Physics 463 (ECE 463), Advanced Optics I
Tuesday and Thursday, 15:30 to 16:45 pm, CHTM Room 103
Fall 2018

Instructor

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Course Description

Electromagnetic theory of geometrical optics, Gaussian ray tracing and matrix methods, finite ray tracing, aberrations, interference.

Book

Pedrotti, Pedrotti and Pedrotti, Introduction to Optics. It is generally considered as an undergraduate book. It has considerably more physical insight than Klein & Furtak often chosen by colleagues, which in my opinion has clumsy tedious trigonometric formula manipulations with little or no physical sense. Other reference book: Born & Wolf, 7th edition, Principles of Optics ISBN-13 978-0-521-64222-4.

Homeworks

Generally given Tuesday, due next Tuesday.

Project

One or two optical measurement project will be described - one project and one week assigned per student. A report is due at the end of the semester, on November 20.

This report will count for 20% of the grade.

Syllabus

Note that the class schedule is subject to change.

Heading	Topic	Date
Introduction	Introduction	8/21/18
	Maxwell's equations in matter / Energy flow	8/23/18
	Classical Electron Oscillator -	8/28/18
	Discussion on the index of refraction / plasma	8/30/18
	Plasma problems /introduction to projects	9/04/18
Planar Interfaces	Reflection and Transmission (Snells/Fresnel)	9/06/18
	Dielectric/metal interfaces, Total Internal reflection	9/11/18
	Prisms (dispersive, expanders, rhomb, etc	9/13/18
	Phase at interfaces, group and phase velocity and delay, velocity in crystals	9/18/18
Geometrical Optics	Simple lenses, doublets, lens formulae	9/20/18
	Instruments (microscope, telescopes)	9/20/18
	Ray tracing, matrix method	9/25/18
	Imaging, spherical and asph. optical surf	9/27/18
	Optical matrices, applications, problems	10/02/18
	Aberrations. Fourier Transforms	10/04/18
	Fourier Transforms & group velocity	10/09/18
	Gaussian Beams	10/16/18
Test 1	Pre-test Review	10/18/18
	Test	10/23/18
Diffraction I.	More on Gaussian beams and Gaussian pulses	10/25/18
	q-parameter; space-time analogy	10/30/18
	Fraunhofer Diffraction as a F. T. Problem	11/01/18
	Newton's fringes, Young's double slit	11/06/18
Interferometers	Various interferometers and Fabry-Perot	11/08/18
	more on interferometers	11/13/18
Gratings	Gratings	11/15/18
Polarization	Polarization, Jones Matrices	11/20/18
Test 2		11/27/18
	Coatings, matrix method for multilayer	11/29/18
Projects and Review	Review of projects	12/04/18
	Wrapping up	12/06/18

Grading

	Points
Homework	40
Test 1	20
Test 2	20
Report	20

Accessibility

In accordance with University Policy 2310 and the Americans with Disabilities Act (ADA), academic accommodations may be made for any student who notifies the instructor of the need for an accommodation.

It is imperative that you take the initiative to bring such needs to the instructors attention, as I am not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow. Contact Accessibility Resource Center at 277-3506 for additional information.

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In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered responsible employees by the Department of Education. This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see: https://policy.unm.edu/university-policies/2000/2740.html

Academic Integrity

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or otherwise fails to meet the standards. Any student judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course. Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.