

Optical Spectroscopy of Molecules (with an emphasis on Fluorescence Spectroscopy)

A graduate course of the Chemistry Subject Board

DCS Graduate Course (Jan – May, 2018)

Contact hours per week: 5.5 (3X1.5 hour lectures + 1 hour tutorials) per week

- 1) Introduction: What spectroscopy tells us about the world, energy levels, and spectroscopic phenomena
- 2) How the optical transitions take place : Quantum mechanics of light-matter interactions
- 3) Electronic spectroscopy: radiative transitions, line shapes, spin forbidden transitions, excitons, concepts of potential energy surfaces
- 4) Fluorescence spectroscopy: Lifetime, Quenching, Anisotropy, Energy transfer,
- 5) Radiation-less transitions: Energy transfer
- 6) Tools and methods of modern spectroscopy: Ultrafast spectroscopy, Time correlated single photon counting, Multiphoton excitation, single molecule spectroscopy, Fluorescence Correlation spectroscopy
- 7) Vibrational Spectroscopy: IR and Raman
- 8) Designs of common optical devices and lasers
- 9) Non-linear optics and fibre optics
- 10) Beyond spectroscopy: optical microscopy and related tools

References:

- 1) Modern Molecular Photochemistry: Nicholas Turro
- 2) Molecular Fluorescence: Principles and Applications: Bernard Valeur
- 3) Principles of fluorescence spectroscopy: Joseph Lakowicz
- 4) Quantum electronics: Amnon Yariv

Lecturer: Prof. Sudipta Maiti

Course start date: January 15, 2018

Email: maiti@tifr.res.in

Hours: 9:30 am – 11:00 am

Days: Monday, Tuesday and Thursday

Venue: Lecture Room AG-80

Tutor: Ankur Gupta