

Physics 413
Introduction to Biophysics
Mon. Wed. Fri. 10-11 am
Location: L109

Instructors: Dr. Charles Church and Dr. Xinmai Yang
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Office hour: Thu. 10-12 am

Overall objective of the course:

The objectives are: (1) to understand the principles of physics;
(2) to illustrate how the principles of physics can be used to understand biological phenomena at the macroscopic as well as microscopic levels;
(3) to understand the physical principles of some diagnostic techniques used in medical science.

TextBook: **Biophysics** by Roland Glaser

Reference books: **Topics in classical biophysics** by Harold J. Metcalf
Biophysics---An Introduction by Rodney Cotterill
Physics in Biology and Medicine by Paul Davidovits
Molecular thermodynamics by Donald McQuarrie, John Simon

Prerequisites:

Physics 213-214 or (211-212); Differential and Integral Calculus.

Outline:

- i) Molecular structure
 - a. Chemical binding;
 - b. Energies, forces, and bonds;
 - c. Thermal molecular movement;
 - d. Structure formation of biomacromolecules;
 - e. Biological membranes.
- ii) Energetics and Dynamics of Biological Systems
 - a. Thermodynamics;
 - b. Biomechanics;
 - c. Bio-fluid flow;
 - d. Electrical fields in cell and organism;
 - e. Nerve signal.
- iii) Physical factors of the environment
 - a. Sound and hearing;
 - b. Light and vision;

- c. Electromagnetic fields.
- iv) Introduction to some experimental and diagnostic techniques.

Method of Evaluations

Two tests	20% each
Homework	20%
Final Exam	40%

Grading Scale

90-100	A
80-89	B
70-79	C
60-69	D
<60	F