

Chemistry 520 (Biophysical Chemistry Laboratory) Fall 2017

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The TA's will hold office hours each week, in addition to the instructor's office hours. These will be announced and posted on the course website (see below).

Overview and Objectives: This course introduces students to experiments which demonstrate the concepts that they have learned in the biophysical physical chemistry course including thermodynamics, kinetics, quantum mechanics, and spectroscopy. The course requires detailed, rigorous treatment of experimental data and proper communication of scientific results. In this course, expect to:

- Explore physical chemistry concepts experimentally
- Improve your ability to carry out detailed data analysis and interpretation
- Communicate scientific results in both written and oral formats
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Laboratory (4014 Malott)

Section 1: Tuesday	8:30 am - 12:20 pm	(26678)	(Tim Quincy)
Section 2: Thursday	12:30 pm - 4:20 pm	(26679)	(Jennifer Doolin)

The lab will close promptly at the time listed above, so be sure to plan accordingly. If you find that you have extra time in the lab, take advantage of the time to work on data analysis.

Laboratory Lecture

The theory behind the laboratory experiments, data and error analysis will be discussed either in lectures at the beginning of the lab period, or in videos posted to blackboard. In addition, information regarding lab reports, lab procedures, due dates, etc. will be communicated at the beginning of lab and also through blackboard. It is your responsibility to ensure that you have reviewed all of the relevant information before the experiment.

Prerequisites: One semester of organic chemistry, two semesters of calculus, and two semesters of physics. *If you do not have these prerequisites, please contact the instructor immediately.* The course will assume a working knowledge of the material from these courses and you should be prepared to demonstrate mastery of that material.

Course Website: Students enrolled in the course should have access to the blackboard site for this course at <http://courseware.ku.edu>. If you are not able to access this site, let the instructor know as soon as possible.

Course Materials

Optional Textbook: The standard Physical Chemistry Laboratory textbook is “*Experiments in Physical Chemistry*” by Shoemaker, Garland, and Nibler. Several experiments that you will be doing this semester are described in this textbook, along with background theory. A condensed version of this text (much cheaper) containing only the most important information has been prepared for this course and is available and instructions for downloading this book are available on the course website. Several copies of the full text will be available in the laboratory, as well as on reserve in Anschutz Library to use as a reference. **Lab notebook:** bound notebook with consecutively numbered pages for recording experimental results. **Safety goggles** (Chemistry department approved!!) are required at all times when experiments are being conducted in the laboratory.

Additional Materials On Reserve in Anschutz Library:

Experiments in Physical Chemistry, by Carl W. Garland, Joseph W. Nibler, and David P. Shoemaker; 8th Ed., McGraw Hill, 2009. (QD457.S567 2009)

An Introduction to Error Analysis, by John R. Taylor; 2nd Ed., University Science Books, 1997. (QC39.T4 1997)

Writing the Laboratory Notebook, by Howard M. Kanare; American Chemical Society, 1985. (Q180.58.K36 1985)

ACS Style Guide: Effective Communication of Scientific Information, edited by Anne M. Coghill and Lorrin R. Garson, 3rd Ed., Oxford University Press, 2006. (QD8.5.A25 2006)

The Elements of Style, by William Strunk, Jr. and E. B. White, 4th Ed., Allyn and Bacon, 2000. (PE1408.S772 2000)

Course Requirements

Five (5) experiments will be conducted during the course of the semester. A formal written laboratory report will be required for 4 of the experiments. **Calculations and error analysis will be due approximately one week after you finish the experiment, with the lab reports typically due the following week. SEE THE LAB SCHEDULE FOR DEADLINES!** You will also be assigned an error analysis exercise to become familiar with the type of data analysis involved in this course, and to acquaint yourself with the general ideas of error analysis. Late calculations or reports will be penalized 10% per day up to a maximum of one week late. *Reports will not be accepted more than one week late. You must complete each lab report and both oral presentations in order to pass this course.*

Required Experiments:

- 1) Heat Capacity Ratios
- 2) Bomb Calorimetry
- 3) DNA Melting
- 4) Enzyme Kinetics
- 5) Spectroscopy

Grading

Error Analysis Worksheet	10
Activities (peer review, problem solving, etc.)	15
Lab reports (4×40 pts)	160
Oral Presentations (2×20 pts)	40
Calculations and data analysis (5×10 pts)	50
Prelab Writeups, lab notebook (5×5 pts)	25

	300 points

Lab Notebooks

Each student is required to keep a lab notebook with all the relevant material for the experiments conducted in this course. Before an experiment can begin, the TA will check to see that the appropriate prelab writeup has been completed. *The TA will also initial your notebook before you leave the lab each day. Duplicate copies or photocopies of the laboratory notebook are to be turned with the lab report.*

Preparation for the experiments

Each student is responsible for reading and understanding the relevant chapter in the textbook and/or handout before beginning work on an experiment. If you have questions concerning the material, please consult the TA's or the instructor. *A prelab writeup consisting of the goals of the experiment, the quantities to be determined, a description of the experimental procedure/apparatus, and a list of any safety precautions is to be completed before you begin work on the experiment.* You must have a TA or the instructor initial your lab notebook to show that your notebook was checked for your prelab writeup before you begin. In addition to the text and handouts, discussion of the laboratory experiments will be given in the lab lectures. These should be very useful in understanding the theory behind the experiments, the equipment, and the calculations required.

Prelab Writeup:

Use the following procedure for preparing the prelab writeup. In order to receive full credit, all of these components must be included. The purpose is to ensure that you are prepared for the experiments.

- 1) On the first page of the experiment, record the title of the experiment, the names of any people working on the experiment, and the date the work was begun.
- 2) State the purpose of the experiment. What is the objective of the experiment? What is to be measured? What is the system being investigated? What methods will be used?
- 3) Describe the procedure to be used to conduct the experiment. If the procedure is identical to the handout or textbook, give the reference and briefly summarize the procedure. Be sure to record any changes that are to be made from the referenced procedure. Also include drawings of the experimental apparatus here.
- 4) Describe any safety precautions that must be taken (even if these are listed elsewhere). Describe any known limitations with the procedure to be carried out.

Leaving the Laboratory

It is your responsibility to clean up the lab before you leave. Make sure that all equipment is turned off, glassware is cleaned and put away, and that your work area is cleaned up. Failure to clean up will result in a loss of 5 points on that experiment. You must also have your TA initial your lab notebook before you leave for the day.

Attendance

This laboratory is challenging and fast paced. Any absences will put you (and your laboratory partner) at an extreme disadvantage. If you miss a lab period because of an illness, university sanctioned activity, or other good reason, you must consult the instructor beforehand to arrange for a makeup. If prior consultation with the instructor is not possible, you may make up the lab if you have a signed note from your doctor or a university official. You will lose a minimum of 5 points from your prelab score if you arrive late for your laboratory without prior permission. Additional deductions may be taken for arrival more than 5 minutes late.

Safety

Each student must have read and understood the *Departmental Safety Regulations* and the course safety information. An online safety quiz will be given through the course website and must be passed with a score of 100% before any laboratory work may begin. Safety concerns specific to the equipment and chemicals in the physical chemistry laboratory are discussed in a separate handout. Before working with lasers, an additional online laser safety quiz must be completed.

Proper dress is required at all times in the laboratory. According to KU EHS rules, this means **wearing long pants** and **closed shoes** and wearing **safety goggles**. No contact lenses are permitted and short pants or dresses are only allowed if worn under a long lab coat. Long hair must be tied back. Students not meeting these regulations will not be allowed to work in the laboratory. Make-up time will not be granted for time missed due to safety violations.

Disabilities

Any student in this course who has a disability that may prevent him/her from fully demonstrating his/her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate the educational opportunity. "The Academic Achievement & Access Center (AAAC) coordinates accommodations and services for all KU students who are eligible. If you have a disability for which you wish to request accommodations and have not contacted the AAAC, please do so as soon as possible. Their office is located in 22 Strong Hall; their phone number is 785-864-4064 (V/TTY). Information about their services can be found at <http://disability.ku.edu>. Please contact me privately in regard to your needs in this course."

Academic Honesty

Each experiment will be performed by groups of at least two students, but each student is expected to turn in their own independent calculations, analysis, and laboratory report. The minimum penalty for academic misconduct or dishonesty will be a grade of 0 for the work in question for all parties involved. Further punishment will be pursued according to University guidelines. Reports copied from a partner will result in a grade of 0 for both reports.

The work you turn in is expected to reflect your knowledge of the subject matter, and therefore be entirely your own. Academic misconduct includes but is not limited to plagiarism, and improper use of references or online resources. Student reports or calculations may be photocopied at the discretion of the instructor without the knowledge or consent of the students.

"The issue of digital plagiarism has raised concerns about ethics, student writing experiences, and academic integrity. KU subscribes to a digital plagiarism detection program called SafeAssign, which may be used to check papers submitted in this course. You may be asked to submit your papers in a digital format (e-mail attachment, BlackBoard(tm) digital drop box or on disk) so that your paper can be checked against web pages and databases of existing papers. Although you may never have engaged in intentional plagiarism, many students do incorporate sources without citations; this program can alert me to your academic needs."

University of Kansas Concealed Carry Requirement Individuals who choose to carry concealed handguns are **solely responsible to do so in a safe and secure manner in strict conformity with [state and federal laws](#) and [KU weapons policy](#)**. Safety measures outlined in the KU weapons policy specify that a concealed handgun:

- Must be under the constant control of the carrier.
- Must be out of view, concealed either on the body of the carrier, or backpack, purse, or bag that remains under the carrier's custody and control.
- Must be in a holster that covers the trigger area and secures any external hammer in an uncocked position
- Must have the safety on, and have no round in the chamber.

Instructors are allowed by Kansas Board of Regents policy, to require backpacks, purses and other bags be placed at specific locations in the room during exams and quizzes, and as such those items will not be under the constant control of the individual. Students who choose to carry a concealed handgun in a purse, backpack, or bag must review and plan each day accordingly, and are responsible for making alternate arrangements as necessary. The university does not provide appropriate secured storage for concealed handguns.

This course takes place in spaces that will require students to leave belongings such as backpacks and purses away and unattended for the duration of class time. Students who choose to carry a concealed handgun in a purse, backpack, or bag must review and plan each day accordingly, and are responsible for making alternate arrangements as necessary. The university does not provide appropriate secured storage for concealed handguns.

Individuals who violate the KU weapons policy may be asked to leave campus with the weapon and may face disciplinary action under the appropriate university code of conduct.