

# Physics 582/BE 580 Radiation Dosimetry

**Fall Term 2005**

**Instructors: Professors Peter Bloch**

**Required Text Book:**

**Introduction to Radiological Physics and Radiation Dosimetry Herb Attix**

This course in medical radiation engineering and physics investigates the interaction of radiation with matter. The types of interaction that will be discussed include:

**(1) X-ray Interactions including the following processes**

- Coherent
- Photoelectric
- Compton
- Pair Production

**(2) Electron Interactions**

- Collisional and radiative processes

**(3) Heavy Charged Particles (Protons)**

- Collisional energy losses in matter
- Elastic and inelastic processes with nuclei

**(4) Neutron Interactions**

- Elastic and neutron capture interactions with nuclei

**(5) Basic Concepts of Dosimetry**

- Radiation exposure
- Kinetic energy release to matter (KERMA)
- Absorbed dose and charged particle equilibrium
- Evaluation of dose in homogenous and non-homogenous media-
- Photon Transport Theory and Monte-Carlo simulations
- Electron Transport Theory and Monte-Carlo simulations
- Cavity Theory

**(6) Principles of radiation detectors**

- Ion chambers
- Calorimeters
- Chemical dosimeters
- Film dosimeters
- Solid state detectors ( NaI and diodes, thermoluminescent detectors, photostimulable phosphors)

**(7) Radiation Protection**

- Radiation Risks to Humans
- Background radiation levels
- National guidelines for radiation protection and personnel monitoring
- Protective barriers
- Radiation surveys