

OSE 4520L: Laser Engineering Lab

CREOL, The College of Optics and Photonics

Credit Hours: 1 credit hour

Term: Spring, 2022

Syllabus

Time:	8:30 AM to 11:20 PM (Section 1) 12:00 PM – 2:50 PM (Section 2)
Location:	
Prerequisites:	OSE 4520 – Laser Engineering
Course Description:	Experiments in the basics of semiconductor optoelectronic devices including photodiodes, light-emitting diodes, laser diodes, CCDs. Applications include solar cells, displays, photodetection, and optical communications.
Instructor:	Dr. Oussama Mhibik
Email/Contact Info:	o.mhibik@creol.ucf.edu
Office Hours and Location:	With an appointment CREOL 153
Course Modality:	P
GTAs:	David Guacaneme david.guacaneme@ucf.edu
Class Website/ Webcourse:	https://webcourses.ucf.edu

Textbook (optional):

Laser Engineering, Keln J. Kuhn, Prentice Hall

Laser Fundamentals, W. Silfvast, Cambridge

Laser Electronics, 3rd ed., J. T. Verdeyen, Prentice-Hall

Fundamentals of Photonics by Bahaa E.A. Saleh, Malvin Carl Teich, Wiley, New York.

And many others

Course Grading and Requirements for Success:

The student is expected to review the textbooks, course notes, and the lab handout; and come to the lab prepared to perform the scheduled experiment. You may be quizzed at the beginning of the class.

A lab handout will be uploaded on Webcourses in advance. Students must properly document all experimental procedures, observations, data, and measurements during the laboratory session. All entries must be in ink on a printed lab handout*. Students will not leave the lab until all data entries are complete. The lab handout must be reviewed by the lab instructor or his assistant before you leave the class. Raw data may be processed later.

Additional assignments need to be turned in via Webcourses. For these, a type-written (12pt font), clearly written explanation must be prepared for each experiment.

Make Up Policy Make-up Lab due to Emergency Reason - If an emergency arises and a student cannot attend a Lab on the scheduled date, the student must notify the instructor no less than 24 hours before the scheduled date and no more than 48 hours after the scheduled date. A make-up lab session will be arranged if official documents regarding the emergency are submitted to the instructor. The instructor will specify a new due date for submitting the report of the make-up lab. The late submission rule of section 4.2 will apply if the student fails to submit the report by the new due date. Any illness will be considered a medical emergency only if a doctor's letter, which confirms the illness, is submitted to the instructor as an official document within the time mentioned in this section. Zero credit will be given for the lab without official documents.

Late Submission of Report due to Emergency Reason - If an emergency arises and a student cannot submit assigned work on or before the scheduled due date, the student must notify the instructor no less than 24 hours before the scheduled date and no more than 48 hours after the scheduled date. The instructor will specify a new due date for submitting the report after receiving official documents from the student. The late submission rule of section 4.2 will apply if the student fails to submit the report by the new due date. Any illness will be considered a medical emergency only if a doctor's letter, which confirms the illness, is submitted to the instructor as an official document within the time mentioned in this section. Zero credit will be given for the lab without official documents.

Attendance Policy, Punctuality, Readiness and Participation:

Regular class attendance is mandatory. Please be on time for class. If you are late more than 15 minutes, you will automatically lose 5 points off your "Lab Participation" grades.

Students in attendance are expected to be active participants in the class.

You will need to download the lab manual and read it ahead of class.

You are recommended to bring a three-ring binder to class to keep all your Lab Manuals in it.

Lab Assignments:

After each lab class, you will need to analyze the data measured during class and answer the assignment questions.

The answers need to be typed neatly showing all the steps, equations and the reasoning in arriving at the solutions.

When graphs are needed, they need to be presented in a professional format.

Criteria	Grade Weighting
Laboratory Participation	15%
Lab Notebook Completeness	25%
Assignments	35%
Draft Lab Report	5%
Final Lab Report	20%
Total	100%

How your lab notebook and assignments will be graded:

Criteria	Maximum score (%)
Organization, neatness and readability of informal notes	25%
Correctness and presentation of results (Including, where appropriate, tables, plots, error analysis)	35%
Depth and conciseness of answers to Discussion and Analysis questions	25%
Responses in complete sentences and paragraphs.	5%
Final Lab Report	15%
Total	100%

Assignment Submission:

Lab assignments must be submitted via Webcourses by each deadline.

The draft and final Lab reports must be submitted through Webcourses at <https://webcourses.ucf.edu> by 11:59 pm of the day that each is due.

Lab reports sent via email or hard copy will NOT be accepted.

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 13, 2023**. Failure to do so will result in a delay in the disbursement of your financial aid.

Grading Scale (%) Rubric Description

100 ≥	A	>	90	Excellent, has a strong understanding of all concepts and is able to apply the concepts in all and novel situations. Has full mastery of the content of the course.
	>	B	≥	Good, has a strong understanding of most or all of the concepts and is able to apply them to stated and defined situations.
	>	C	≥	Average, has a basic understanding of the major concepts of the course and is able to apply to basic situations.
	>	D	≥	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 situations.
	>	F	≥	0 Demonstrates no understanding of the course content.

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.

Deadlines, Holidays, and Significant Semester Events:

First Day of Class	1/11
Last Day to Drop Classes:	1/13
Last Day to Add Classes:	1/13
Final Exam:	4/26-5/02

Please refer to the [UCF Academic Calendar](#) and the [UCF Exam Schedule](#) for more information such as Exam Dates, Add/Drop, Withdrawal, and Grade Forgiveness Deadlines.

Student Learning Outcomes and Measures

(Delete the ones below that do not apply to your courses:)

Outcome	Measure	Course
6 Graduates have an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	6.1 A passing student must be able to conduct directed experimentation, collect data, analyze and interpret results.	OSE4520L Laser Engineering Lab

Grade Dissemination

Grades will be available on webcourses

Policy Statements

Lab safety:

- Do not look at any laser beam or even the LED light directly.
- Do not be in the path of any laser beam.
- Wear safety goggles. The goggles should be suitable for the power and wavelength of the light that you will use in your experiment.

Academic Integrity

Students should familiarize themselves with UCF's Rules of Conduct at <<https://scai.sdes.ucf.edu/student-rules-of-conduct/>>. According to Section 1, "Academic Misconduct," students are prohibited from engaging in

1. Unauthorized assistance: Using or attempting to use unauthorized materials, information or study aids in any academic exercise unless specifically authorized by the instructor of record. The unauthorized possession of examination or course-related material also constitutes cheating.
2. Communication to another through written, visual, electronic, or oral means: The presentation of material which has not been studied or learned, but rather was obtained through someone else's efforts and used as part of an examination, course assignment, or project.
3. Commercial Use of Academic Material: Selling of course material to another person, student, and/or uploading course material to a third-party vendor without authorization or without the express written permission of the university and the instructor. Course materials include but are not limited to class notes, Instructor's PowerPoints, course syllabi, tests, quizzes, labs, instruction sheets, homework, study guides, handouts, etc.
4. Falsifying or misrepresenting the student's own academic work.
5. Plagiarism: Using or appropriating another's work without any indication of the source, thereby attempting to convey the impression that such work is the student's own.
6. Multiple Submissions: Submitting the same academic work for credit more than once without the express written permission of the instructor.
7. Helping another violate academic behavior standards.
8. Soliciting assistance with academic coursework and/or degree requirements.

Responses to Academic Dishonesty, Plagiarism, or Cheating

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.

Unauthorized Use of Websites and Internet Resources

There are many websites claiming to offer study aids to students, but in using such websites, students could find themselves in violation of academic conduct guidelines. These websites include (but are not limited to) Quizlet, Course Hero, Chegg Study, and Clutch Prep. UCF does not endorse the use of these products in an unethical manner, which could lead to a violation of our University's Rules of Conduct.

They encourage students to upload course materials, such as test questions, individual assignments, and examples of graded material. Such materials are the intellectual property of instructors, the university, or publishers and may not be distributed without prior authorization. Students who engage in such activity could be found in violation of academic conduct standards and could face course and/or University penalties. Please let me know if you are uncertain about the use of a website so I can determine its legitimacy.

Unauthorized Distribution of Class Notes

Third parties may attempt to connect with you to sell your notes and other course information from this class. Distributing course materials to a third party without my authorization is a violation of our University's Rules of Conduct. Please be aware that such class materials that may have already been given to such third parties may contain errors, which could affect your performance or grade.

Recommendations for success in this course include coming to class on a routine basis, visiting me during my office hours, connecting with the Teaching Assistant (TA), and making use of the Student Academic Resource Center (SARC), the University Writing Center (UWC), the Math Lab, etc. If a third party should contact you regarding such an offer, I would appreciate your bringing this to my attention. We all play a part in creating a course climate of integrity.

In-Class Recording

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach enrolled students about a particular subject.

Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, private conversations between students in the class or between a student and the faculty member, and invited guest speakers is prohibited.

Recordings may not be used as a substitute for class participation and class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct as described in the Golden Rule.

Course Accessibility Statement

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) <http://sas.sdes.ucf.edu/> (Ferrell Commons 185, 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.

Deployed Active Duty Military Students

If you are a deployed active duty military student and feel that you may need a special accommodation due to that unique status, please contact your instructor to discuss your circumstances.

Campus Safety Statement

Emergencies on campus are rare, but if one should arise during class, everyone needs to work together. Students should be aware of their surroundings and familiar with some basic safety and security concepts.

- In case of an emergency, dial 911 for assistance.
- Every UCF classroom contains an emergency procedure guide posted on a wall near the door. Students should make a note of the guide's physical location and review the online version at <https://centralflorida-prod.modolabs.net/student/safety/index> ➞.
- Students should know the evacuation routes from each of their classrooms and have a plan for finding safety in case of an emergency.
- If there is a medical emergency during class, students may need to access a first-aid kit or AED (Automated External Defibrillator). To learn where those are located, see <https://ehs.ucf.edu/automated-external-defibrillator-aed-locations>.
- To stay informed about emergency situations, students can sign up to receive UCF text alerts by going to <https://my.ucf.edu> and logging in. Click on "Student Self Service" located on the left side of the screen in the toolbar, scroll down to the blue "Personal Information" heading on the Student Center screen, click on "UCF Alert", fill out the information, including e-mail address, cell phone number, and cell phone provider, click "Apply" to save the changes, and then click "OK."
- Students with special needs related to emergency situations should speak with their instructors outside of class.
- To learn about how to manage an active-shooter situation on campus or elsewhere, consider viewing this video <https://youtu.be/NIKYajEx4pk> ➞



Detailed Course Outline

Detailed Description: This lab course is associated with the theory course (OSE 4410) on the principles, design, and applications of optoelectronic devices. Basic specifications of key optoelectronic devices, including photodiodes, Light-Emitting Diodes (LEDs), diode lasers, LED and Liquid Crystal Displays are experimentally studied by the students. The experiments include both DC (static) and AC (dynamic) characteristics of the devices and emphasize both the electrical and optical figures of merit. The advantages and disadvantages of various types of photodetectors and light sources are experimentally and quantitatively studied in the lab.

Topics: The experiments are listed in the Lab schedule at the end of this document.

Weekly Schedule

OSE4520L, Spring 23, Dr. Oussama Mhibik

Week	Day	Date	Topic	Group
1	Monday	1/08	Instructor Introduction; Course Overview; Laser safety overview	ALL
2	Monday	1/15	Martin Luther King Jr. Day (no-classes)	ALL
3	Monday	1/22	Gas Laser (HeNe)	A
4	Monday	1/29	Gas Laser (HeNe)	B
5	Monday	2/05	Diode Laser	A
6	Monday	2/12	Diode Laser	B
7	Monday	2/19	Lecture+ Spectroscopy of Nd:YAG crystal	A

8	Monday	2/26	Lecture+ Spectroscopy of Nd:YAG crystal	B
9	Monday	3/05	Diode Pumped Nd:YAG Laser	A
10	Monday	3/12	Spring Break (no classes)	ALL
11	Monday	3/19	Diode Pumped Nd:YAG Laser	B
12	Monday	3/26	Laser Pulses	A
13	Monday	4/02	Laser Pulses	B
14	Monday	4/09	Nonlinear Frequency Generation	A
14	Wednesday 4/11		Draft Report due	ALL
15	Monday	4/16	Nonlinear Frequency Generation	B
16	Wednesday 4/25		Final Report	ALL

Syllabus Disclaimer

The instructor reserves the right to modify this syllabus in any way throughout the semester. All changes will be made effective one week after they are disclosed to the class.

The instructor reserves the right to change the exams dates. Students will be given one week notice.

Course Summary:

Date	Details	Due
Fri Jan 12, 2024	Laser Safety	due by 11:59am
Fri Jan 19, 2024	Section and time selection	to do: 11:59pm
	Final Paper submission	
	Lab 1 assignement	
	Lab 2 assignment	
	Lab 3 assignment	
	Lab 4 assignment	

Date	Details	Due
	Lab 5 assignment	