The Hashemite University
Faculty of Science

Department: Physics	
Year: 2025/2026	**Semester:** First

Course Information	
Course Title	Physical Optics
Course Number	102321
Course Credits	Three credit hours
Prerequisite	Physics 102203 " General Physics III"
Course Duration	One semester

Instructor	**Professor Wa'el Salah**
Course Time	**Monday and Wednesday 10:00 – 11:30**
Office Location	**Physics Building/room 209**
Office Hours	**Monday and Wednesday 11:30-13:00**

Textbook	
Title	**Introduction to Optics**
Authors	***Frank L. Pedrotti, Leno M. Pedrotti and Leno S. Pedrotti***
Publisher	Pearson Higher education, 2006
Edition	**3rd. Ed.**

References

(1) E. Hecht, Optics, 4th. Ed. Pearson Higher Education, 2003.
(2) E. Hecht, Schaum's Outline Series, Problems and Solutions of Optics, McGrew Hill.

Course Description

A study of electromagnetic waves in their generation, propagation and superposition that lead to the understanding of ray optics, polarization, interference, diffraction, and coherence

Course Objectives

The primary objective of this course is to enable a student to:

1. **Understand basic optics.**
2. **Understand interference and coherence.**
3. **Interrupt interferometric technique.**

4. Students will increase their fundamental knowledge of optics. Students will understand the relevance of optics to other fields of physics and science and it's role in many technologies

Chapter	Description
4	**Wave Equation:** one-dimensional wave equation, Harmonic waves, Harmonic waves as complex numbers, Plane waves, Spherical Waves, Electromagnetic waves.
5	**Superposition of Waves:** Superposition principle, Superposition of waves of the same frequency, Random and coherent sources, Standing waves, Phase and group velocity.
7	**Interference of Light:** Two beam interferences, Young's double-slit experiment, Fringes of equal thickness, Newton's rings.
8	**Optical Interferometry**: The Michelson interferometer; Application of the Michelson interferometer, Stokes relations, Multiple-beam interference in a parallel plate, Fabry-Perot interferometer, Fringe profiles, Resolving power, Free spectral range.
9	**Coherence:** Temporal coherence and natural line width, Partial coherence, Spatial coherence width.
11	**Fraunhofer Diffraction:** Diffraction from a single slit, Beam spreading, Rectangular and circular apertures, Resolution, Double slit diffraction, Diffraction from many slits.
13	**Fresnel Diffraction:** Fresnel-Kirchhoff diffraction integral, Criterion for Fresnel diffraction, The obliquity factor, Fresnel diffraction from circular apertures, Phase shifts of the diffraction light, The Fresnel zone plate, Fresnel diffraction from aperture with rectangular symmetry, The Cornu spiral, Application of the Cornu spiral.
14	**Matrix Treatment of Polarization:** Mathematical representation of polarized light, Jones vectors and Matrices.

Student Responsibility:

Attendance: Attendance is checked every class period. You are responsible for determining the contents and extent of any class work done during any period of absence.

Exams:

- First examination — June 24, 2012
- Second examination — Jully 8, 2012
- Final examination — To be announced latter.

Grades: The final grade will be calculated according to the following weighing:

First Exam	25%
Second Exam	25%
Final Exam	50%