Physical Biochemistry
Course Syllabus
BCHM 485: TuTh, 9:30-10:45am, CHE 2136 (Chem Engineering Bldg)
Spring 2005

Prof.: David Fushman
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e-mail: fushman@umd.edu (much preferred to phone), Please restrict telephone inquiries to
office hour times, except in “emergencies”. Email is welcome anytime.
Office hours: Wednesday, 2:00-3:30pm

Teaching Assistant: Aydin Haririnia
Office hours: Tuesday & Thursday, 1-2pm, Room 1109, Agriculture/Life Sciences Surge Bldg
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Course Description

This is a section two of the Physical Chemistry course designed to cover topics of particular
relevance to problems and applications of physical methods to modern biochemistry. There is
significant emphasis on various experimental techniques: sedimentation, chromatography,
electrophoresis, relaxation kinetics, a broad range of spectroscopies applied to biomolecules, and
on methods for biomolecular structure determination.

Mathematical level required: physical chemistry is a rigorous quantitative discipline. Many of
the problems and methods discussed throughout the course require familiarity with the following
mathematical techniques: logarithms and exponentials, trigonometric functions, complex
numbers and complex functions, basic vector analysis, matrix algebra (including determinants
and eigenvalue equations), derivation and integration techniques, power series and Taylor
expansions, differential equations.

Textbooks:
Required: (A copy of the required textbooks will be available in the Chemistry Library)
(2) David Eisenberg, Donald Crothers, Physical Chemistry with Applications to the Life

Additional recommended sources: Principles of Physical Biochemistry by van Holde, Johnson
& Ho; Molecular Driving Forces by Dill & Bromberg; Biophysical Chemistry by Cantor &
Schimmel.

There is a course homepage at:

http://gandalf.umd.edu/BCHM485/
where you will find a copy of the syllabus, regular homework and reading assignments, exam solutions and statistics, and extra material. Some of these materials will be posted as we proceed with the course. You are welcome to email your questions and comments. I do not guarantee individual responses, but errors or common points of confusion will be addressed in class.

**Course Outline**
The exact order of topics and the number of lectures on each may change.

1. **Quantum Mechanics.** (5.5 weeks)

2. **Statistical thermodynamics.** (3 weeks)

3. **Molecular motion.** (1.5 weeks)

3. **Chemical and biochemical kinetics.** (2.5 weeks)

4. **Diffraction, Scattering.** (1 week)
   X-ray, electron, neutron diffraction, crystal structures, space symmetry groups. Methods for biomolecular structure determination.

Examinations will be given on the following dates (These exam dates are firm):

- I Tuesday, March 8
- II Thursday, April 28
- Final exam: **Tuesday May 17, 8:00-10:00 am**

**Grading Policies.** Each exam during the semester will be worth 100 points and the final exam will be 150 points. Exams during the semester will include only the material covered since the previous exam but will inevitably draw on information from earlier in the semester. The final will cover the entire course material. The exams will include material covered in the lectures and in the corresponding sections of the textbook. Ten 10-min quizzes worth 10 points each will be given at the end of the lecture every Tuesday, except for the week of a midterm exam and not on the first Tuesday (Feb 1 and Mar 29) after the winter and spring breaks. These quizzes are designed to encourage your regular reading of the material. In addition, problem sets will be
given as homework regularly: these are optional, however, completing them is likely to be very helpful in your preparation for the exams. All mid-term exams will be 75 min long and will be given in the lecture room (CHE 2136). You will be allowed to use calculators for computation only.

Your final letter grade will be based on your total score on all quizzes, on the two mid-term exams, and on the final exam (maximum 450 points). Grading will be done on a curve based on the overall distribution of the class scores. You will be guaranteed an A if your total score is 85% or better, a B if it is 60% or better and a C if it is above 30% of the class. In addition, students who scored ≥ 400 points will be guaranteed an A, and those with ≥ 200 points will be guaranteed a passing grade, independent of the curve. Final grading will then be done using the “+/-” grading system, as follows. The cut-offs for A, B, etc grades will be determined first. Then each letter-range will be divided into three groups: all students whose scores are in the upper third of, e.g. B range will be given a B+, those in the middle will receive a B, and the lower third will receive a B-, and so on.

Regrades.
If you think a mistake has been made in grading your work, you must submit it to me for regrading no later than one week after the date on which the work was returned to the class, with a written explanation of your reasons for desiring a regrade. The entire exam is subject to regrading, which often decreases the total score. After that, the grade will be considered final. Arithmetic errors in the grading can be corrected without regrading.

Make-up exam policy.
Do not miss any of the exams or quizzes. If you miss an exam, you will have a score of “0” on the exam until it is made up. Only students with legitimate excuses as determined by the University policy will be given a make-up exam. For a make-up exam you will need written documentation of the emergency or illness. A missed quiz will be assigned a score of “0”; there will be no make-up for a missed quiz.

It is your responsibility to contact me promptly to schedule a make-up exam. In any case, YOU MUST CONTACT ME WITHIN 24 HOURS OF MISSING AN EXAM.

All students must take the final exam.
Please notify me as soon as possible if you know ahead of time that you will miss an exam for any reason, including previously scheduled events, religious observances, etc. According to the University policy you must tell me no later than February 8 (the last day of schedule adjustment period).

Teaching assistance.
The teaching assistant for this course is Mr. Aydin Haririnia, an advanced graduate student in the Biochemistry program.
We are happy to help you with the material during office hours. If necessary, we will arrange other times to meet. A review session will be scheduled before the final exam. If you believe a mistake has been made in lecture (I guarantee this will happen), please speak up or inform me afterward. Please ask questions in lecture if something is not clear.
Academic integrity.
From the Code of Academic Integrity, University of Maryland, College Park:
“The University is an academic community. Its fundamental purpose is the pursuit of knowledge… Essential to the fundamental purpose of the University is the commitment to the principles of truth and academic honesty. Accordingly, The Code of Academic Integrity is designed to ensure that the principle of academic honesty is upheld…”

The Code of Academic Integrity is available on the University web site at http://www.inform.umd.edu/CampusInfo/Departments/JPO/code_acinteg2a.html and is printed in the current Schedule of Classes. Students are responsible for knowing and understanding the content of the Code.

There will be zero tolerance to violations of the Code of Academic Integrity. Suspected cases will be reported immediately to the appropriate authorities. The standard penalty for violations of the Code of Academic Integrity is a grade of “XF”

Specific guidelines relevant to this course include:
1. All work that you submit for grading in this course (i.e. examinations) must be the original work of the student whose name is on the work.
2. You may use a calculator for most in-class exams, but only for computation. Any other use is a violation of the University’s Code of Academic Integrity.
3. Other actions such as falsification of excuses for missed exams or submission of an altered, graded examination for regrading, etc., are also violations of the Code of Academic Integrity or the Code of Student Conduct.

Honor Pledge
The University of Maryland Honor Pledge reads:
"I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination."

The Pledge statement should be handwritten and signed on the front cover of all examination papers submitted for evaluation in this course. Students who fail to write and sign the Pledge will be asked to confer with the instructor. Further information about the Honor Pledge can be found on the University web page:
http://www.inform.umd.edu/CampusInfo/Departments/JPO/AI/honorpledge/