department of Public Safety website.

Tentative class schedule:

Date-Week of	Chapter
Aug. 21	Chapt. 2: Wave Motion Tu: 2.1-5 Th 2.6-10
Aug. 28	Chapt. 3: EM Theory, Photons, and Light Tu: 3.1-3.4 Th 3.5-3.7 <i>Hmwk 1 due (Ch 2)</i>
Sept. 4	Chapt. 4: The Propagation of Light Tu: 4.1-4.5 Th 4.6-4.11 <i>Hmwk 2 due (Ch 3)</i>
Sept. 11	Chapt. 5: Geometrical Optics Tu: 5.1-5.3 Th 5.4-5.6 <i>Hmwk 3 due (Ch 4)</i>
Sept. 18	Chapt. 5 Cont. Tu: 5.7-5.9 Th: 6.1-6.5 Chapt. 6: More Geometrical Optics <i>Hmwk 4 due (Ch 5)</i>
Sept. 25	Chapt. 7: The Superposition of Waves Tu: 7.1-7.2 Th: 7.3-7.4 <i>Hmwk 5 due (Ch 5-6)</i>
Oct. 2	Tu: Review Th: Midterm Exam I
Oct. 9	Chapt. 8: Polarization Tu: 8.1-4 <i>Hmwk 6 due (Ch 7)</i> Th 8.5-8
Oct. 16	Chapt. 8 cont. Tu: 8.9-8.13 Chapt. 9: Interference Th 9.1-3 <i>Hmwk 7 due (Ch 8)</i>
Oct. 23	Chapt 9 cont. Tu: 9.3-6 Th: 9.7-8 <i>Hmwk 8 due (ch 8-9) + Presentation topics due</i>
Oct. 30	Chapt. 10: Diffraction Tu: 10.1-2 Th: 10.3-4 <i>Hmwk 9 due (Ch 9)</i>
Nov. 6	Chapt. 10: Diffraction Tu: 10.4-5

	Chapt. 11: Fourier Optics Th: 11.1-2 <i>Hmwk 10 due (Ch 10)</i>
Nov. 13	Tu: Review Th: Midterm Exam II
Nov. 20	Thanksgiving break
Nov. 27	Tu: Presentations I Th: Presentations II <i>Hmwk 11 due</i>
Dec. 4	Chapt. 11: Tu: 11.3-4 Th Review + Evals <i>Hmwk 11 due (Ch 10-11)</i>