

# PHYS 201

## Waves and Optics

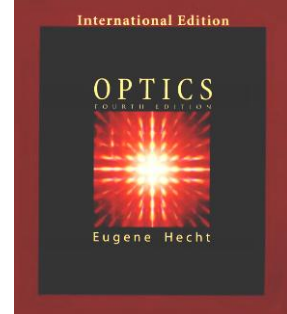
### Instructor

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**Grader:**TBA

### Schedule

Lectures:  
Mon 08:45-10:30  
Wed 10:45-12:30  
Recitations: TBA



### Textbook

Eugene Hecht, *Optics*, 4<sup>th</sup> edition Addison-Wesley (2002).

(Available @ Kitapsan-İzmir Pearson Education Bölge Bayisi  
Kıbrıs Şehitleri Cad. No:48/1 Alsancak-İzmir  
Tel : 463 18 24 Fax : 463 76 42) (63TL+10% Disc.)  
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**Pre-requisite:** Phys 102

### Reference Books:

1. Robert Guenther Modern Optics, John Wiley 1990
2. M. Born and E. Wolf Principles of Optics 7<sup>th</sup> Edition Cambridge 2005
3. F A Jenkins and H E White Fundamentals of Optics 4<sup>th</sup> Edition McGraw Hill 2001

### Grading

Midterm Exam-1	25%	(16 Nov, Wed)
Midterm Exam-2	25%	(14 Dec, Wed)
Final Exam	40%	(TBA)
Homeworks	10%	
Extra	5%	

### Office Hours

Mon: 13:30-15:15

## Course Outline

1. History Development of Optics
2. Wave Motion
  - 2.1. Simple Harmonic Motion
  - 2.2. One-Dimensional Waves
  - 2.3. Harmonic Waves
  - 2.4. Phase and Phase Velocity
  - 2.5. The Superposition Principle
  - 2.6. The Complex Representation
  - 2.7. Phasors and the Addition of Waves
  - 2.8. Plane Waves
  - 2.9. The Three-Dimensional Differential Wave Equation
  - 2.10. Spherical Waves
3. Electromagnetic Theory, Photons, and Light
  - 3.1. Basic Laws of Electromagnetic Theory
  - 3.2. Electromagnetic Waves
  - 3.3. Energy and Momentum
  - 3.4. Radiation
  - 3.5. Light in Bulk Matter
  - 3.6. The Electromagnetic-Photon Spectrum
4. The Propagation of Light
  - 4.1. Rayleigh Scattering
  - 4.2. Reflection
  - 4.3. Refraction
  - 4.4. Fermat's Principle
  - 4.5. The Electromagnetic Approach
  - 4.6. Total Internal Reflection
  - 4.7. Familiar Aspects of the Interaction of Light and Matter
  - 4.8. The Stokes Treatment of Reflection and Refraction
  - 4.9. Photons, Waves, and Probability
5. The Superposition of Waves
  - 5.1. The Addition of Waves of the Same Frequency
  - 5.2. The Addition of Waves of Different Frequency
6. Polarization
  - 6.1. The Polarized Light
  - 6.2. Polarizers
  - 6.3. Scattering and Polarization
  - 6.4. Polarization by Reflection
  - 6.5. Retarders
  - 6.6. Circular Polarizers
  - 6.7. Optical Modulators
  - 6.8. A Mathematical Description of Polarization
7. Interference
  - 7.1. Conditions for Interference
  - 7.2. Wavefront-splitting Interferometers
  - 7.3. Amplitude-splitting Interferometers
  - 7.4. Multiple-Beam Interference
  - 7.5. Applications of Single and Multilayer Films
  - 7.6. Applications of Interferometry
8. Diffraction
  - 8.1. Fraunhofer Diffraction
  - 8.2. Fresnel Diffraction
  - 8.3. Boundary Diffraction Waves
9. Geometrical Optics
  - 9.1. Lenses, Mirrors, Prisms
  - 9.2. Fiberoptics
  - 9.3. Optical Systems
  - 9.4. Wavefront Shaping
  - 9.5. Gravitational Lensing
  - 9.6. Thick Lenses and Lens Systems
  - 9.7. Analytical Ray Tracing
  - 9.8. Aberrations
10. Modern Optics, Fourier Optics