

Chemistry 333 - Biophysical Chemistry

Fall 2016

Dr. Erin D. Speetzen and Dr. Amanda L. Jonsson

While Dr. Speetzen is the instructor of record for this course, she will be going on maternity leave on or before October 14th. Dr. Jonsson will take over the course until Dr. Speetzen returns on December 16th for the final exam/presentation.

Contact Information

Dr. Speetzen

Office: B-135 (Science)

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Office Hours: Tuesdays 11 a.m. – noon

Wednesdays 11 a.m. – noon

Thursdays 2:00 – 3:00 p.m.

Fridays 1:00 – 2:00 p.m.

Dr. Jonsson

Office: B145 (Science)

E-mail: amanda.jonsson@uwsp.edu

Office Hours:

Meeting Times

Lecture: Tuesday, Thursday, Friday 10 – 10:50 a.m. Room SCI A111

Prerequisites

Math 120, Physics 204 or 250, Chem 365, and accepted biochemistry major or consent of chair.

Course Description

Examine physiochemical principles underlying structure and chemical properties of macromolecules of biological importance, including principles of thermodynamics, equilibrium, kinetics, and dynamics. Includes methods for separation and isolation of macromolecules and their spectroscopic characterization.

Course Outline

This course will consist of three four-week units, each focusing on a different aspect of biophysical chemistry and end with a (roughly) two week unit of in-class projects.

Unit 1: Thermodynamics (Sept 6th – October 4th)

Unit 2: Spectroscopy (October 6th – November 1st)

Unit 3: NMR and X-Ray Crystallography (November 3rd – November 29th)

Projects: December 1 – Dec 14th)

Required Materials

Textbook

Physical Chemistry Principles and Applications in Biological Sciences, 5th Edition, Pearson, 2014. This book is available for rental at the University Bookstore.

Scientific Calculator

Your calculator must be able to do logarithms and exponents. You will not be allowed graphing calculators or any calculator with a QWERTY keyboard. Calculators that meet these requirements can be purchased at the University Bookstore, office supply stores such as Staples or Office Depot, or at other stores such as Target, Walmart, etc. for around \$10.

Optional Materials

3-Ring Binder

In order to better keep track of course materials, some students may find that using a 3 ring binder is beneficial as it allows you to more easily incorporate handouts or figures into your notes.

Laptop Computer

Students wishing to take their notes electronically are more than welcome to do so. One warning, we will be using many mathematical equations and expressions in this course, which may be hard to accurately incorporate into a Word or OneNote document. I reserve the right to ban laptops if students are using them for inappropriate activities.

Course Learning Outcomes

1. Be able to explain the theory behind several spectroscopy techniques that are important in the biosciences.
2. Be able to interpret spectra/data from several experimental techniques that are important in the biosciences to provide molecular-level information about biochemical systems.
3. Be able to explain the fundamental laws of thermodynamics.
4. Be able to apply the theories and equations of thermodynamics to solve problems of chemical and biological interest.
5. Be able to apply knowledge of thermodynamics to explain phenomenon of chemical and biological interest.
6. Be able to explain how NMR and X-ray crystallography are used to determine macromolecular structure.

Preparation/Participation

Before coming to class each day you should read through the assigned reading (rarely more than 10 pages and often with many pictures/tables). I do not expect that you understand all the material before coming to class, however, I do expect that you are familiar enough with the material that we can discuss it without having to stop to define each new word. **Reading physical chemistry texts is really, really hard! Chances are, things won't make much sense until after lecture, but skimming the material before class is a good way to figure out what we will be talking about in class.**

During class I expect that you pay attention (to the best of your abilities), refrain from using technology (ipods, laptops, cell-phones, etc.) in a disruptive way, and participate in class discussions and activities. Participation is not awarded its own grade, but in my experience students who participate in class tend to do better than those who do not.

Make-Up policies

I do not have a formal attendance policy for this course, however in my experience, students who do not come to class do not do well in the course. **Students will be allowed to make up missed exams for the following reasons:** illness (with a doctor's note), family emergency (with some sort of documentation, a funeral announcement, etc.), school sponsored activities (with a coach's/advisor's note), or other worthwhile reasons (visits to graduate schools, etc.) as long as they notify me **in advance**. In the case of an emergency for which advance notice is not possible the student must contact me within **48 hours** of the missed exam to arrange a make-up. Students who miss class on a day on which an assignment is must turn the assignment in early if the absence is foreseeable. **Late assignments will be accepted with a 10% late penalty per business day it is late. In the event of a pop quiz, no make-ups will be provided, no matter how "good" the reason for missing class is.**

Recommended study habits and tips

Physical chemistry (at it's worst) takes everything you hated about physics, calculus, and general chemistry and combines it into one course. At it's best, it allows you to predict and rationalize the behavior of molecules, understand physicochemical phenomenon, and determine structure and function for macromolecules. Many students find physical chemistry to be one of the most challenging courses they take as an undergraduate. Fortunately, there are things you can do to help make your experience a good one.

- Before coming to class each day, review your notes from the previous day. You don't need to spend much time on this (5 – 10 minutes), but it will remind you of what we have covered and of any questions you would like cleared up before we move on to new material.
- When taking notes in class leave white space so you can go back and fill in gaps later. After class, sit down with a friend and compare notes. Fill in the things you are missing. When you are done read through your notes and see if they make sense. If not, talk to a friend, reread sections of the book, or talk to the professor to keep filling in the gaps until things make sense.
- Do as many problems as possible! On assignments and exams I won't be asking you how you feel about chemistry, I'll be asking you to answer/solve chemistry problems. In order to do that you need to know how to answer/solve chemistry problems. The best way to learn this, or any other skill, is practice, practice, and more practice!
- Work with others, but make sure you can do the problems on your own. Working together is a great way to learn. It allows you to talk over your ideas with others and come to conclusions you may not have reached on your own. Despite it's benefits working with others can be harmful if you are allowing the others in the group to carry you. Unless you understand how to do the problems on your own you will fail the exams and you will likely fail the course.

Grading

Your grade in this course will come from the following components

Exams (60%)
Communication Assignments(20%)
Projects/Pop quizzes/In-class activities (20%)

Your final grade in the course will be determined using the following scale (please note that the instructor reserves the right to lower these cut-offs, but will never raise them)

$90 \leq A \leq 100$ $87 \leq A^- < 90$
 $84 \leq B^+ < 87$ $80 \leq B < 84$ $77 \leq B^- < 80$
 $74 \leq C^+ < 77$ $70 \leq C < 74$ $67 \leq C^- < 70$
 $63 \leq D^+ < 66$ $58 \leq D < 63$
F < 58

Exams: There will be three exams given in this course. Question types on the exams may include: multiple choice, short answer, matching, worked problem, and essay. Each exam is worth 20% of your grade in the course.

Exam Dates: Tuesday October 4th, Tuesday November 1st, Tuesday November 29th

Communication Assignments: Over the course of the semester you will be doing one or more writing assignments and/or oral presentations. Details about each assignment, including assessment criteria, and due dates will be provided at a later date.

Projects and In-class Activities: In this course you will do several projects and in-class activities either in groups or individually. Many of these activities will be done in class. Dates of activities and projects will be announced in advance.

Pop Quizzes: The instructor reserves the right to offer pop quizzes if it becomes clear that students are not coming to class prepared or not keeping up with work outside of class.

Homework: No graded homework will be given out in this class, however suggested problems will be given out with each study guide to aid in preparation for the exams. Final answers to all numeric problems will be given so you can check your work. Detailed solutions will be kept in my office for student viewing.

Rights and Responsibilities

UWSP values a safe, honest, respectful, and inviting learning environment. In order to ensure that each student has the opportunity to succeed, we have developed a set of expectations for all students and instructors. This set of expectations is known as the *Rights and Responsibilities* documents, and it is intended to help establish a positive living and learning environment at UWSP. Click here for more information:

<http://www.uwsp.edu/stuaffairs/Pages/rightsandresponsibilities.aspx>

Academic Misconduct

The definition of academic misconduct can be found at
<http://www.uwsp.edu/admin/stuaffairs/rights/rightsChap14.pdf>

Disability Services

The Americans with Disabilities Act (ADA) is a federal law requiring educational institutions to provide reasonable accommodations for students with disabilities. For more information about UWSP's policies, check here:

<http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/ADA/rightsADAPolicyInfo.pdf>.

If you have a disability and require classroom or exam accommodation, please register with the Disabilities Services office and then contact me. Complete information on the disability services offered at the university may be found at <http://www.uwsp.edu/special/disability/>. In order to receive accommodations you must have documentation of your disability on file with the Office of Disability Services. In addition, you must provide me with an Accommodations Request Form (available at the website). You must have me sign the form and return it to the Office of Disability Services.

Important Dates

Sept. 6	Classes Begin
Sept. 15	Last day to drop a 16 week course without a grade
Nov. 11	Last day to drop a 16 week course.
Nov. 23	Thanksgiving break begins at 6 p.m.
Dec. 15	Last day of class