

<b>Phys 4703</b>	<b>INTRODUCTION TO PHOTONICS</b>	<b>(CR3)</b>
<b>Preq.</b>	<b>Phys 3402/ ADP (Physics)</b>	

### **Objectives**

*To study the application of light, studying the photonic devices including detectors.*

### **Syllabus**

Guided Wave Optics: Planar slab waveguides, Rectangular channel waveguides, Single and multi-mode optical fibers, waveguide modes and field distributions, waveguide dispersion, pulse propagation  
Gaussian Beam Propagation: ABCD matrices for transformation of Gaussian beams, applications to simple resonators  
Electromagnetic Propagation in Anisotropic Media: Reflection and transmission at



anisotropic interfaces, Jones Calculus, retardation plates, polarizers Electro-optics and Acousto-optics: Linear electro-optic effect, Longitudinal and transverse modulators, amplitude and phase modulation, Mach-Zehnder modulators, Coupled mode theory, Optical coupling between waveguides, Directional couplers, Photoelastic effect, Acousto-optic interaction and Bragg diffraction, Acousto-optic modulators, deflectors and scanners Optoelectronics: p-n junctions, semiconductor devices: laser amplifiers, injection lasers, photoconductors, photodiodes, photodetector noise.

### ***Recommended Books***

1. *Fundamentals of Photonics* by B. E. A. Saleh and M. C. Teich (2<sup>nd</sup> Edition), John Wiley (2007)
2. *Photonic Devices* by J-M. Liu, Cambridge (2009)
3. *Photonics: Optical Electronics in Modern Communications* by A. Yariv and P. Yeh, Oxford (2006)
4. *Optics* by E. Hecht (4<sup>th</sup> Edition), Addison-Wesley (2001)