

ECE/BIOM 526

Biological Physics- Syllabus SPRING 2012

Instructor: Diego Krapf
krapf@engr.colostate.edu
<http://www.engr.colostate.edu/~krapf/biophysics/>

Office: ERC A111

Phone: (970) 491-4255

Meeting time: Tuesdays and Thursdays, 9:30 - 10:45, Engineering E202

Course website: RamCT

Office hours: contact me by email to schedule office hours.

Text: “Biological Physics: Energy, Information, Life” by P. Nelson, Freeman, 2008

Recommended reading material: 1. “Molecular Cell Biology” H. Lodish et al. 6/e (Freeman, 2007); 2. “Molecular Biology of the Cell”, B. Alberts et. al 4/e (2002)

Description: This course will introduce the field of biological physics by examining living systems quantitatively. The course is intended to train a broad student audience in mathematical and physical modeling of biological systems. All the topics covered in the syllabus will be rigorously rooted in quantitative experimental data. Emphasis will be given to understanding the techniques and instrumentation used to investigate biological systems at the nanoscale.

Topics to be covered:

- Cell components. Length, force and time scales in biophysics. Wk 1
- DNA packaging. DNA elasticity. Wk 2-3
- Brownian motion. Diffusion. Wk 4-5
- Electrophoresis. Nernst-Planck equation. Wk 6
- Transport at low Reynolds numbers. Wk 7
- Entropic forces. Wk 8
- Charged surfaces and their counterion clouds. Electroosmosis. Wk 9
- Molecular motors. Wk 10-11
- Membrane potentials. Ion channels. Wk 12-13
- Nerve impulses. Wk 14-15

We will not cover chapters 3 and 8 of the textbook.

Chapter 3 deals with probability and statistics. If you do not have a good background in these areas it is highly recommended that you read this chapter.

Method of evaluation: One midterm: 20%, Final: 50%, Homeworks (8 best homeworks): 20%, Quizzes (8 best): 10%

A+ = 98-100

A = 94-97

A- = 90-93

B+ = 87-89

B = 84-87

B- = 80-83

C+ = 76-79

C = 65-75

D = 50-64

F = 0-49

The University is required to provide reasonable accommodations to students with disabilities, so as not to discriminate on the basis of that disability. Students with disabilities are encouraged to contact the instructors to discuss their individual needs for accommodations. Also, you may visit Resources for Disabled Students: <http://rds.colostate.edu/> or call them at (970) 491-6385.

The course will adhere to the **Academic Integrity Policy** of the CSU General Catalog (page 7, <http://www.catalog.colostate.edu/FrontPDF/1.6POLICIES1112f.pdf>) and the Student Conduct Code (<http://www.conflictresolution.colostate.edu/conduct-code>)