Principles of Biophysical Chemistry 11:115:409 Spring

Course meeting days/time and location will be shared as the semester begins. Students may also look at the class schedule.

CONTACT INFORMATION:

Instructor: Dr. Natalya Voloshchuk
Email: natalya.voloshchuk@ rutgers.edu
Office: room 129, Lipman Hall

COURSE WEBSITE, RESOURCES AND MATERIALS:

The course has required textbook: Physical chemistry for life sciences, Peter Atkins and Julio De Paula, 2nd ed., 2011, W.H. Freeman and Company, New York, ISBN-13: 978-1-4292-3114-5. Reading assignments come primarily from the textbook. Additional sources will be used when necessary. Weekly presentations and other relevant materials are organized on the course Canvas site in the weekly modules. To access the course, please visit https://tlt.rutgers.edu/canvas. For more information about course access, support or technological assistance with the Canvas site contact the Canvas Help Desk via email at 877-361-1134 immediately upon having an issue. To protect yourself from possibly missing a deadline because of a technical issue, we ask that you work in advance of deadlines to ensure timely completion of assignments. Please have a backup plan in place in case your computer or your internet go down during the semester as make-ups will not be given due to technical difficulties.

COURSE DESCRIPTION:

The course focuses on the application of physical theory and selected experimental methods to biochemical processes.

LEARNING GOALS:

1) state basic principles of thermodynamics, kinetics, and quantum chemistry
2) solve problems using principles of thermodynamics, kinetics, and quantum chemistry
3) apply principles of thermodynamics, kinetics, and quantum chemistry to characterization of biomolecular structures and functions

RESPONSIBILITIES & ASSESSMENT:

To learn and succeed in the course you must invest time working with the course content. There are four examinations. All examinations are open book / open notes. The exams each comprise 15% of the grade. Problems for each topic will be formally assigned and the average of problem sets will be worth 40% of your grade. Students are expected to carry out problems like the homework assignments on the exams.

COURSE GRADING SCALE

Grade	Range
A	89 – 100
B+	85 – 88
B	79 – 84
C+	75 – 78
C	69 – 74
D	59 – 68
F	Below 59

COURSE GRADE IS CALCULATED AS FOLLOWS:

Total	100%
Problem sets	40%
Exams	60%

TECHNOLOGY REQUIREMENTS

Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Canvas

Technology skills necessary for this specific course

- Live web conferencing using Zoom
- How to convert handwritten work to pdf

Required Equipment

- Computer: current Mac or PC with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

Required Software

- Microsoft Word or equivalent
- Microsoft Excel or equivalent
- Microsoft PowerPoint or equivalent

STUDENT PARTICIPATION EXPECTATIONS

Because this is an online course, your attendance is based on your online activity and participation. The following is a summary of everyone's expected participation:

- **Logging in**:

  Be sure you are logging in to the course in Canvas each week, including weeks with holidays or weeks with minimal online course activity. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, please contact Dr. Voloshchuk at natalya.voloshchuk@rutgers.edu as soon as possible.

- **Time Commitment**

  To be successful in this course, you should plan to dedicate approximately 8-10 hours per week. General rule is one should plan to dedicate approximately 3hrs outside the class per credit of the class (9 hours for this class).

- **Synchronous sessions**: **EXPECTED**

Your attendance for all live, scheduled events for the course, including office hours, is expected but not required. For live presentations, a recording will be provided. Students are expected to attend every class meeting and participate in classroom discussions.

- **Missing an assignment/deadline: LATE WORK IS NOT ACCEPTED**

  If you have missed an assessment due to sickness or any other reason, please contact Dr. Voloshchuk at natalya.voloshchuk@rutgers.edu as soon as possible.

DISCUSSION AND COMMUNICATION GUIDELINES

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style**: While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. Informality (including an occasional emoticon) is fine for non-academic topics. Please also refrain from using all CAPITAL LETTERS, as this is often interpreted as shouting.
- **Tone and civility**: Let us maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm does not always come across online. Treat your instructor and fellow students with respect at all times, and in all communications.
- **Citing your sources**: When we have academic discussions, please cite your sources to back up what you say. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.)
- **Backing up your work**: Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Canvas. Please keep a copy of this for your records in case it is required later.

INSTRUCTOR'S FEEDBACK AND RESPONSE TIME

We are providing the following list to give you an idea of our intended availability throughout the course. (Remember that you can email help@canvas.rutgers.edu or call 848-932-4702 if you have a technical problem.)

- Grading and Feedback
  For problem sets and exams you can generally expect feedback within 7 days.
- E-mail
  We will reply to e-mails within 24 hours on school days.
- Discussion Board
  We will check and reply to messages in the discussions every 24 hours on weeknights.
- Office hours by appointment and arranged

LECTURE AND EXAM SCHEDULE*:

date	topic	Reading	Problem sets
Thermodynamics			
1/18/22 1/21/22 1/25/22	The course introduction Thermodynamic terminology The First Law Differential scanning calorimetry (enthalpy of protein unfolding)	Chapter 1	PS 1 (out)
1/28/22	The second law (chapter 2)	Chapter 2	PS 2 (out)
2/1/22 2/4/22	Phase equilibria (chapter 3) Protein folding: Gibbs energy, enthalpy, entropy	Chapter 3	PS 1 (due) PS 2 (due)
2/8/22	Problem solving, review		
2/11/22	EXAM I		
Chemical equilibrium			
2/15/22	Phase equilibria	Chapter 3	
2/18/22	Thermodynamic description of mixtures	Chapter 3	
2/22/22 2/25/22	Chemical equilibria Protein folding: Gibbs energy	Chapter 4	PS 3 (out)
3/1/22 3/4/22	Ion and electron transport Thermodynamics of redox reactions	Chapter 5	PS3 (due)
3/8/22	Problem solving, review		
3/11/22	EXAM II		
Kinetics			
3/22/22	Kinetics. Reaction rates	Chapter 6	PS 4 (out)
3/25/22 3/29/22	Rate laws and mechanisms	Chapter 7	PS 5 (out) PS 4 (due)

4/1/22	Complex mechanisms, thermodynamics vs kinetics in protein folding	Chapter 8	PS 5 (due)
4/5/22	Problem solving, review		
4/8/22	EXAM III		
Intro to Quantum chemistry			
4/12/22 4/15/22	Quantum theory	Chapter 9	PS 6 (out)
4/19/22 4/22/22	Bonding	Chapter 10, 11 selected material	PS 7 (out) PS 6 (due)
4/26/22 4/29/22	Spectroscopy	Chapter 12	PS 7 (due)
Scheduled final exam date and time	Exam IV		

Note the course schedule is subject to change: topics, dates, exams, and problem sets.

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Please follow the procedures outlined at https://ods.rutgers.edu/students/registration-form. Full policies and procedures are at https://ods.rutgers.edu/

ACADEMIC INTEGRITY

In this course you are bound by all the academic standards detailed in Rutgers University Academic Integrity Policy.

The university's policy on Academic Integrity is available at http://academicintegrity.rutgers.edu/academic-integrity-policy. The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.