ULTRAFAST LASER SPECTROSCOPY

PROF. ANINDYA DATTA
Department of Chemistry
IIT Bombay

TYPE OF COURSE : New | Elective | PG
COURSE DURATION : 12 weeks (27 Jan’ 20 - 17 Apr’ 20)
EXAM DATE : 25 Apr 2020

PRE-REQUISITES : A basic course in Molecular Spectroscopy

INTENDED AUDIENCE : Chemistry, Physics, Materials Science, Biological Sciences, Chemical Engineering Students

COURSE OUTLINE :

ABOUT INSTRUCTOR :
Prof. Datta is a Professor of Chemistry in IIT Bombay, with research interest in ultrafast spectroscopy and time resolved fluorescence microscopy. He has teaching experience of 17 years. 14 Ph. D. students have graduated from our laboratory. Eight more are working towards their degree. He received Excellence in Teaching Award from the institute in 2017 and has taught two NPTEL courses: one on Molecular Spectroscopy and another on Symmetry in Chemistry.

COURSE PLAN :
Week 1: Introduction, Steady state spectroscopy, Spectrophotometers Lab visit: Spectrophotometers
Week 2: TCSPC theory Lab visit: TCSPC TCSPC data analysis
Week 3: Streak Camera Femtosecond Optical Gating Lab visit: Femtosecond Optical gating
Week 4: Pump probe technique: Theory Lab visit: Pump probe Impulsive Raman spectroscopy
Week 5: How are ultrashort pulses produced and amplified? Optical parametric Amplification
Week 6: Nonlinear optics
Week 7: Fluorescence depolarization and its time evolution: basics and application
Week 8: Forster Resonance Energy Transfer
Week 9: Application of ultrafast laser spectroscopy in basic science: How much time does it take for a bond to break? What is the mechanism of acid base reaction?
Week 10: Solvation dynamics, Hydrogen bond dynamics
Week 11: Ultrafast processes in materials science
Week 12: Ultrafast processes in life sciences