



UNIVERSITY OF  
CENTRAL FLORIDA

## OSE 3052L - FOUNDATIONS OF PHOTONICS LAB

Section: 0001

*Optics and Photonics*

### Course Information

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**Term:** Fall 2024

**Class Meeting Days:** F

**Class Meeting Time:** 09:00 - 11:50

**Class Meeting Location:** CROL A210

**Modality:** P

**Credit Hours:** 1.00

### Instructor Information

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Dr. Ivan Divliansky

**Title:** Associate Professor

**Office Location:** CREOL A121

**Office Hours:**

Monday 10-11

**Email:** [ibd1@creol.ucf.edu](mailto:ibd1@creol.ucf.edu)

### Course Description

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OSE 3052L OPT-OPT 1(0,3)Foundations of Photonics Laboratory: PR: MAP 2302, CR: OSE 3052. The laboratory experiments covering fundamental photonics principles related to light sources, dispersion of light, interference and diffraction of light, and other optical phenomena. Fall, Spring. M&S fee \$15.00

**Objective:**

The objective of this lab to become familiar with the fundamental properties of light, explore optical phenomena in a laboratory setting, make careful measurements, and draw own conclusions about the models and theories that describe these phenomena.

**Description:**

The laboratory course is designed to reinforce the concepts discussed in class with a hands-on approach and to allow the students to learn laboratory techniques for observing optical phenomena and quantitative experimental characterization in geometrical optics, polarization, interference, and diffraction.

## **Student Learning Outcomes**

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

- Comment on basic concepts and principles of geometrical optics, dispersion, aberration, polarization, interference, and diffraction
- Discuss the nature of light, its propagation, polarization and reflection and refraction at planar interfaces
- Describe basic optical phenomena and their applications
- Handle and align optical elements and set up basic optical experiments
- Operates optical devices and equipment
- Present their observations and conclusions in a clear informative document

**Outcomes :**

Graduates have an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

**Measure 6.1:**

A passing student must be able to analyze, interpret, and use engineering judgement to draw conclusions from a directed experiment that includes the collection of data.

**Assessment item:** One experiment from lab workbook near the end of the semester that incorporates data/**experimental** analysis that connects with applications of optical engineering.

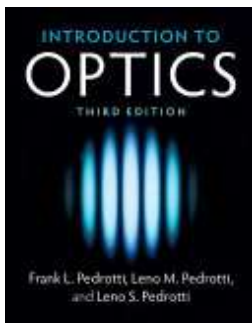
## Measure 6.2

A passing student must be able to develop and conduct appropriate experimentation to characterize the properties of an optical or photonic component or system.

**Assessment item:** Instructor provided problem to solve experimentally.

## Course Materials and Resources

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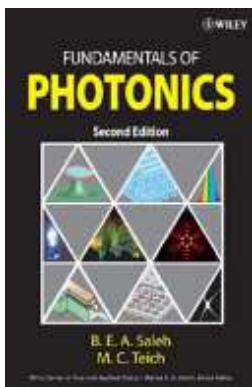
### Introduction to Optics

ISBN: 9781108563321

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

**Publisher:** Cambridge University Press

**Publication Date:** 2017-12-21



### Fundamentals of Photonics

**Authors:** Bahaa E. A. Saleh, Malvin Carl Teich

**Publisher:** Wiley-Interscience

**Publication Date:** 2007-03-09

## Course Assessment and Grading Procedure

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The student is expected to review the textbooks, notes, and the lab handout and come to lab prepared to perform the scheduled experiment.

**A pre-lab quiz will be done before the beginning of every lab.**

A laboratory notebook must be used to properly document all experimental procedures, observations, data, and measurements during the laboratory session. All entries must be in ink. Lab notebooks will be graded using the guidelines described below.

**Grading policy:**

**The final grade will be based upon:**

Pre-lab quizzes - 10%

Laboratory notebooks - 50%

Laboratory report draft - 5%

Formal laboratory report - 20%

Design project - 15%

- Lab notebooks will be handed out to you on the first day of the course and collected every week after the experiments are completed. They will be returned few days later.

**Assignment Schedule**

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Due Date	Assignment Name	Assignment Type	Points
	<a href="#">Lab 1</a>	Assignment	100
	<a href="#">Laser safety training</a>	Assignment	0
	<a href="#">Quiz 1</a>	Assignment	100

**Grading Scale**

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Letter Grade	Percentage
A	94-100%
A-	90-93%
B+	87-89%

Letter Grade	Percentage
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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### Absences and Makeup Lab Sessions:

If an emergency arises and a student cannot attend the lab session or cannot take an exam on the scheduled date, the student must give notification to the instructor no less than 24 hours before the scheduled date and no more than 48 hours after the scheduled date. Per university policy, students must be allowed to turn in make-up work (or an equivalent, alternate assignment) for university-sponsored events, religious observances, or legal obligations (such as jury duty). In these instances, students must also be excused from class without penalty. The Undergraduate Catalog states, "Reasons for acceptable absences may include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligations, severe weather conditions, and religious holidays."

Because of the fluid nature of the lab with the experimental setup changing every week, there will be **ONLY ONE MAKEUP ALLOWED** except in cases of genuine emergency.

It is expected and encouraged that students finish their experiments within the assigned class time. However, with prior arrangements with the teaching assistant, students may be allowed to access the lab before and after the class time of the same week.

### Formal laboratory report grading

In any field of science and engineering, once a significant amount of experimental work has been performed, the results of the work should be written up formally. Among other things, this could be in the form of a written report to you supervisors, or to a funding agency, or could be the results of new research that are submitted to a research journal for publication.

**It is a requirement of this laboratory course that you take one of your assigned laboratory experiments and write this up in a formal report, in the style of a journal publication.** You may choose which laboratory to write up, in conjunction with the lab instructor. You will use your own data and you may not select the same experiment as any of your lab partners.

**Follow the example papers that are uploaded to Canvas.**

The report should contain the following sections:

Abstract

Introduction

Experimental methods

Results

Discussion of results

Conclusions and recommendations for future experimental work.

References.

**The Final paper has to be submitted by the due date specified in the syllabus or earlier. If the paper is submitted later than the due date, 10 points will be taken from the paper grade for every day after the deadline.**

The papers should be submitted via Canvas.

The instructor reserves the right to change or modify any portion of this schedule without prior notice or recourse by the students.

## **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 of 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

Week	Topic	
1	August 23 <sup>rd</sup>	<b>Light sources and basic practices</b>
2	August 30 <sup>th</sup>	<b>Brewster angle and total internal reflect</b>
3	September 6 <sup>th</sup>	<b>Dispersion of light</b>
4	September 13 <sup>th</sup>	<b>Interference I: Young's double-slit experir</b>
5	September 20 <sup>rd</sup>	<b>Diffraction of light: Diffraction from var apertures</b>
6	September 27 <sup>th</sup>	<b>Interference II: Michelson interferometer / Pol of light</b>
7	October 4 <sup>th</sup>	<b>Polarization of light / Interference II: Mich interferometer</b>
8	October 11 <sup>th</sup>	<b>No class - Formal Report Draft Due</b>
9	October 18 <sup>th</sup>	<b>Transmission Surface Gratings</b>

Week	Topic	
10	October 25 <sup>th</sup>	<b>Reflective Surface Gratings</b>
11	November 1 <sup>st</sup>	<b>Make-up lab</b>
12	November 8 <sup>th</sup>	<b>Design Project</b>
13	November 15 <sup>th</sup>	<b>No lab: Preparation of Final report</b>
14	November 22 <sup>nd</sup>	<b>Formal Report:</b> Final version of formal report
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## **Course Requirements**

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The laboratory notebook contains all the experimental directions and spaces for your observations, results, tables, plots, and responses to questions for each laboratory experiment you will conduct this semester. There is also space reserved to enter your informal lab notes. However, you should keep these notes in a neat and organized manner, so that your lab partners, and your lab instructor can easily follow what you have written, and (most importantly) so that you can come back later and read what you did long after you have forgotten the details.

– As an engineer, keeping detailed notes that allow you or others to understand and reproduce your work will be a requirement of whatever job you have.

When you turn in your work, you should have answered all questions in a neat and clear manner.

- You should also be sure that your informal notes, experimental setup sketches table and plots are clear.
- Make sure you have taken and reported all required data and presented in in the manner asked for. If you choose to present the data in additional ways then you can do so, but you

should state why. Be sure that all your error analysis is complete where appropriate.

- Explicitly answer all questions asked about the data, experimental method, etc.
- Ensure that you fully answered all of the discussion and analysis questions (those that require you to answer questions beyond your actual lab measurements). While your answer should have depth, they should also be concise – do not try to use long sentences to mask a lack of understanding. It is important that your answers are in complete, readable sentences.

You will complete your lab notes in each class session and turn this lab book in for grading at the end of class. There is no other formal report required – just complete the lab notes section for each experiment fully and take good informal notes.

This lab book is also available online so that you can read ahead for future experiments if you wish.

One formal laboratory report (written as a scientific journal paper) will be required as the final examination for this laboratory course. A draft of this report will be due mid-semester. After receiving feedback on this draft, you can complete the report and turn it in by the date of the final examination.