

Course title
Optics for Micro- and Nano- Technologies

Code
OPT9005

ECTS credits 5
Faculty Faculty of Technology and Maritime S
Location Høgskolen i Vestfold
Teaching Language English

Participants

PhD-students at Vestfold University College and collaborating institutions

Prerequisite knowledge

Introductory electro-magnetics, introduction to MEMS.

Aim and Objectives

Upon completion of this course the student should be able to:

- demonstrate a good overview of the geometrical optics principles, ray tracing through lenses and mirrors, designing a simple layout of optical elements to achieve certain functions in an optical system.
- demonstrate a good overview of the physical optics principles and understand wave-optical phenomenon such as diffraction, interference, polarization and coherence.
- Understand different optical sources such as lamps, lasers, LEDs, Understand optical detectors such as thermal detectors and quantum detectors.
- Understand different optical MEMS devices and their operating principles.
- Understand basic MOEMS device fabrication steps used in the clean-room for the manufacturing of advanced MOEMS devices.
- Able to simulate MOEMS devices

Outline Syllabus

Geometrical optics, lenses, mirrors, Ray tracing

- Physical/Fourier optics, beam propagation, diffraction, interference, polarization, coherence
- Optical waveguides, rectangular, circular, waveguide modes,
- Optical sources and detectors, laser, LEDs, thermal detectors, quantum detectors
- Optical MEMS, micro-mirrors, micro-lens, gratings,
- Applications of MOEMS
 - o Optical communications, phase modulators, attenuators, switches, add/drop, VCSELS,
 - o Display, scanners
 - o Biosensors, spectroscopy, imaging

Work Methods/Teaching

Lectures from text books, Home work assignments, computer simulations

Assessment /Method(s)

Home Assignments, Design Project,

Design Project: Project topics will be provided. Students can also propose new topics. Team projects are encouraged. All projects will be peer-reviewed at both proposal and final stages.

Reading list

- Reference Books: 1- Photonic Microsystems, by Olav Solgard
2- MOEMS: Micro-opto-eleetro-mechanical Systems, by M. Edward Motamedi
3- Optics, by Eugene Hecht
4- Introduction to Modern optics, by Grant R. Fowles

Coordinator (Professional responsible)

Asc. Professor M. N. Akram