

ECE 185 Lasers and Modulators

Electrical and Computer Engineering Department, University of California, San Diego
Syllabus (Spring 2009)

Course Description: Labs: HeNe laser, laser diode external cavity laser, electrooptic modulation, acoustooptic modulation, spatial light modulators.

Instructor: Prof. Zhaowei Liu, EBU1, Room 3207 (x23470) zhaowei@ece.ucsd.edu

Lab manager: Peter Ilinykh, (x44819) pilinykh@ece.ucsd.edu

TA: Marco Antonio Escobar Acevedo, maescoba@ucsd.edu

Lecture:

Time: Mon. Wed. 5:00am-6:20pm

Location: U413A1

Office Hour:

Time: Mon. 3:00pm-5:00pm

Location: EBU1 3207

Prerequisite: ECE183 with grade of C or better.

Text Book: Lab manual entitled, “Laser and Modulators” provided by the instructor.

References: Fundamentals of photonics, 2nd edition by B. E. A. Saleh and M. C. Teich

Course Objectives:

1. Develop understanding of principles of laser optics; optical modulation employing electro-optic technique as well as acoustooptic technique
2. Gain familiarity with optical components, both active and passive
3. Develop proper experimental techniques for laser optics, optical modulation and detection.
4. Foster laboratory teamwork.

Class/laboratory schedule: Every week- two and a half hours of lecture and four hours of laboratory.

Grading Policy: 50% Labs + 10% Homework + 20% Midterm + 20% Term paper

Course outline: (Topics and time schedule are subjected to changes)

Week 1 (3/30-4/1)	Introduction to laser physics	
Week 2 (4/6-4/8)	Cavity stability	HW1 out
Week 3 (4/13-4/15)	He-Ne laser	
Week 4 (4/20-4/22)	Electro-optic modulation	HW1 due, HW2 out
Week 5 (4/27-4/29)	Electro-optic modulation	
Week 6 (5/4-5/6)	Electro-optic effects in liquid crystals	HW2 due, HW3 out
Week 7 (5/11-5/13)	Midterm, space light modulators	
Week 8 (5/18-5/20)	Acousto-optic modulation	HW3 due, HW4 out
Week 9 (5/25-5/27)	Acousto-optic modulation	
Week 10 (6/1-6/3)	Laser diodes and modulation	HW4 due
Week 11 (6/8-6/12)	Final	

Course Website:

<http://circuit.ucsd.edu/~zhaowei/Teaching.html>

<http://ece-classweb.ucsd.edu/spring09/ece185/>

Contribution of course to meet the professional components:

1. Understanding of the underlying principles of, and an ability to apply knowledge of mathematics, science and engineering to electrical engineering problems.
2. Ability to design and conduct experiments, as well as to analyze and interpret data.
3. Knowledge of electrical engineering safety issues. Special emphasis on lab procedure on safe use of lasers. Safety procedure included in lab manual; trained teaching assistant available in the laboratory to ensure proper operation of laser and other lab equipment.
4. Ability to design a system, component, or process to meet desired needs. Homework assignment and pre-lab exercise provide the basic rules of how the optical systems are designed for signal modulation, data transmission, and detection.
5. a) An ability to collaborate effectively with others, b) an ability to function on multidisciplinary teams. Laboratory experiments are typically conducted in teams of 3 people.
6. Ability to identify, formulate, and solve engineering problems.
7. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
8. Understanding of professional and ethical responsibility.
9. Ability to communicate effectively a) in writing, b) verbally, c) with visual means. Laboratory report emphasizes effective writing.
10. The broad education necessary to understand the impact of engineering solutions in a global and societal context
11. Recognition of the need for, and the ability to engage in, life-long learning.