TIFR, Hyderabad

Course: Classical Electrodynamics-II (P-206)

Start Date: 06.01.2020

Credits: 4

Coordinates: Monday and Wednesday between 12:00 – 13:30 hrs

Instructor: Prof. Subhasish Dutta Gupta, UoH

Syllabus:

- Special relativity and relativistic kinematics
- Covariant (Lagrangian) formulation of electrodynamics
- Motion of charges and electromagnetic fields: Leinard Weichert potentials
- Charges in electromagnetic fields: radiation from an accelerated Charge, Bremsstrahlung, Cherenkov, Synchrotron and Transition radiation.
- Radiation reaction: energy loss mechanisms
- Electromagnetic fields propagating through matter: scattering, diffraction.
- Dispersion, causality and Kramers-Kronig relation. Metamaterials: Negative index and hyperbolic media. Perfect lensing. Optical pulses and beams: Fast and slow light. Goos-Hanchen and Feodorov-Imbert shifts. Spin-orbit interaction with light
- **Special topics:** Lasers and nonlinear optics, novel optical phenomena, Plasmonics and nano-optics.

Prerequisites (those courses which have to be done before opting for this course):

Classical Electrodynamics-I

Primary Text / Reference Books:

- W.K.H.Panofsky and M.Phillips : Classical Electricity and Magnetism (Addison Wesley)
- J.D. Jackson, Classical Electrodynamics (John Wiley)
- Landau & Lifshitz : Electrodynamics of continuous media (Pergamon)
- David J. Griffiths, Introduction to Electrodynamics (Prentice Hall)
- S Dutta Gupta, N Ghosh and A Banerjee, Wave Optics – Basic concepts and contemporary trends, (CRC press)

Evaluation Method (Weightage for Internal Assessment, Mid Term / Term End exams, Presentations etc.):

Internal assessment (problem sets) and midterm: 40
Term end exams: 40
Presentation and quiz: 20