



NE312 Aug 3:0

Nonlinear and Ultrafast Photonics

Instructor

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Teaching Assistant

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Department: Centre for Nano Science and Engineering

Course Time: Mon., Wed., Fri., 12:00 - 1:00 PM

Lecture venue: TF-10, CeNSE Building

Detailed Course Page: <http://www.cense.iisc.ac.in/supradeepagroup/index.php/teaching/nonlinear-and-ultrafast-photonics/>

Announcements

Brief description of the course

This is an intermediate level optics course which builds on the background provided in "Introduction to photonics" offered in our department. Owing to the extensive use of lasers in various fields, we believe a good understanding of these principles is essential for students in all science and engineering disciplines.

Prerequisites

Electromagnetic Fields, Introduction to Photonics

Syllabus

Classical theory of nonlinear optical interactions, Intensity dependent refractive index, Molecular origins of Nonlinear optical response, Nonlinear effects from various orders of susceptibilities, Photon-phonon scattering, Electro and Acousto-Optic effects, Non-linear optics in guided wave devices, Self-phase/Cross-phase modulation, Solitons, Four-wave mixing, Stimulated Raman/Brillouin scattering, Introduction to ultrafast optics, Theory of mode-locking, Effects of Dispersion, Ultrafast Pulse Measurement, Ultrafast Pulse Shaping, Ultrafast Phenomena

Course outcomes

Strong working knowledge in applied nonlinear photonics

Ability to design practical systems based on nonlinear optics such as harmonic generators, parametric amplifiers, difference frequency generation, Raman and Brillouin effects, Modelocked Lasers

Grading policy

25% for Midterm

25% for End Term

25% for Term Paper

25% for Project Presentation

Assignments

Resources

1. Robert W. Boyd, Nonlinear Optics, Elsevier (2003)
2. Govind P. Agrawal, Nonlinear Fiber Optics, Elsevier (2007)
3. Andrew M Weiner, Ultrafast Optics, Wiley (2008)
4. Miscellaneous Research Articles and Reviews.