Instructor: Professor Zimei Bu
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  phone: 212-650-8169
  Marshak Science Building, Rooms 1336 (office); 1305 (lab)

Hours:
  Classes: Tuesday, Thursday 9:30 - 10:45 AM
  Recitation: Tuesday 11:00-11:50 AM
  Lab: Tuesday and/or Thursday 2:00 - 5:50 PM
  Office Hours: Thursday 11:00 AM-12:00 PM

Course description and objectives:
This course will review the important concepts that are taught in chemistry, biochemistry and physical chemistry I. These concepts will be applied to understand the structure, thermodynamics, motion, and kinetics of biological macromolecules. Students will learn the chemical and physical principles that govern the structure, folding, and assembly of biomolecules. In addition, this course will introduce important theories and techniques that are used to determine the structure and function of biological macromolecules. Some of these simple principles and techniques will be put in practice in the lab.

The pre-requisites for this course are: CHEM 243, 263, and 330. A grade of C or higher is required in the prerequisite course.

Test books:
Required: Physical chemistry for the biological sciences, Gordon G. Hammes
Recommended: Principles of physical biochemistry / Kensal E. van Holde, W. Curtis Johnson, P. Shing Ho., 2nd ed. This is an advanced textbook for the graduate level courses.

Grading:
Grades will be based on:
  1. Tests (three tests; 25%)
  2. lab (15%)
  3. mid-term exam (25%)
  4. final exam (25%)
  5. Recitation (10%). To encourage class and recitation participation (attendance, questions, comments, etc.), a bonus of 5% will be added to your final grade based on your participation and presentation.

The conversion from percentage to letter grades is done as follows:

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<th>Percentage</th>
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Topics covered
Part I. Physical chemistry concepts, principles, and applications in biology
1. Scope of physical biochemistry; structure, conformation, folding, and assembly of biological molecules and macromolecules
2. Forces affecting the structure and conformation of biological macromolecules, and their interactions
3. Thermodynamics and applications in biology
4. Hydrodynamics and applications in biology
5. Kinetics and applications in biology

Part II. Biophysical Techniques
1. Calorimetry (DSC, ITC)
2. Surface plasmon resonance, analytical ultracentrifugation
3. Spectroscopy: Adsorption Spectroscopy; Fluorescence spectroscopy; fluorescence resonance energy transfer (FRET); Fluorescence depolarization
4. Scattering: Light scattering; X-ray scattering; and neutron scattering
5. X-ray diffraction, X-ray crystallography
6. Nuclear magnetic resonance spectroscopy.

Course outcomes: After completing this course, students will have an overview of the scope of molecular biophysics. Students will be able to apply the concepts and principles of physical chemistry to study and to analyze the interactions and reactions of biological macromolecules. Students will also master some of the important techniques to characterize the structure and function of biological macromolecules.

Statement on Academic Integrity
The CCNY policy on academic integrity will be followed in this course. The document can be found through the CCNY website by clicking on Current Students → Academic Services → Policy on Academic Integrity. All students must read the details regarding plagiarism and cheating in order to be familiar with the rules of the college. Cases where academic integrity is compromised will be prosecuted according to these rules. In addition, the Policy of Academic Integrity can be found in the Undergraduate Bulletin 2007-2009 in Appendix B.3 on page 312 or online at http://www1.ccny.cuny.edu/current/integrity.cfm.

Disability
In compliance with CCNY policy and equal access laws, appropriate academic accommodations are offered for students with disabilities. Students must first register with The AccessAbility Center for reasonable academic accommodations. The AccessAbility Center is located in the North Academic Center, Rm. 1/218. Tel: (212) 650-5913. Under The Americans with Disability Act, an individual with a disability is a person who has a physical or mental impairment that substantially limits one or more major life activities. If you have any such issues, I encourage you to visit the AccessAbility Center to determine which services may be appropriate for you.

Courtesy
Noise and excessive chatter, eating, drinking, or use of unauthorized electronic equipment is not allowed in the classroom.
**Attendance**

Students are expected to attend every class session of each course in which they are enrolled and to be on time. An instructor has the right to drop a student from a course for excessive absence. Students are advised to determine the instructor’s policy at the first class session. They should note that an instructor may treat lateness as equivalent to absence. (No distinction is made between excused and unexcused absences.) Each instructor retains the right to establish his or her own policy, but students should be guided by the following general College policy: In courses designated as clinical, performance, laboratory or field work courses, the limit on absences is established by the individual instructor. For all other courses, the number of hours absent may not exceed twice the number of contact hours the course meets per week. When a student is dropped for excessive absence, the Registrar will enter the grade of WU.
Weekly Schedule:
1/28  General Introduction
1/30  Biological macromolecules
2/04  Biological macromolecules
2/06  Thermodynamics and applications (basic principles, review)
2/11  Thermodynamics and applications (application)
2/13  Test 1
2/18  Hydrodynamics and applications (principles)
2/20  Hydrodynamics and applications (applications)
2/25  Kinetics and applications
2/27  Kinetics and applications
3/04  Test 2
3/06  traveling to ORNL, no class
3/11  Ligand binding
3/13  Midterm
3/18  Experimental data and error analysis
3/20  Wave functions and scattering
3/25  Scattering techniques
3/27  Scattering techniques
4/01  Spectroscopy (theories)
4/03  Spectroscopy (uv/vis)
4/08  Spectroscopy (fluorescence)
4/10  Test 3
4/14-4/22 Spring Recess
4/24  Surface plasmon resonance/titration calorimetry
4/29  Surface plasmon resonance/titration calorimetry
5/01  Diffraction
5/06  X-ray diffraction and crystallography
5/08  NMR
5/13  NMR spectroscopy
5/15  Reading Day
5/20  Final exam