PHY 4700 Introduction to Biomedical Physics Winter 2014

Instructor: Zhi-Feng Huang, 356 Physics Building
Tel: (313) 577 2791; Email: huang@wayne.edu
Office hours: Mon & Wed 3:00pm – 4:00pm, or by appointment

Lecture time and location: M W 11:45am – 1:35pm, 245 Physics Building

Prerequisites: PHY 2130/2140 or PHY 2170/2180; MAT 2020; PHY 3700

Textbook: 1) "Biological Physics: Energy, Information, Life", by Philip Nelson, updated 1st edition, W. H. Freeman (also the textbook of the follow-up course PHY 5750);
2) "Biomedical Applications of Introductory Physics", by J. A. Tuszynski and J. M. Dixon, Wiley.

Supplementary text/References:
"Introduction to Physics in Modern Medicine", by S. A. Kane, Taylor & Francis;
"Modern Physics", by K. S. Krane, Wiley;
"Modern Physics", by P. A. Tipler and R. A. Llewellyn, W. H. Freeman;
Any general physics textbook of PHY 2130/2140 or PHY 2170/2180.

Homework: Posted in Blackboard course website; Collected in class at due date. Late homework will NOT be accepted; The lowest homework score will be dropped. You must show your own work and solution steps to receive credits, although group discussions are allowed. Any copy from other sources (such as from other students, internet, or elsewhere) is prohibited and will be given 0 credit.

Exams: Two midterm exams: to be announced at least 1 week in advance (NO make-up exams);
Final exam (Cumulative): April 24 (Thursday), 10:40am – 1:10pm.

Grading:

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

A: 90 – 100%; A-: 85 – 89%
B+: 80 – 84%; B: 75 – 79%; B-: 70 – 74%
C+: 65 – 69%; C: 60 – 64%; C-: 55 – 59%
D+: 50 – 54%; D: 45 – 49%; D-: 40 – 44%
F: 0 – 39%

Course content and learning outcomes

This course covers basic and applied physics concepts used in biology and modern medicine. Students will learn and understand the following topics:

- Thermodynamics: Temperature and heat, thermodynamic laws, ideal gas, entropy, and Boltzmann distribution.
- Diffusion, random walks, osmosis, and the related biological applications including cell membranes and biological organisms.
- Fluid mechanics in biological systems.
- Modern physics and introduction to quantum mechanics: Photoelectric effect, blackbody radiation, atoms, molecules, energy levels and spectra, the Schrödinger equation (1D).
- Medical applications: Radioactivity, radiation therapy, medical diagnostics (X-ray, CT/CAT, emission tomography, PET).
- Nuclear magnetic resonance (NMR) and magnetic resonance imaging (MRI).

Additional resources and help

Student Disability Services: If you have a documented disability that requires accommodations, you will need to register with Student Disability Services (SDS) for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Please be aware that a delay in getting SDS accommodation letters for the current semester may hinder the availability or facilitation of those accommodations in a timely manner. Therefore, it is in your best interest to get your accommodation letters as early in the semester as possible.