

PHYSICS 400 Molecular and Cellular Biophysics

Fall 2011

Instructor: Prof. Will Loinaz and Prof. Ashley Carter

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Office Hrs: Prof. Carter - TTh 11:30 – 12:00 pm, MWF 11:00 – 12:00 pm
Prof. Loinaz - TBA

These are official office hours, but you should feel free to stop by at any time. Also, you can make an appointment for a more convenient time.

Class Hours:

Lecture is Tuesday and Thursday at 10:00 - 11:30 am, SMUDD Room 206
There will also be a problem session. It will be announced.

Catalog Description:

(Offered as PHYS 400, BIOL 400, BCBP 400, and CHEM 400.) How do the physical laws that dominate our lives change at the small length and energy scales of individual molecules? What design principles break down at the sub-cellular level and what new chemistry and physics becomes important? We will answer these questions by looking at bio-molecules, cellular substructures, and control mechanisms that work effectively in the microscopic world. How can we understand both the static and dynamic shape of proteins using the laws of thermodynamics and kinetics? How has the basic understanding of the smallest molecular motor in the world, ATP synthase, changed our understanding of friction and torque? We will explore new technologies, such as atomic force and single molecule microscopy that have allowed research into these areas. This course will address topics in each of the three major divisions of Biophysics: bio-molecular structure, biophysical techniques, and biological mechanisms.

Requisite: CHEM 161, PHYS 116/123, PHYS 117/124, BIOL 191 or evidence of equivalent coverage in pre-collegiate courses.

Text and Materials:

- 1) **Text:** *An Introduction to Biophysics* by Thomas Nordlund. Text is available at Amherst Books.
- 2) **Lecture Materials:** For lectures you will need to bring a scientific calculator, a pen, and a notebook/binder for notes or to hold handouts.

Grading:

Your grade for the course will be based on your homework and exam grades. During lectures you will also be expected to participate during lecture.

Homework:

In addition to reading roughly a chapter per week, you will be expected to complete one homework assignment per week for roughly 10 assignments. Homework assignments are primarily a teaching exercise to prepare you for the exams, but they will be worth 30-40% of the grade. Homework will be due on Thursday night. We encourage you to collaborate on the homework assignments, however copying is a violation of the code of intellectual responsibility. If you have any doubts please ask the instructor. Late policy: Late homework will be given a 50% penalty for up to 3 days late. Extensions will be granted on a case by case basis, but we will expect a darn good reason.

Exams:

There will be two exams during the course. Times are tentative. We will make changes if needed. Exam grades will be roughly 60-70% of your grade.

Midterm: Ch. 1-7, Wednesday, October 19, 7-9 pm.

Final Exam: Ch. 1-7 and 12-17, Registrar scheduled.

INTELLECTUAL RESPONSIBILITY:

Homework – You are encouraged to work with other students on your homework, but what you turn in must represent your own understanding of the problems. Copying a solution from another student or from a published source will be considered a violation of intellectual responsibility. This rule applies to solutions posted on the internet as well.

Exams – You will not be allowed to collaborate with anyone during an exam. What you submit must be entirely your own work.