

OPTICAL ENGINEERING (OEN)

OEN 520 Optical Design and Instrumentation (3 Credits)

This course introduces geometrical and physical optics systems and a variety of optical equipment, including mirrors, prisms, beam splitters, couplers, polarization equipment, lasers and laser coupling techniques. Laboratory experiments will introduce basic photonic, geometric and physical optics instrumentation as well as measurement techniques.

OEN 530 Optical Materials (3 Credits)

This course relates optical behavior to the fundamental chemical, physical and micro-structural properties of conductors, insulators, and semiconductor materials. Specialty topics such as Kerr effect, Stark effect, Zeeman shift, radiative and non-radiative transitions, up-conversion processes, and other energy transfer mechanisms are also discussed, with an emphasis on semiconductor materials.

OEN 540 Lasers and Photonics (3 Credits)

This course reviews the electromagnetic principles of optics, including Maxwell's equations, optical amplification processes, Gaussian beams, and modal characteristics of laser resonators. An overview of gas, solid state, and semiconductor laser systems is presented. Finally, foundational principles of selected photonic devices, including semiconductor-based detectors and photovoltaic devices are introduced.

OEN 560 Optical Communications I (3 Credits)

This course introduces the advantages of optical communication and the fundamental components of a communication system. Topics include waveguide theory, signal impairments mechanisms such as optical attenuation and dispersion in fibers, laser modulation, photo detection and noise, and coherent communications.

OEN 561 Optoelectronic and Photonic Devices (3 Credits)

The course provides an understanding of the combined use of optoelectronic and photonic components and devices, which enables the design of a well-engineered fiber optic communication system. The first part of the course provides a review of sources, amplifiers, detectors, and signal degradation mechanisms in optical fibers. The second part of the course focuses on wavelength-division multiplexed fiber networks and optical switching cores for routing. Finally, system design testing and performance optimization for different network configurations will also be tested with the aid of system modeling software.

OEN 580 Quantum Mechanics (3 Credits)

Contact the department for specific course information.

OEN 630 Opto-Electronic Devices (3 Credits)

Materials for optoelectronics optical processes in semiconductors, absorption and radiation, transition rates and carrier lifetimes are discussed. Principles of LEDs, lasers, photo detectors, modulators and solar cells, and optoelectronic integrated circuits are discussed in detail.

OEN 661 Optics and Lasers (3 Credits)

Contact the department for specific course information.