

**NEW COURSE**

**ECEN 6006**

## **MICROOPTICS**

Instructor: Prof. Rafael Piestun

Recent advances in the fabrication of micro- and nano-structured materials for the generation and control of light are opening new approaches to the design of devices and systems. The motivation for a transition from *macro* to *micro* and *nano*-optics is not merely miniaturization, but also a search for new phenomena that are only encountered at the sub-wavelength regime. We will discuss whether optics can follow the path of microelectronics towards miniaturization, integration, flexibility, and reliability. This course deals with the scientific and technological fundamentals of this developing field.

### Topics

1. Introduction: Why *Lilliputian* optics?
2. Fundamental concepts: Scattering, Diffraction, Refraction, Interference
3. Classification of optical components and systems: Refractive, Diffractive, Guided-wave, Free-space optics
4. Fabrication techniques: Lithography, Mechanical and Laser Micromachining
5. Modeling of micro- and nano-optical elements
6. Design techniques
7. Photonic crystals
8. Near field optics
9. Optical microelectromechanical systems
10. Beam and pulse shaping in multiple dimensions
11. Examples of microoptical systems: Interconnects, Storage, Imaging, Sensing

Time: M-W 12:30 – 1:45 (SPRING 2002)

Prerequisites: Fundamental of Photonics (ECEN 5016) or equivalent  
Electromagnetic Fields and Waves (ECEN 3400) or equivalent