



VE 438 : Advanced Lasers and Optics Laboratory

Summer 2017

Instructor: Wenjie Wan, Ph.D.

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Category Description:

This new course fills the need for JI's EE major students as well ME's to gain introductory and hands-on knowledge and experience in optics, electromagnetism technology and their applications. VE438 offers an introduction to laboratory optics, optical principles, and optical devices and systems. This course covers a wide range of topics, including: polarization, coherence, diffraction, holography, imaging, optical communication, display, adaptive optics etc.

The course will be delivered both in lecture and laboratory. Most optical systems in lab involve the use of many of the principles and components we will study in lecture. The goal is to help the student develop a thorough understanding of the underlying physical principles of modern optical devices and systems through hands-on learning. In general, there are two lectures and one laboratory period each week. Lectures are supplemented with weekly laboratory exercises, problem sets and a final laboratory project or final exam of the student's choosing.

Prerequisite: VP 240 or equivalent (4 credits)

Course Objectives:

Construction and design of optics, lasers; nonlinear optics; fiber optics; detectors; optical communication; display; spectroscopy. Project requires the design and set-up of a practical optical system.

Textbook/Reference:

Fundamentals of Photonics, 2nd Edition(or newer) by Bahaa E. A. Saleh, Malvin Carl Teich, ISBN: 978-0-471-35832-9, Wiley-Interscience; 2 edition (March 9, 2007)

Optics, 4th Edition(or newer) by Eugene Hecht, ISBN-13: 978-0805385663, ISBN-10: 0805385665 Addison-Wesley; (August 12, 2001)



Course Outline: *Tentative and subject to change*

Week	Lecture	LAB
1	Introduction to VE438	
2	Basic optics: polarization , reflection , diffraction	
	Coherence theory	
3	Optical waveguide / fiber	Lab1 : basic
4	Optical communications	Lab2 : coherence
5	Spectroscopy	Lab3 : fiber
	Acousto-optics	
6	Liquid crystal & display	Lab4 : communication
7	Nonlinear optics	
8		Lab5 : spectroscopy
9		Lab6 : AOM
10		Lab7 : LCD
11		Lab8 : second harmonics
12		
13		Final exam

Pre-/Post-lab Problems:

Pre-/post-lab problems are designed for students to preview & review the course contents before or after the lectures, students are expected to gain the knowledge through lectures & self-studies of course materials to prepare themselves for each lab. After lab, several challenging problems are assigned to help students review the lab & their extensions.

Laboratory:

Students are formed in groups to perform the labs, during which cooperative efforts are highly demanded.



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Final exam:

The examination is designed to measure each individual's understanding of the course materials, it composes not only the question directly or indirectly related to the labs, also some designing problems to test students' understanding & ability to use what they learn through the course.

Term Project:

To fulfill the MDE course requirement, a term project ought to be completed on group basis. Such projects are designed to measure students' understanding on the course material, meanwhile, build their capability to conduct individual projects.

Grading Policy:

Pre-lab & post-lab problems: 30%

Labs: 20%

Final Exam: 30%

Term Project: 20% (for MDE)

