Minnesota State University Moorhead

PHYS 325: Optics

A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 3

Lab Hours/Week: 0

OJT Hours/Week: *.*

Prerequisites:
MATH 366 - Differential Equations AND PHYS 201 - General Physics II & Lab

Corequisites: None

MnTC Goals: None

This course covers geometrical and physical optics including paraxial theory, interference, diffraction, polarization and optical instruments.

B. COURSE EFFECTIVE DATES: 06/01/2005 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. One dimension waves, phase velocity
2. Three dimension spherical and cylindrical wave
3. Energy and momentum of waves
4. Reflection and refraction
5. Lenses, including systems of lenses and aberrations
6. Phasors
7. Rayleigh scattering
8. Polarization
9. Interference and diffraction (Fresnel and Fraunhofer)
10. Imaging techniques

D. LEARNING OUTCOMES (General)

1. Apply the mathematical techniques from vector and differential calculus to problems in electromagnetic wave propagation and geometric and physical optics.
2. Understand imaging techniques such as optical microscopy, electron microscopy, x-ray microscopy, scanning probe microscopy, magnetic resonance imaging, holography and tomography.
3. Interpret, both conceptually and mathematically, the physical meaning of images produced by the techniques above.
4. Recognize situations in which a particular imaging technique is most appropriate.
5. Develop the skills of a physicist: checking units, limiting cases, developing conceptual and mathematical skills.

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted