

BIOL 4520/6520: Molecular Biophysics (Fall 2023, CRN: 86222, 86223)

Class time and place: 3:30 pm - 4:45 pm, Tue and Thu, Bailey Science Center Room 2022

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

Office hours: Monday 1:00 PM – 4:00 PM / Tuesday 1:00 PM – 3:00 PM (or by appointment by email)

Communication: You may see me during my office hours or send me emails from your **Valdosta email account** not through BlazeView email. 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), Pens or Pencils, Calculator, and **Paper-based regular notebooks**

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, DAT, PCAT, or OAT, 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 much of 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 mathematics, 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.
- Three in-class exams and one 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 (100 pts) = 600

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.

All exams are open-notebook exams. You can use your own handwritten notebooks. You are not allowed to use any other materials such as printed or copied materials, laptops, or your cellphone during exam. In the lab exam, you can use anything including the internet, but no communications with other people.

Required Accommodations Statement:

Students with disabilities who are experiencing barriers in this course may contact the Access Office (<https://www.valdosta.edu/student/disability/>) for assistance in determining and implementing reasonable accommodations. The Access Office is located in University Center Room 4136 Entrance 5. 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. To request reasonable accommodations for pregnancy and childbirth, contact Ms. Myia Miller, Title IX Compliance Officer, at maburden@valdosta.edu. Please note, you will be required to provide documentation from an appropriately licensed medical professional indicating the requested accommodations are medically necessary.

Required Non-Discrimination and Title IX Statement:

Valdosta State University (VSU) upholds all applicable laws and policies regarding discrimination on the basis of race, color, sex (including sexual harassment and pregnancy), sexual orientation, gender identity or expression, national origin, religion, age, veteran status, political affiliation, or disability. The University prohibits specific forms of behavior that violate Title IX of the Education Amendments of 1972. Title IX of the Education Amendments of 1972 prohibits discrimination on the basis of sex in education programs and activities that receive federal funding. VSU considers sex discrimination in any form to be a serious offense. Title IX refers to all forms of sex discrimination committed against others, including but not limited to: sexual harassment, sexual assault, sexual misconduct, and sexual violence by other employees, students or third parties and gender inequity or unfair treatment based on an individual's sex/gender. The designated Title IX Coordinator for VSU is Ms. Selenseia Holmes. To view the full policy or to report an incident visit: <https://www.valdosta.edu/administration/student-affairs/title-ix/>

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. Students are responsible for knowing and abiding by the Academic Integrity Policy as set forth in the Student Code of Conduct and this syllabus. All students are expected to do their own work and to uphold a high standard of academic ethics. Any violations of this policy may result in the academic penalties outlined in the syllabus and may also be referred to Student Affairs for further disciplinary action.”

- 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 17: Registration for fall 2023 ends (11:59pm)

October 12: Withdrawal Deadline for full-term VSU courses

Week of	Chapter	Topics
8/15	1	Introduction;
8/17	2	Properties of Gases
8/22	2	Properties of Gases
8/24	3	The First Law of Thermodynamics
8/29	3	The First Law of Thermodynamics;
8/31	4	The Second Law of Thermodynamics
9/5	4	The Second Law of Thermodynamics
9/7		Review or Catch-up
9/12	1 – 4	Exam 1 (100 pts)
9/14	5	Solutions
9/19	5	Solutions
9/21	5	Solutions
9/26	6	Chemical Equilibrium

9/28	6	Chemical Equilibrium
10/3	6	Chemical Equilibrium
10/5	6	Chemical Equilibrium
10/10		Fall break
10/12		Review or Catch-up
10/17	5 – 6	Exam 2 (100 pts)
10/19	7	Electrochemistry
10/24	7	Electrochemistry
10/26	7	Electrochemistry
10/31	7	Electrochemistry
11/2	8	Acids and Bases
11/7	9	Chemical Kinetics
11/9	9	Chemical Kinetics
11/14	9	Chemical Kinetics
11/16		Review or Catch-up
11/21	7 – 9	Exam 3 (100 pts)
11/23		Thanksgiving
11/28	10	Enzyme Kinetics
11/30	10	Enzyme Kinetics
12/8	1 – 10	Final (200 pts) 2:45pm-4:45pm