



UNIVERSITY OF  
CENTRAL FLORIDA

**OSE 5041 - Introduction to Wave  
Optics**  
**Section: 0V02**  
*Optics and Photonics*

## **Course Information**

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**Term:** Spring 2025

**Class Meeting Location:**

**Modality:** V

**Credit Hours:** 3.00

## **Instructor Information**

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Pieter Kik

**Office Location:** CREOL A220

**Office Hours:**

T/R 6pm-7pm

**Email:** kik@ucf.edu

## **Course Description**

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OSE 5041 OPT-OPT 3(3,0)Introduction to Wave Optics: PR: EEL 4440 or PHY 4424 or C.I. Electromagnetic foundation of light waves as applied to reflection, diffraction, interference, polarization, coherence, and guided waves. Occasional.

This course is intended for the first-year master students and advanced senior undergraduate students, who would like to learn the basic properties of light, electromagnetic theory, the propagation of light, such as scattering, refraction and

reflection, image formation, polarization, interference, and diffraction. To illustrate the practical application of several of the covered concepts, the optical elements in virtual reality and augmented reality systems will be discussed.

Topics covered include

- Wave motion
- Electromagnetic theory
- The propagation of light
- Geometrical optics
- The superposition of waves
- Polarization
- Interference
- Diffraction
- Augmented reality and virtual reality

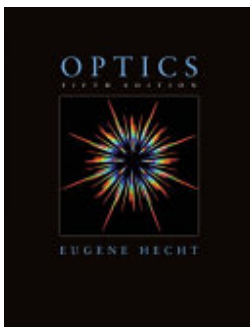
## Student Learning Outcomes

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Upon completion of this course, students will understand the basic principles of wave optics. They should will understand the role of the wave-nature of light in phenomena and applications including optical refraction, imaging, beam focusing, waveguides, optical fibers, wave plates, anti-reflection coatings, interferometers, and grating spectrometers.

## Course Materials and Resources

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### **Optics**

**ISBN:** 9780133977226

**Authors:** Eugene Hecht

**Publisher:** Pearson

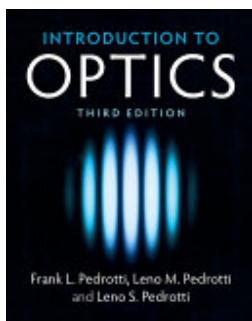
**Publication Date:** 2017-01-01

## Recommended Course Materials

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**Title:** Introduction to Optics

**ISBN:** 9781108428262



**Authors:** Frank L. Pedrotti, Leno M. Pedrotti, Leno S. Pedrotti

**Publisher:** Cambridge University Press

**Publication Date:** 2018-01-01

## Course Assessment and Grading Procedure

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Assessment	Percent of final grade
Homework (weekly)	20
Midterm Exam	35
Final Exam	45
Total	100

## Grading Scale

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Letter Grade	Percentage
A	94-100%
A-	90-93%
B+	87-89%
B	84-86%
B-	80-83%
C+	77-79%
C	74-76%
C-	70-73%
D+	67-69%
D	64-66%
D-	61-63%
F	0-60%

## Policies for Course Grade

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## **Makeup Work Policy**

If an emergency arises and a student cannot take an exam on the scheduled date, the student must give notification to the instructor no less than 24 hours before the scheduled time. The instructor will specify a new date for taking the exam. Any illness will be considered a medical emergency only if an official Doctor's note confirming the illness is submitted to the CREOL Graduate Office.

## **Missed/Late Assignments**

Missed or Late assignments without prior consent from the instructor will not receive credit. An extension of the submission deadline may be granted at the discretion of the instructor if the following criteria are met:

- The extension request was sent before the original submission deadline.
- The student provided a plausible excuse for the delayed submission.
- The student provided a reasonable updated submission deadline.

## **Grade Objections**

All objections to grades should be made in writing within one week of the work in question. Objections made after this period has elapsed will not be considered.

## **Course Accessibility**

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The University of Central Florida is committed to providing access and inclusion for all persons with disabilities. Students with disabilities who need access to course content due to course design limitations should contact the professor as soon as possible. Students should also connect with [Student Accessibility Services \(SAS\)](#) (Ferrell Commons 185, [sas@ucf.edu](mailto:sas@ucf.edu), phone 407-823-2371). For students connected with SAS, a Course Accessibility Letter may be created and sent to professors, which informs faculty of potential course access and accommodations that might be necessary and reasonable. Determining reasonable access and accommodations requires consideration of the course design, course learning objectives and the individual academic and course barriers experienced by the student. Further conversation with SAS, faculty and the student may be warranted to ensure an accessible course experience.

## Academic Integrity

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Students should familiarize themselves with UCF's Code of Conduct at [Student Conduct and Integrity Office](#). According to Section 1, "Academic Misconduct," students are prohibited from engaging in:

- a. Academic misconduct is defined as any submitted work or behavior that obstructs the instructor of record's ability to accurately assess the student's understanding or completion of the course materials or degree requirements (e.g., assignment, quiz, and/or exam). Examples of academic misconduct include but are not limited to: plagiarism, unauthorized assistance to complete an academic exercise; unauthorized communication with others during an examination, course assignment, or project; falsifying or misrepresenting academic work; providing misleading information to create a personal advantage to complete course/degree requirements; or multiple submission(s) of academic work without permission of the instructor of record.
- b. Any student who knowingly helps another violate academic behavior standards is also in violation of the standards.
- c. Commercial Use of Academic Material. Selling of course material to another person and/or uploading course material to a third-party vendor without authorization or without the express written permission of the University and the instructor of record. Course materials include but are not limited to class notes, the instructor of record's slide deck, tests, quizzes, labs, instruction sheets, homework, study guides, and handouts.
- d. Soliciting assistance with academic coursework and/or degree requirements. The solicitation of assistance with an assignment, lab, quiz, test, paper, etc., without authorization of the instructor of record or designee is prohibited. This includes but is not limited to asking for answers to a quiz, trading answers, or offering to pay another to complete an assignment. It is considered Academic Misconduct to solicit assistance with academic coursework and/or degree requirements, even if the solicitation did not yield actual assistance (for example, if there was no response to the solicitation).

## Responses to Academic Dishonesty, Plagiarism, or Cheating

Students should also familiarize themselves with the procedures for academic misconduct in UCF's student handbook, [The Golden Rule](#). UCF faculty members have a responsibility for students' education and the value of a UCF degree, and so seek to prevent unethical behavior and respond to academic misconduct when necessary. Penalties for violating rules, policies, and instructions within this course can range from a zero on the exercise to an "F" letter grade in the course. In addition, an Academic Misconduct report could be filed with the Office of Student Conduct and Academic Integrity, which could lead to disciplinary warning, disciplinary probation, or deferred suspension or separation from the University through suspension, dismissal, or expulsion with the addition of a "Z" designation on one's transcript.

Being found in violation of academic conduct standards could result in a student having to disclose such behavior on a graduate school application, being removed from a leadership position within a student organization, the recipient of scholarships, participation in University activities such as study abroad, internships, etc.

Let's avoid all of this by demonstrating values of honesty, trust, and integrity. No grade is worth compromising your integrity and moving your moral compass. Stay true to doing the right thing: take the zero, not a shortcut.

## **Title IX**

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Title IX prohibits sex discrimination, including sexual misconduct, sexual violence, sexual harassment, and retaliation. If you or someone you know has been harassed or assaulted, you can find resources available to support the victim, including confidential resources and information concerning reporting options at [Let's Be Clear](#) and [UCF Cares](#).

For more information on diversity and inclusion, Title IX, accessibility, or UCF's complaint processes contact:

- Title IX – OIE – [Office of Institutional Equity](#) & [askanadvocate@ucf.edu](mailto:askanadvocate@ucf.edu)
- Disability Accommodation – Student Accessibility Services – [Student Accessibility Services](#) & [sas@ucf.edu](mailto:sas@ucf.edu)
- [Access and Community Engagement](#) (including the Ginsberg Center for Inclusion and Community Engagement, Military and Veteran Student Success, and HSI)

Initiatives)

- UCF Compliance and Ethics Office – [Compliance, Ethics, and Risk Office](#) & [complianceandethics@ucf.edu](mailto:complianceandethics@ucf.edu)
- The [Ombuds Office](#) is a safe place to discuss concerns.

## Reporting an Incident or Issue

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If you believe you have experienced abusive or discriminatory behavior by any faculty or staff member, contact the Office of Institutional Equity [online](#) or at 407-823-1336. You can also choose to report using the UCF Integrity Line and can report anonymously or as yourself at 1-855-877-6049 or using the [online form](#). UCF cares about you and takes every report seriously. For more information see the [Reporting an Incident or Issue Webpage](#).

## Deployed Active-Duty Military Students

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Students who are deployed active duty military and/or National Guard personnel and require accommodation should contact their instructors as soon as possible after the semester begins and/or after they receive notification of deployment to make related arrangements.

## Campus Safety

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At UCF Public Safety and Police, safety is the top priority. Emergencies on campus are rare, but if one should arise, it's important to be familiar with some basic safety and security concepts.

- In an emergency, always dial 911.
- Every UCF classroom has an **Emergency Procedure Guide** posted on a wall near the door, which will show you how to respond to a variety of situations. This guide can also be found online [here](#).
- In the event of an active threat, remember **AVOID, DENY, DEFEND**. Choose the best course of action and act immediately. Watch the video [here](#) to learn more.

- **AVOID.** Pay attention to your surroundings and have an exit plan. Get as much distance and as many barriers between you and the threat as quickly as possible.
- **DENY.** When avoiding is difficult or impossible, deny the threat access to you and your space. Lockdown by creating barriers, turning the lights off and remaining quiet and out of sight. Make sure your cell phone is silenced, but do not turn it off.
- **DEFEND.** When you are unable to put distance between yourself and the threat, be prepared to protect yourself. Commit to your actions, be aggressive and do not fight fairly. Do whatever it takes to survive.
- For emergencies on campus, UCF will utilize the [UCF Alert](#) system. All UCF students, faculty and staff are automatically enrolled to receive these email and text alerts, however, it's a good idea to frequently ensure your [contact information is up to date](#).

## Financial Aid Accountability

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All instructors/faculty are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete this activity by the end of the first week of classes or as soon as possible after adding the course. Failure to do so may result in a delay in the disbursement of your financial aid.

## Class Schedule

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Topic No.	Topic
1	Harmonic Waves, Phase, Superposition, Complex waves
2	Phasors, wave addition, plane/cylindrical/spherical waves
3	Electromagnetic waves, energy, irradiance
4	Wave propagation in materials, light spectrum, colors
5	Concept of scattering, reflection, transmission
6	Electromagnetic boundary conditions, Snell's law, Total internal reflection



<b>Topic No.</b>	<b>Topic</b>
7	Imaging with lenses
8	Imaging with mirrors
9	Addition of waves with same frequency; wavepackets, pulse trains
10	Polarized light; linear, circular, elliptical, random polarization; dichroism, birefringence
11	Polarizers, quarter wave plates, half wave plates
12	Interference; Young's Double Slit experiment
13	Amplitude splitting 1: AR coating, thin film reflection
14	Amplitude splitting 2: fringes of equal thickness, Newton's rings, interferometers
15	Multiple-beam interference; etalon, Fabry-Perot cavity
16	Diffraction from 1D aperture and 2D apertures
17	Diffraction from multiple apertures, gratings
18	Fraunhofer vs. Fresnel diffraction
19	Coherence; Light sources (incandescent, light emitting diodes, lasers)
20	Applications: fiber optics and AR systems