



UNIVERSITY OF  
CENTRAL FLORIDA

## OSE 3052 - Foundations of Photonics

Section: 0001

*Optics and Photonics*

### Course Information

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**Term:** Fall 2024

**Class Meeting Days:** MW

**Class Meeting Time:** 09:00 - 10:15

**Class Meeting Location:** CROL A214

**Modality:** P

**Credit Hours:** 3.00

### Combined Section Information

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This syllabus applies to sections OSE 3052 0001, OSE 3052 0011.

The Discussion Class meets in HEC 118 from 2:00PM to 2:50PM on Wednesdays.

### Instructor Information

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Patrick Li Kam Wa

**Title:** Professor

**Office Location:** CREOL rm 209

**Office Hours:**

Tuesdays and Thursdays 8:00AM to 9:00AM

and Tuesdays and Thursdays 4:00PM to 5:00PM

Or by appointment.

**Phone:** 407-823-6816

**Email:** patrick@creol.ucf.edu

## **Course Description**

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OSE 3052 OPTIC-OPTICS 3(3,1)Foundations of Photonics: PR: Grades of C (2.0) or better in PHY 2049 and PHY 2049L and MAC 2313. Introduction to wave and photon models of light. Polarization and coherence. Interference and diffraction of light. Interferometers and spectrometers. Fall, Spr

Some of the main growth areas in the “high-tech” sectors are centered on the branch of optics known as “Photonics”, examples are: displays, data storage, telecommunication systems. This is not a temporary phenomenon. Continued growth of optics and photonics based industries means that there will be a growing and permanent need for engineers and scientists with some training in optics. Other areas of optics, such as bio-photonics, laser machining, laser marking, infrared imaging, etc. are growing strongly also. These topics are covered in the other courses in the Photonic Science and Engineering degree program. This course provides students with the strong foundation in optics that will be needed for the subsequent courses. We will frequently make reference to applications as we go.

This course introduces the basic descriptions of light as waves (physical optics), and photons.

Interference of optical waves is described along with interferometers and their applications to optical metrology and sensing.

Diffraction of optical waves propagating through apertures is examined and the effects on the resolution of imaging systems and the spreading and focusing of optical beams are covered.

Diffraction gratings and grating spectrometers will be studied.

The polarization of light and polarization devices used to control light will be examined.

Regarding light as photons, a brief introduction to absorption, emission, and luminescence phenomena is followed by a brief description of photonic devices such as

light emitting diodes, lasers and optical detectors.

## **Student Learning Outcomes**

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After successful completion of this course, students will be able to:

- to solve analysis and design problems for basic optical systems such as the following examples:
  - Determine the changes in the Young's double-slit interference pattern that result from bringing the slits closer by some factor.
  - Determine the changes in the Michelson interferogram that result from moving one of the mirrors or inserting a thin glass slab in one of the arms.

ABET Outcome:

Graduates have an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

ABET Measure:

A passing student must be able to formulate and solve a complex or multistep problem based on relevant parameters.

## **Course Materials and Resources**

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### **Optics**

**ISBN:** 9780137526420

**Authors:** Eugene Hecht

**Publisher:** Pearson

**Publication Date:** 2016

**Edition:** 5th

## **Recommended Course Materials**

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**Title:** Introduction to Optics

**ISBN:** 9781108428262

**Authors:** F.L. Pedrotti, L.S. Pedrotti, L.M Pedrotti

**Publisher:** Prentice-Hall

**Publication Date:** 2009

**Edition:** 3

**Title:** Fundamentals of Photonics

**ISBN:** 9780471839651

**Authors:** B. Saleh and M. Teich

**Publisher:** Wiley

**Publication Date:** 2007

**Edition:** 2

**Online Access:** <https://onlinelibrary.wiley.com/doi/book/10.1002/0471213748>

## **Course Assessment and Grading Procedure**

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Course Item	Percent of Final Grade
Attendance (UCF Here)	5%
Homework	10%
Quizzes	20%
Two mid-term tests (20% each)	40%
Final Exam	30%
	105%

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## Assignment Schedule

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Due Date	Assignment Name	Assignment Type	Points
8/23	<a href="#">Academic activity</a>	Assignment	0
	<a href="#">Attendance</a>	Assignment	5

## 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

Only in extenuating circumstances that can be documented.

## **Missed/Late Assignments**

Not graded unless student has made arrangement with the instructor before due date.  
Earn zero on assignment.

## **Attendance**

Attendance is needed and will be recorded using "UCF Here" App. A grade of 5% of the total will be based on attendance.

## **Grading 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 – **NO EXCEPTIONS**.

## **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.

## **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](#).

## **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.

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## **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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Week	Topic
1	Introduction and Course Overview
2	Wave Motion
3	Math of Waves
4	Photons and Light
5	The Superposition of Waves

<b>Week</b>	<b>Topic</b>
6	Polarization
7	Interference
8	Interference
9	Interferometers
10	Interferometers
11	Diffraction
12	Gratings and Spectrometers
13	Gratings and Spectrometers
14	
15	
16	