**Instructor:** Zhi-Feng Huang, 356 Physics Building  
Tel: (313) 577 2791; Email: huang@physics.wayne.edu  
Office hours: Mon 2:30pm – 5:00pm, or by appointment  
Teaching Associate: Mircea Pantea, 337 Physics Building

**Class time and location:** M W 9:35am – 11:25am, 185 Physics Building

**Prerequisite:** PHY 2130/2140 or PHY 2170/2180 (General Physics); PHY 3700 (Mathematics for Biomedical Physics; already completed or concurrently enrolled)

**Textbook:** “Biological Physics: Energy, Information, Life”, by Philip Nelson, W. H. Freeman (will be also used in the other course “PHY 6X00: Biological Physics”); “Biomedical Applications of Introductory Physics”, by J. A. Tuszyński and J. M. Dixon, John Wiley & Sons.

**Additional text/References:**
- “Introduction to Physics in Modern Medicine”, by S. A. Kane, Taylor & Francis;

**Homework:** Put in Blackboard; Due 1 week after assigned, and collected in class; Late solutions will not be accepted; The lowest homework score will be dropped.

**Exams:** Two exams: to be announced more than one week in advance;  
Final exam (Cumulative): Friday, April 25, 8:00am – 10:30am.

**Grading:** 1st exam: 20%  
2nd exam: 20%  
Final exam: 30%  
Quiz (in class): 10%  
Homework and class participation: 20%

**Course content**

This course covers basic and applied physics concepts used in biology and modern medicine, including:
- Thermodynamics: Temperature and heat, ideal gas, entropy, free energy, microscopic systems, and Boltzmann distribution.
- Diffusion, random walks, osmosis, and the related biological applications such as cell membranes and biological organisms.
- Fluid mechanics in biological systems.
- Introduction to quantum mechanics: Atoms, molecules, energy levels and spectra, the Schrödinger equation (1D).
- Radiation and medical applications: radioactivity, medical diagnostics (tomography and CT, PET scans), radiation therapy.
- Magnetism and Magnetic resonance imaging; diagnostic ultrasound imaging.