Instructor: Xiangdong Zhu  
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http://www.physics.ucdavis.edu/xdzhu/  

Lecture: 2:10 PM – 3:00 PM, MWF, 140 Physics/Geology Building  

Office hours: Drop-in, Rm. 237 Physics/Geology Building  

Lecture notes (136 pages, on www.physics.ucdavis.edu/xdzhu)  
OSLO Software Reference Version 6.1  

Homework: There are 9 assignments. Each will be posted on Monday on my Web page: www.physics.ucdavis.edu/xdzhu/course2006_Spring.html. The assignment is due on the following Monday at the time of the lecture. The assignments are graded based on the number of problems that are attempted. The solution to an assignment will be posted on the Web page after the assignment is collected. No late homework will be collected.  

Midterm Exam: 2:10 PM – 3:00 PM, Friday, May 5, 2006  
Final Exam: 10:30 AM – 12:30 PM, Friday, June 9, 2006  

Grading rules:  
Homework: 25%  
Midterm exam: 30%  
Final exam: 45%  

Introduction of Modern Optics, Grant R. Fowles (Dover Publications)  

Prerequisites: Physics 9 series and Math 21 sequence, preferably Physics 110 series  

108 Lab: Lab begins on 4/17/06 (the third week of the Instruction)  
Section#1: 3:10 – 5:30 PM, Mondays, 156A Roessler Hall  
Section#2: 3:10 – 5:30 PM, Wednesdays, 156A Roessler Hall  

[1] Measurement of light mean-free path in highly scattering media  

T.A.: Peter Quinliven
SCHEDULE:

I. Geometric Optics:
   i. Snell's law of refraction and reflection
   ii. Refraction and reflection at spherical surfaces and Paraxial approximation
       Thin lens equation
       Mirror equation
       Microscope and Telescope
       Beyond paraxial approximation: aberrations correction with lens systems
       Ray tracing with OSLO Premium 6.1 software
   iii. (2 × 2)-Matrix description for paraxial rays
       Thick lens
       Lens systems

II. Wave Optics:
   i. Two-beam interference
      Young's fringes
      Stokes relations
      Single reflections from two parallel surfaces
      Michelson interferometer and Mach-Zender interferometer
   ii. Multiple reflections from two parallel surfaces
      Fabry-Perot Interferometer
   iii. Diffraction
      Fraunhofer diffraction from a single slit
      Fraunhofer diffraction from multiple slits
      Reflection gratings and blaze angles

III. Maxwell's Theory of Optics
   i. Maxwell's equations and boundary conditions
   ii. Snell's law of reflection and refraction (revisit)
   iii. Fresnel equations of reflection and transmission
   iv. Brewster angle
   v. Critical angle and evanescence wave
   v. Multilayer thin film optics: (2 × 2)-Matrix description

IV. Optical Dielectric Constant
   i. Induced dipole moments of electrons
   ii. Optical constants of metals, semiconductors, and insulators
   iii. Optical constants in anisotropic optical media (liquid crystals)
   iv. Optical constant in magnetic/optically active materials

V. Polarized Light and its propagation in anisotropic Media
   i. Polarization of light
   ii. Jones vector representation of polarization
   iii. Jones (2 × 2)-Matrix representation of polarizing optical components
   iv. Light propagation in uniaxial crystals and double refraction
   v. Production of polarized light with polarizing optical components
   v. Optical activity
IMPORTANT DATES:

April 10: HW#1
April 17: HW#2
April 24: HW#3
May 1: HW#4

May 5: Midterm Exam, 2:10 PM – 3:00 PM, Friday

May 8: HW#5
May 15: HW#6
May 22: HW#7
May 29: HW#8

June 7: HW#9

June 9: Final Exam, 10:30 AM – 12:30 PM, Friday