

**Physics 463 (ECE 463), Advanced Optics I**  
Mondays and Wednesdays, 14:00 to 114:15 pm, ***PAIS Room 1100***  
Fall 2019

**Instructor**

Jean-Claude Diels  
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**Teaching Assistant**

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**Course Description**

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

**Book**

Material will be provided on the Website. If you want to buy a book, one simple reference is: Pedrotti, Pedrotti and Pedrotti, Introduction to Optics.  
A complete reference book (the “Bible of Optics” or style ”Encyclopedia Britannica” or “Introduction to the concept elephant in 7 volumes”):  
Born & Wolf, 7th edition, Principles of Optics ISBN-13 978-0-521-64222-4.

**Homeworks**

Generally given Wednesday, due the next Wednesday .

**Project**

One project assigned per student, theoretical or hands on, COVID-19 deciding. Report and presentation at the end of the semester.

## Syllabus

Note that the class schedule is subject to change.

Heading	Topic	Date
<b>Introduction</b>	Introduction	8/17/20
	Maxwell's equations in matter / Energy flow	8/19/20
	Classical Electron Oscillator -	8/24/20
	Discussion on the index of refraction / plasma	8/26/20
	Plasma problems /introduction to projects	8/31/20
<b>Planar Interfaces</b>	Reflection and Transmission (Snells/Fresnel)	9/02/20
	Dielectric/metal interfaces, Total Internal reflection	9/07/20
	Prisms (dispersive, expanders, rhomb, etc	9/09/20
	Phase at interfaces, group and phase velocity and delay, velocity in crystals	9/14/20 9/16/20
<b>Geometrical Optics</b>	Simple lenses, doublets, lens formulae	9/21/20
	Instruments (microscope, telescopes)	9/23/20
	Ray tracing, matrix method	9/28/20
	Imaging, spherical and asph. optical surf	9/30/20
	Optical matrices, applications, problems	10/05/20
	Aberrations. Fourier Transforms	10/07/20
	Fourier Transforms & group velocity	10/12/20
	Gaussian Beams	10/14/20
<b>Test 1</b>	Pre-test Review	10/19/20
	Test	10/21/20
<b>Diffraction I.</b>	More on Gaussian beams and Gaussian pulses	10/26/20
	q-parameter; space-time analogy	10/28/20
	Fraunhofer Diffraction as a F. T. Problem	11/02/20
<b>Interferometers</b>	Newton's fringes, Young's double slit	11/04/20
	Various interferometers and Fabry-Perot	11/09/20
	more on interferometers	11/11/20
<b>Gratings</b>	Gratings	11/16/20
<b>Polarization</b>	Polarization, Jones Matrices	11/18/20
<b>Test 2</b>		11/23/20
<b>Projects and Review</b>	Review of projects	11/30/20
	Multilayer matrices	12/02/20
	Wrapping up	12/07/20

## Grading

Homework 40%, Test1 20%, Test2 20%, report 20%.

## Questions, Communication

Please call me at 272 7830 or 277 4026 to make appointment. Please leave a message. One person only: we can meet either in my office in Physics (PAIS 2236) or at CHTM (114A).

Small groups (2 or more): I can reserve a meeting room (classroom) at CHTM.

## COVID-19 message from the Provost James Paul Holloway

### **Respect the UNM Community by Preserving Health**

You have the ability to prevent the spread of COVID-19 and to preserve the health of fellow students, your instructor, staff and the community by following UNM health protocols. The UNM Provost Administrative Directive on Mandatory Student Face Covering and Symptom Reporting of July 9, 2020 requires that all students on UNM-Main and UNM branch campuses wear face masks in the face-to-face classroom and on campus unless they have a specific mask accommodation (confidentially documented with the Accessibility Resource Center). UNM Provost Administrative Directive is consistent with Governor Lujan Grisham's Public Health Emergency Order, as amended, and the Public Health Order of the New Mexico Health Secretary. *It also requires daily participation in symptom screening through covidscreen, which will be sent via UNM e-mail.*

**Acceptable masks and mask wearing in class:** A two-layer mask that covers the nose and mouth and that is cleaned regularly is acceptable. A face shield is not sufficient protection. It is vital that you wear your mask correctly, covering your nose and mouth. Removing your mask for an extended period to eat or drink in class violates the Provost Administrative Directive and endangers others.

**Mask Wearing Accommodation:** Individuals with a documented disability or diagnosis may seek accommodation with the UNM Accessibility Resource Center (ARC) ([arc.unm.edu](http://arc.unm.edu)). Individuals do not need to reveal private information to an instructor. ARC will require documentation of health requirements, which will be kept confidential. The instructor will be informed only of any need for accommodation.

**Consequences of not wearing a mask properly:** Unless you have an ARC-approved accommodation, if you don't wear a mask, or if you do not wear a mask properly by covering your nose and mouth, you will be asked to leave class. If you fail to wear a mask properly on more than one occasion, you can expect to be dropped from the class. If you insist on remaining in the classroom while not wearing a mask (without an ARC-determined accommodation), class will be dismissed for the day to protect others and you will be dropped from the class immediately.

*This class may move to remote delivery at any time to preserve the health and safety of the students, instructor and community. Please check [Dielslab.unm.edu](https://dielslab.unm.edu) regularly for updates about our class and please check <https://bringbackthepack.unm.edu> regularly for general UNM updates.*

### **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 instructor's attention, as he is 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.

### **Title IX**

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](http://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.