

Laser Theory and Design – Fall 2020 Revised 1/8/23

EEL 5447 Section 26357

Class Periods: Tuesday 2 & 3, Thursday 3

Location: Larsen 239

Instructor: Prof. Henry Zmuda

email: zmuda@ece.ufl.edu

Phone: (352) 392 – 0990

Mobile (850) 225 – 9200 (emergencies only please)

Office Hours: TBA, always by appointment. The Thursday class begins at 9:35, however, I will be present in my office (Larsen 235) from 8:30 to discuss class material or to answer questions.

Teaching Assistants: none

Course Description

Credits: 3; Studies the field of semiconductor optoelectronics and the physics of optoelectronic devices including the interaction of photons with electrons and holes in a semiconductor leading to the realization of optoelectronic devices such as photon amplifiers, LEDs, diode lasers, electro-absorption modulators, and detectors, including their design and application-specific characteristics.

Course Pre-Requisite: Physics of Electrical Engineering. The ability to write a computer program is essential. A working knowledge of Matlab is sufficient.

Course Objectives: The student will learn how to design, construct, and test (in principle, no actual construction is performed) a variety of optoelectronic devices to meet specifications with regard to emission/detection wavelength, power level, and size.

Materials and Supply Fees: None

Required Textbooks and Software

None – Extensive course notes developed by the instructor are provided.

Recommended Textbooks

Title: Laser Diodes and Photonic Integrated Circuits

Authors: Larry Coldren, Scott Corzine, and Milan L. Mashanovitch

Publisher: Wiley, 2012, 2nd Edition, ISBN: 978-0470484128

Course Schedule

Weeks 1, 2: Electromagnetic for lasers

Exam 1

Weeks 3, 4: Atomic radiation, solid-state amplifiers and lasers

Exam 2

Weeks 5, 6: Essentials of quantum mechanics

Exam 3

Weeks 7, 8: Essentials of solid-state physics

Week 9: Light emitting diodes

Exam 4

Weeks 10, 11: Semiconductor optical amplifiers and lasers

Week 12: Further discussion of laser systems

Week 13, 14: Advanced topics on laser physics

The five exams are short, one-period in-class exams.

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is a component of the overall grade for undergraduate students, **so the student must be present for the lectures**. Students are expected to be present and arrive on time.

Homework Policy: Homework is due no later than 5:00 pm of the assigned due date. Late homework policy: 1 day late, 25% reduction in grade; 2 days later, 50% reduction in grade; 3 or more days late, 75% reduction in grade. To help deter procrastination, questions concerning the homework will not be entertained the day that the homework is due. Plots and graphs must be done on a computer. Hand-drawn graphs will not be accepted.

Working together on the homework is allowed and highly encouraged, but each student must individually submit homework and is responsible to understand its content. If your solution is questionable in any way you may be asked to provide an oral clarification before a grade is issued.

Exams: Graduate students will have additional exam questions not required for the undergraduate students.

If ANY external reference is used it MUST be cited.

For legitimate excused absences (sickness, unavoidable university-related travel, personal emergencies) must be documented. Arrangements for make up exams for excused absences will be scheduled between the student and

Excused absences are consistent with university policies in the undergraduate catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation.

Determination of Course Grades:

Assignment	Percentage of Final Grade	
	Undergraduate	Graduate
Attendance	25 %	25 %
Homework	25 %	0 %
Five (5) Exams	50 %	75 %
Total	100%	100%

Grading Policy

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00

69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.

<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.

<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.

<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.