



CH 247.53. Biophysical Chemistry
Chemistry Department, School of Science and Engineering
1st Semester, SY 2010-2011
T-F, 6:00-8:00 pm, Ch-205
admu_Ch247_53@yahoogroups.com
Dr. Fabian M. Dayrit *fdayrit at ateneo.edu*
Dr. Richard B. Gross *rbgross at gmail.com*
Dr. Nina Rosario L. Rojas *nrojas at ateneo.edu*

Course Objectives

The student is expected to further his understanding of physical chemical principles in the context of their applications to biological systems. The course shall generally cover the following: (a) a review a thermodynamics and statistical thermodynamics, and chemical kinetics as applied to biochemical processes; (b) a survey of methodologies used in studying biomolecular structure and function such as X-ray diffraction, NMR, Mass spectrometry, optical techniques (e.g., circular dichroism, fluorescence spectroscopy, surface plasmon, microscopy, etc.) and other biophysical techniques (e. g., electrophoresis, chromatography, centrifugation, etc.); and (c) an overview of some case studies wherein an integrative biophysical approach is used to understand the observed biochemical phenomenon at different hierarchichal levels of molecular/cellular organization (e. g., membrane transport phenomena, protein folding problem, neural signalling, actin-myosin system, light-harvesting protein, etc.).

Prerequisites

Ch 45/46/47/48 and Ch 151 or equivalent

References

There is no prescribed textbook for the course, some references are:

- Bergethon, P. R. *The Physical Basis of Biochemistry: The Foundations of Molecular Biophysics* (Springer, 1998).
- Cotterill, R. *Biophysics: An Introduction* (Wiley, 2003).
- Cooper, A. *Biophysical Chemistry* (Tutorial Chemistry Texts). (Royal Society of Chemistry, 2004)
- Nelson, P. *Biological Physics: Energy, Information, Life* (Freeman, 2004).
- Tinoco, I. K. Jr., K. Sauer, and J. C. Wang. *Physical Chemistry: Principles and Applications in Biological Sciences* (Prentice Hall, 1995).
- Haynie, D. *Biological Thermodynamics* (Cambridge, 2001).
- Journal articles.

Course Outline and Timeframe (more detailed schedule will be posted on the web as we go along): note: class sessions are 2-hour meetings unless otherwise specified.

Dates	Topics	Instructor
T, 15 Jun	Introduction to the course and assignment of report requirement	Dr. Rojas
T, Jul 6	Macromolecular structure and X-ray diffraction (special lecture)	Dr. Eduardo A. Padlan
T, July 13-F, Aug 6	Review of key ideas in Physical Chemistry Introduction to Biophysics Membrane proteins: isolation and biophysical characterization (UV-vis spectroscopy, sedimentation, fluorescence spectroscopy and transport phenomena)	Dr. Gross
T, Aug 10-F, Sep 3	Globular proteins: Separation by charge and size: electrophoresis, chromatography, and sedimentation/centrifugation Globular proteins and the protein folding problem	Dr. Rojas
T, Sep 7-F, Oct 1	NMR and mass spectrometry of biological molecules	Dr. Dayrit
T, Oct 5 onwards	Oral presentations and final requirements	

Course Requirements

ITEM	Points
Dr. Gross's unit	100 points
Dr. Rojas's unit	100 points
Dr. Dayrit's unit	100 points
Final oral presentation	200 points
TOTAL	500 points

Grading System

100% ≥ A ≥ 93% > A- ≥ 86% > B+ ≥ 79% > B ≥ 72% > B- (no credit) ≥ 65% > C (fail)

Class Policies

Course Methodology: The student is expected to have read the assigned chapters for the week. Thus, the classroom hours shall be devoted to review of the readings and on solutions of the problem sets. Problem sets shall be assigned on a take-home or in-class basis. There shall also be homework problems and tutorials to be posted on the class web site (see address below).

Academic Integrity: Attendance will be checked regularly. Students with more than 6 absences, excused or unexcused, will be automatically withdrawn from the course (W). The Ateneo de Manila University upholds an Honor Code whereby each student shall do independent work and shall not obtain extra-ordinary help on class work that will have bearing on his/her true grade.

Problem sets (take-home or in-class) shall be the independent work of each student.

Dishonorable conduct shall be grounds for failure in the course or expulsion from the university.

Standard policies of the Graduate School apply.

Office Location

Dr. Dayrit: NCIC or SOSE Dean's Office, 3/F SEC A

Dr. Gross: Ch-115

Dr. Rojas: Ch-115

Online Class Sites

Dr. Dayrit:

Dr. Gross:

Dr. Rojas: <http://nrojas.wordpress.com>