

029:180:001 Syllabus Fall 2003

## **029:180:001 Electromagnetic Foundations of Optics**

**10:55A - 12:10P TTh 618 VAN**

**Instructor:** Professor Markus Wohlgenannt

Office Hours: 302 Van Allen Hall, T 12:15A-15:00P

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**Course description:** This course describes phenomena associated with the propagation of and interaction with electromagnetic waves. The goal is to provide the student with a thorough understanding, based on Maxwell's laws of Electromagnetic Theory, of optical phenomena important to current science and technology. Topics to be treated include wave-propagation, electromagnetic theory, Fourier optics, atomic scattering, lasers, fiber optics and more. Students must be familiar with geometric optics, the basics of differential equations and Electromagnetic Theory. Prerequisite: 029:130 or equivalent

**Text:** Hecht, *Optics (Fourth Edition)*. Topics on light-matter interaction will be taught from Hopf and Stegeman, *Applied Classical Electrodynamics, Volume 1: Linear Optics*. It is not necessary to buy this book, I will provide you with handouts.

**Web Page:** We will use WebCT: Details of the course can be found here, including the syllabus, homework assignments, and solutions to homework and exams.

**Homework:** The six assignments for the semester will be due Sept. 11, 25, Oct. 9, 23, Nov. 6, 20. Solutions will be posted at the next class following the due date – late homework will not be accepted after the solutions have been posted.

**Exams:** Midterm exam: Th, Oct. 16, Class time

Final: t.b.a.

**Grading:** The final grade is calculated from the homework, midterm exam, and the final exam. The relative weight of the course elements will be 50% Homework, 20% Midterm Exam, and 30% Final. Plus/minus grading will be used.

**Complaints, Plagiarism, and Cheating:** “Academic Misconduct” and “Student Complaints Concerning Faculty Actions” procedures are available for your review in the Fall 2001 Schedule of Courses and the CLAS Student Academic Handbook. The Department Associate Chair, Prof. Craig Kletzing, can be contacted through the Main Office 203 VAN.

**Students with Disabilities:** I would like to hear from anyone who has a disability which may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please see me after class or during my office hours.

29-193 Syllabus Spring 2003

## **Topics**

### **I. Wave Motion (On midterm)**

Aug 26, 28

Hecht, Ch. 2

### **II. Electromagnetic Theory (On midterm)**

Sept 2, 4

Hecht Ch. 3

### **III. Propagation of Light (On midterm)**

Sept. 9, 11,16

Hecht Ch. 4

### **IV. Superposition of Waves (On midterm)**

Sept. 18, 23

Hecht Ch. 7

### **V. Polarization (On midterm)**

Sept. 25, 30

Hecht Ch. 8

### **VI. Interference**

Oct. 2, 7

Hecht Ch. 9

### **VII. Diffraction**

Oct 9, 14, 16

Hecht Ch. 10

### **VIII. Fourier Optics**

Oct 21, 23

Hecht Ch. 11

### **IX. Coherence**

Oct 28

Hecht Ch. 12

### **X. Lasers**

Oct 30, Nov 4, 6

Hecht Ch. 12

### **XI. Interaction of Light and Matter**

Nov 11, 13

Hopf and Stegeman

### **XII. Crystal Optics**

Nov 18, 20

Hopf and Stegeman

### **XIII. Electro- and Magneto-Optics**

Dec 2, 4, 9

Hopf and Stegeman

### **XIV. Revision**

Dec 11