

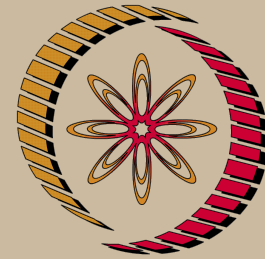
# NOC:Optical communications - Video course

## COURSE OUTLINE

Optical communications is a frequent elective/core course offered to third/final year undergraduate students in Electrical Engineering. This course offers a gradual approach to optical communications with emphasis on latest developments in coherent optical communications. Starting from a broad introduction to transmitters and receivers, this course covers optical fibers and waveguides, lasers, detectors, optical amplifiers, channel impairments and their mitigation using signal processing algorithms. Matlab models will be discussed.

## COURSE DETAIL

Week	Topics
1.	Overview of optical fiber communications, Optical transmitter components--lasers and optical modulators
2.	General digital communication system, Line coding and Pulse shaping, Signal space representation
3.	Digital modulation formats: ASK, PSK, and QAM, Matlab models, Optical implementation, Matlab models
4.	Higher-order modulation (star and square QAM) and Multicarrier modulation (OFDM), Optimum receiver principles
5.	Optical receivers I: Photodetectors and its performance characteristics, noise in photodetection, common types of photodetectors



NP-TEL

# NPTEL

<http://nptel.ac.in>

## Electronics & Communication Engineering

### Pre-requisites:

Knowledge of electromagnetics and digital communication fundamentals

### Coordinators:

**Dr. Pradeep Kumar K**  
Department of Electrical  
Engineering IIT Kanpur

6.	Optical receivers II: Direct detection, self-homodyne (differential) detection, and coherent detection, Sensitivity, Impact of noise
7.	Lasers, rate equations, RIN and phase noise
8.	Optical amplifiers: EDFA and SOA, ASE, system impact
9.	Electromagnetic theory, Wave equations, Reflection and transmission of waves
10.	Optical fiber modes, single and multi-mode fibers, single and multi-core fibers, attenuation and dispersion
11.	Nonlinear effects (SPM, XPM, FWM), Multiplexing: Polarization, Wavelength, and Time division multiplexed systems, Important WDM components
12.	DSP in optical communications, dispersion mitigation, phase noise estimation and compensation, carrier phase recovery, digital back propagation

