



Syllabus of Record

I. Catalog Description

EOPT 130 – Introduction to Optics

(3c-3l-4cr)

Prerequisites: PHYS 111/112 or PHYS 131/132

Introduces the basic principles and theory of light as a geometrical ray and an electromagnetic wave, and provides elementary treatments of light sources, image formation and important wave phenomena. Topics include properties of light, reflection, refraction, absorption, transmission, interference, diffraction, polarization. Theory is applied to common applications and devices used in the photonics field.

II. Course Outcomes

Upon successful completion of this course, the student will be able to:

1. Explain and discuss terminology related to optical devices using ray and wave description of light.
2. Apply the laws of reflection and refraction to determine paraxial image position and size for simple reflecting and transmitting optical systems using graphical construction methods and calculations.

3. Explain and discuss the effects of aberrations on optical system performance.

4. Apply basic theory of interference, diffraction, and polarization to articles in professional literature and in selecting optical components.
5. Explain diffraction effects of light beams and their dependence on wavelength and aperture size.
6. Discuss the physics concepts of geometric and wave optics and applications such as thin film coatings.
7. Design and use simple optical systems, such as beam expanders, microscopes, telescopes, prism spectrometers and interferometers.

a) Absorption and optical density

Reading Material:

Light Source and Wave Optics Text Module 5.5 Propagation

Wave Optics/Components and Devices Text Module 6.6 Filters and Beam Splitters

Reading Material:

Light Sources and Wave Optics Text Module 5-8 Polarization

Wave Optics/Components and Devices Text: Module 6-10 Polarizers and Module 7-8

Electro-Optic Modulators

7. Simple Optical Systems

(3 hours)

- a) Human eye and cameras
- b) Microscopes
- c) Telescopes

Reading Material:

Geometric Optics Text Module 2-8 *Matrix Optics*

8. Matrix Optics

(3 hours)

- a) Review of matrix algebra
- b) Matrix for each optical component
- c) Matrix for an optical system

Reading Material:

Geometric Optics Text Module 2-7 *Optical Systems*

9. Holography

(1 hours)

- a) Introduction
- b) Basic setup for making holograms
- c) ~~Erasing and processing the hologram~~

- d) Reconstructing the image
- e) Other setups for making holograms

Reading Material:

Light Sources and Wave Optics Text Module 5.9 Holography

measuring the focal length of the spherical mirrors and thin lenses and studying their image properties

Lab 6 - Interferometer Alignment and Michelson Interferometer Experiments include

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

CORD Communications "Light Sources and Wave Optics 3rd Ed", by Center for Occupational Research and Development ISBN-10: 1578375495, 2012

CORD Communications "Wave Optics/ Components and Devices, 2nd Edition" by Center for Occupational Research and Development ISBN-10: 1578376262, 2010

CORD Communications "Fundamentals of Light and Lasers, 2nd Edition", by Center for Occupational Research and Development ISBN-10: 1578373891, 2008

CORD Communications "Geometric Optics, 2nd Edition," by Center for Occupational Research and Development ISBN-10: 1578375118, 2008

IX. Special Resource Requirements

Calculator, compass, protractor, two triangles (45-45-90 & 30-60-90 degrees); and pencils of 3 different colors.

X. Bibliography

CORD Communications "Fundamentals of Light and Lasers" Center for Occupational Research and Development ISBN-10: 1578376386, 2008

CORD Communications "Light Sources and Wave Optics 2nd Ed" Center for Occupational

[The rest of the page contains extremely faint and illegible text, likely due to heavy redaction or poor scan quality.]

No equivalent courses are taught by other departments.

- B3 Will this course be cross-listed with other departments? If so, please summarize the department representatives' discussions concerning the course and indicate how consistency will be maintained across departments.

The course will not be cross-listed with other departments.

- C1 Are faculty resources adequate? If you are not requesting or have not been authorized to hire

additional faculty demonstrate how this course will fit into the schedule(s) of current faculty

What will be taught less frequently or in fewer sections to make this possible? Please specify how preparation and equated workload will be assigned for this course.

An additional faculty member will not be needed when the course is added. This course to be added will replace the other two courses which are not needed any more. Preparation will be

C7 Does any professional society recommend enrollment limits or parameters for a course of this nature? If they do, please quote from the appropriate documents.

No recommended enrollment limits exist for courses of this nature. Enrollment limitations are nearly dependent on the laboratory facilities at the offering institution.

C8 If this course is a distance education course, see the Implementation of Distance Education