OSE 3052 L
Introduction to Photonics Laboratory

Laboratory notebook

UCF CREOL, THE COLLEGE OF OPTICS AND PHOTONICS

Course Syllabus
OSE 3052 L - Introduction to Photonics Laboratory

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Office hours: Monday 10:00 – 11:00 pm

Prerequisites: **Please refer to the UCF Catalog (https://catalog.ucf.edu)**

Course Description: **Please refer to the UCF Catalog (https://catalog.ucf.edu)**

Class location: CREOL A210

Class meeting days: Friday

Class Office Hours: 7-9 pm

Class website: UCF Webcourses

Credit Hours: One credit hour – two contact hours

Co-requisite: OSE 3052 – Introduction to Photonics or equivalent

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.

Learning outcomes:

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

Course Materials and Textbook:

- **Introduction to Optics,** F. Pedrotti, L. Pedrotti, and L. Pedrotti, Addison-Wesley, 3rd Edition, 2006.
- **Fundamentals of Photonics**, B. E. A. Saleh and M. C. Teich, Wiley, 2nd Edition, 2007.
- Relevant theoretical background material for the experiments will be provided on the course website: https://webcourses.ucf.edu/

Course Requirements (additional details on Page 6):

- **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 in the table on Page 7 of this Notebook.

Grading policy:

The final grade will be based upon	Pre-lab quizzes	15%
	Laboratory notebooks	50%
	Laboratory report draft	5.0%
	Formal laboratory report	20%
	Design project	10%

- 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.

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.

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

Grading Scale (%)	Rubric Description
$100 \geq A > 93 \geq A^{-} > 90$	Excellent, has a strong understanding of all concepts and is able to apply the concepts in all experiments. Has full mastery of the content of the course and lab report writing.
$90 \geq B^{+} > 87 \geq B > 83 \geq B^{-} > 80$	Good, has a strong understanding of most or all of the concepts and is able to apply them to defined laboratory experiments. Well written lab report.
$80 \geq C^{+} > 77 \geq C > 73 \geq C^{-} > 70$	Average, has a basic understanding of the major concepts of the course and is able to apply to basic experimental situations.
$70 \geq D^{+} > 67 \geq D > 63 \geq D^{-} > 60$	Below average, has a basic understanding of only the simple concepts and is able to apply to only a limited number of the most basic experiments.
$60 \geq F$	Demonstrates little to no understanding of the course content.

University Rules on Professionalism and Ethics

Per university policy and plain classroom etiquette, mobile phones, etc. must be silenced during all classroom lectures, unless you are specifically asked to make use of such devices for certain activities.
Academic dishonesty in any form will not be tolerated!!! If you are uncertain as to what constitutes academic dishonesty, please consult The Golden Rule, the University of Central Florida's Student Handbook (http://www.goldenrule.sdes.ucf.edu/) for further details. As in all University courses, The Golden Rule Rules of Conduct will be applied. Violations of these rules will result in a record of the infraction being placed in your file and the student receiving a zero on the work in question AT A MINIMUM. At the instructor's discretion, you may also receive a failing grade for the course. Confirmation of such incidents can also result in expulsion from the University.

Academic Ethics Specific to This Lab Course
It is the nature of a laboratory course that you will be working in groups. Obviously, those of you who are lab partners will be using the same raw data. You are encouraged to discuss your observations and insights with your lab partners; however, each of you has to write your own ORIGINAL lab reports.

Cheating and plagiarism are serious breaches of the UCF Code of Honor as described in the UCF Golden Rule and the UCF Creed and will not be tolerated in this course. All cases will be reported to the Office of Student Conduct (OSC).

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 – NO EXCEPTIONS.

Definitions
Cheating: any unauthorized assistance in graded, for-credit assignments.
Plagiarism: appropriating the work of others and claiming, implicitly or explicitly, intentionally or unintentionally, that it is your own.
With increased use of the internet, digital plagiarism is becoming more of a problem on campuses everywhere. You are encouraged to use the internet; however, electronic copying and pasting of

material directly into reports and papers without proper reference of the source is blatant plagiarism. **Always reference the sources of information.**

Students should familiarize themselves with the procedures for academic misconduct in UCF's student handbook, The Golden Rule (https://goldenrule.sdes.ucf.edu/). 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, 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.

Providing a fellow student with experimental data from an experiment in which he/she did not participate is also forbidden. All parties that are involved in such practice will be reported to UCF Office of Student Conduct (OSC).

If there is any question concerning acceptable practice in this laboratory course, don't hesitate to ask the instructor.

Students with Special Testing/Learning Needs
Students with special needs and require special accommodations must be registered with UCF Student Disability Services prior to receiving those accommodations. Students must have documented disabilities requiring the special accommodations and must meet with the instructor to discuss the special needs as early as possible in the first week of classes. UCF Student Disability Services can be contacted at http://www.sds.sdes.ucf.edu/, or at (407) 823-2371.

Financial Aid and Attendance:
As of Fall 2014, all faculty members are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete the following academic activity by the end of the first week of classes, or as soon as possible after adding the course, but no later than January 18; Certify that you have been educated in laser safety procedures. Failure to do so will result in a delay in the disbursement of your financial aid.

Class Website: Materials used for classes will be available on UCF Webcourses for download before each class.

List of Experiments (week-by-week calendar; subject to modifications)

1	January 12th	**Light sources and basic practices**
2	January 19th	**Brewster angle and total internal reflection**
3	January 26th	**Dispersion of light**
4	February 2rd	**No Class**
5	February 9th	**Interference I:** Young's double-slit experiment
6	February 16th	**Diffraction of light: Diffraction from various apertures**
7	February 23th	**Interference II**: Michelson interferometer / **Polarization of light**
8	March 1rd	**Polarization of light / Interference II**: Michelson interferometer
9	March 8th	**Formal Report Draft Due**
10	March 15th	**Transmission Surface Gratings**
11	March 22th	**SPRING BREAK- No class**
12	March 29st	**Reflective Surface Gratings**
13	April 5th	**Make-up lab**
14	April 12th	**Design Project**
15	April 19st	**Preparation of the formal report**
16	May 1st	**Formal Report:** Final version of formal report due

Course Requirements Cont.: Instructions for maintaining your laboratory notebook and report writing

This 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.

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 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.

How your laboratory notebook will be graded?

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.

For each laboratory, you will be graded according to the following rubric.

Item	**Maximum score (%)**	**Your Score**
Organization, neatness and readability of informal notes	25%	
Correctness and presentation of results (Including, where appropriate, tables, plots)	35%	
Depth and conciseness of answers to Discussion and Analysis questions)	25%	
Responses in complete sentences and paragraphs.	15%	
Total	100%	

How your formal laboratory report will be graded?

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.

Max points		**Paper sections**				
5		**Title**				
		Describes content concisely, adequately, appropriately				
5		**Abstract**				
		Conveys a sense of the full report concisely and effectively				
10		**Introduction**				
		Successfully establishes the context of the research topic				
		Effectively presents the objectives and purpose of the research topic				
		Presents interesting questions or issues related to the topic				
15		**Methods**				
		Gives enough details to allow for replication of procedure				
15		**Results**				
		Opens with 1 or 2 sentence(s) describing main finding of the experiments				
		Presents visuals clearly and accurately				
		Presents verbal findings clearly and with sufficient support				
		Successfully integrates verbal and visual representations				
20		**Discussion**				

		Opens with explanation of how findings link to the context of experiments				
		Addresses questions & issues and discusses the answers				
10		**Conclusion**				
		Convincingly describes what has been learned by doing the experiments				
10		**Presentation**				
		Citations and references adhere to proper format				
		Format of tables and figures is correct				
		Report is written in scientific style: clear and to the point				
		Grammar and spelling are correct				
10		**Overall aims of the report:** *the student...*				
		Has successfully learned what the experiments are designed to teach				
		Accurately analyzes data				
100		Total Max points				

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 after an assignment is created by the instructor.

References used:

1. *J. Geary, Introduction to Optical Testing, Vol. TT 15, SPIE Optical Engineering Press (1993).*
2. *Wikipedia*
3. *Thorlabs user's guide*
4. *Newport guide*