

BIOL 4520: Molecular Biophysics (Fall 2021, CRN: 85019)

Class time and place: 3:30 pm - 4:45 pm, Tue and Thu, Bailey Science Center Room 2202

Instructor: Dr. Jonghoon Kang (Office 2217; Phone 2293337140; E-mail jkang@valdosta.edu)

Office hours: Tuesday and Thursday 2:00 PM – 3:30 PM (or by appointment)

Communication: You may see me during my office hours or send me emails from your Valdosta email account. We may discuss course-related issues and you may ask questions on course material during my office hours. So take advantage of my office hours.

Course description: Introduction to thermodynamics, kinetics and their applications to biological systems. 3 Hours. Additional description for BIOL 6520: Students are expected to enhance their understanding of current biological literature that contains biophysical concepts covered in this course.

Prerequisite: For BIOL 4520: MATH 2261, BIOL 1107, 1107L, BIOL 1108, 1108L, BIOL 3200, BIOL 3250, CHEM 1211, CHEM 1211L, CHEM 1212, CHEM 1212L, and either PHYS 1111K or PHYS 2211K or consent of the instructor. For BIOL 6520: Admission into the graduate program or permission of the instructor.

Required materials: *Physical Chemistry for the Biosciences*, by Raymond Chang from University Science Books (ISBN-13: 978-1891389337)

Course objectives: We will learn how biological phenomena can be understood, interpreted, and analyzed using mathematics, physics, and chemistry. The knowledge and techniques that students learn from this course will prepare them in their advanced research in biomedical science or related fields. This course should be *directly* useful for students who will take standard tests such as MCAT and DAT, as the topics of this course are the major components in those tests. (You can check the validity of this statement by going to their homepage and verifying their exam contents.) You don't remember the url of their homepage? Not a problem. Just Google it and you will see it. Often time I see students worry about their math skills for those tests. Math skills that you learn from this course should resolve your concerns if you enjoy the course and work hard.

Specific goals

- Describe the basic terminology used in thermodynamics and kinetics
- Perform basic manipulations of equations of thermodynamics and kinetics
- Interpret biochemical phenomena in terms of thermodynamics and kinetics.
- Recognize the importance of physics and chemistry in the biological sciences.

Course assignments

- Attending class and taking notes
- Read the textbook and work on the problems discussed in class
- Work on extra problem sets for each chapter that will be distributed. The problem sets will give you a good idea on the format of the exams. Your work won't be graded, but the assignments may be reviewed in class (see the schedule).
- Three in-class exams and one open-notebook final exam

Grading criteria

BIOL 4520 grade = Three in-class exams (100 pts each) + One Final (200 pts) = 500

BIOL 6520 grade = BIOL 4520 grade + Term paper (200 pts) = 700

A \geq 90%; B \geq 80%; C \geq 60%; D \geq 40%; F < 40%

Course policies: If you miss any assignment due to medical or family-related emergency you can have make-up assignments as long as you prove the valid reason of your absence (doctor's notes). Otherwise no make-up tests! And you will get a zero point for the missing part.

Accommodations Statement: Students with documented disabilities who are experiencing barriers in this course may contact the Access Office for assistance in determining and implementing reasonable accommodations. The access Office is located in Farbar Hall. The phone numbers are 229-245-2498 (V), 229-375-5871. For more information, please visit VSU's Access Office or email: access@valdosta.edu.

Title IX Statement: Valdosta State University (VSU) is committed to creating a diverse and inclusive work and learning environment free from discrimination and harassment. VSU is dedicated to creating an environment where all campus community members feel valued, respected, and included. Valdosta State University prohibits discrimination on the basis of race, color, ethnicity, national origin, sex (including sexual harassment and sexual violence), sexual orientation, gender identity, religion, age, disability, genetic information, or veteran status, in the University's programs and activities as required by applicable laws and regulations such as Title IX. The individual designated with responsibility for coordination of compliance efforts and receipt of inquiries concerning nondiscrimination policies is the University's Interim Title IX Coordinator: Ms. Selenseia Holmes, titleix@valdosta.edu, Student Union, Suite 3106, Valdosta State University, Valdosta, Georgia 31698, 229-333-5941. To file a report (not make an inquiry) please visit https://cm.maxient.com/reportingform.php?ValdostaStateUniv&layout_id=7.

Classroom Policies

- Attendance and tardiness: Any absence policy should conform to the university policy. University Attendance Policy from the VSU catalogue:
"The University expects that all students shall regularly attend all scheduled class meetings held for instruction or examination. When students are to be absent from class, they should immediately contact the instructor. A student who misses more than 20% of the scheduled classes of a course will be subject to receive a failing grade in the course."
- Academic Integrity: You know that cheating is a bad thing to do. Students caught cheating will receive a grade of F for the test in question and will be reported to the Dean of Students. You are expected to follow VSU's Academic Integrity Code. From VSU's Academic Integrity Code (the full code is available at <https://www.valdosta.edu/academics/academic-affairs/academic-honesty-policies-and-procedures.php>)
"Academic integrity is the responsibility of all VSU faculty and students. Faculty members should promote academic integrity by including clear instruction on the components of academic integrity and clearly defining the penalties for cheating and plagiarism in their course syllabi. Students are responsible for knowing and abiding by the Academic Integrity Policy as set forth in the Student Code of Conduct and the faculty members' syllabi. All students are expected to do their own work and to uphold a high standard of academic ethics."
- Classroom demeanor or conduct: Every student should make the lecture a comfortable and enjoyable learning experience. Late entry to the class room or leaving early are not desirable behaviors. Common sense should be practiced and expected.
- Communication: All VSU-related correspondence should be conducted via VSU email addresses for both student and instructor.

Additional Information (at instructor's discretion)

- Expectations for competencies such as writing, technology skills, or performance: Students should be able to describe biological phenomena at the molecular and cellular level in terms of physics and chemistry.
- Instructional philosophy: I believe reading one book ten times is better than reading ten books one time each. This is the case for this course. Students are encouraged to practice all the exercise and examples in the textbook ten times.
- Strategies used to support learning: Students should take advantage of my office hours. Studying as a group (study group) should be a good idea.

Schedule of Activities or Assignments, including university -scheduled final exam time (all schedule is tentative and may be subject to change)

August 19: Registration for fall 2021 ends (11:59pm)

October 14: Withdrawal Deadline for full-term VSU courses

Date	Chapter	Topics
8/17 – 8/19	1, 2	Introduction; Properties of Gases
8/24 – 8/26	3	The First Law of Thermodynamics
8/31 – 9/2	3, 4	The First Law of Thermodynamics The Second Law of Thermodynamics
9/7 – 9/9	4	The Second Law of Thermodynamics
9/14 – 9/16		Review and Exam 1 (100 pts)
9/21 – 9/23	5	Solutions
9/28 – 9/30	5, 6	Solutions; Chemical Equilibrium
10/5 – 10/7	6	Chemical Equilibrium
10/14	6	Chemical Equilibrium
10/19 – 10/21		Review and Exam 2 (100 pts)
10/26 – 10/28	7	Electrochemistry
11/2 – 11/ 4	7, 8	Electrochemistry; Acids and Bases
11/9 – 11/11	9	Chemical Kinetics
11/16 – 11/18	9	Chemical Kinetics and Review
11/23		Exam 3 (100 pts)
11/30 – 12/2	10	Enzyme Kinetics and Review
12/10		Open-Notebook Final (200 pts) 2:45pm-4:45pm