

PHY560 Methods in soft condensed matter physics

Schedule: Wednesday, 5:30 pm -7:40pm

Location: East Hall, Room 305

Instructor: Yana Reshetnyak, Physics Department; E-mail: reshetnyak@mail.uri.edu

Credits: 3

General description:

The main goal of the course is to review main principles of experimental methods used in physics, engineering, chemistry, biology and medicine. The course is complementary to PHY381 and 382 and designed for student at both undergraduate and graduate levels.

Course Content:

General introduction into photophysics

Fluorescence spectroscopy (absorption, emission, lifetime, polarization, FRET)

Circular dichroism

Infrared spectroscopy

Inverse Photoemission Spectroscopy

Introduction in NMR spectroscopy

Medical Imaging (X-ray, MRI, ultrasound, PET, fluorescence)

Optical microscopy

Atomic force microscopy

Near field, Scanning tunneling, Electron microscopies

Surface preparation and characterization techniques of ion bombardment

Low Energy Electron Diffraction.

Surface plasmon resonance

Single molecule mechanics and fluorescence

Fluorescence correlation spectroscopy

Thermodynamics (calorimetry)

Modeling and simulation

Introduction to biotechnology

Course structure:

The lectures will be presented during 1.5 hours followed by student's presentations and/or laboratory visits: Spectroscopy lab, Surface and sensor partnership lab, INBRE facility labs, Medical physics lab in Rhode Island Hospital.

Textbook:

The course will be based on the selected chapters (from various text books), some material could be found on-line on the educational web site of the American Biophysical Society:

<http://www.biophysics.org/education/topics.htm#techniques>

Grading:

One 20 min presentation on selected topic (50%)

Final exam (50%)