

**Chemistry 510/520: Biological Physical Chemistry  
Fall 2016**

**Instructor: Cindy L. Berrie**

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Office Hours: TBA and by appointment

**Line Number:** 10942 (Chem 510)      26636 (Chem 520)

**Meeting time:** 9:00 am – 9:50 am MWF

**Location:** 2048 Malott Hall

**Lab Sections (for Chem 520)**

26678 Tues 8:30 am - 12:20 pm

26679 Thurs 12:30 pm - 4:20 pm

Teaching Assistants

Jennifer Doolin	<a href="mailto:doolinj@ku.edu">doolinj@ku.edu</a>	B029 Malott
Tim Quincy	<a href="mailto:tquincy@ku.edu">tquincy@ku.edu</a>	B035 Malott

**Overview and Objectives:** This course introduces students to basic concepts in physical chemistry, with specific application to biological systems. The course will cover thermodynamics, chemical and physical equilibria, kinetics, and quantum mechanics and spectroscopy. *In addition to the requirements for Chem 510, Chem 520 will have a laboratory component that will meet once a week in which you will learn to carry out experiments to explore the concepts covered in the lecture course, as well as become proficient at scientific communication through the preparation of rigorous scientific reports.*

In this course, expect to:

- Explore fundamental aspects of physical chemistry
- Understand how physical chemistry provides insight into biology and biochemistry
- Demonstrate an ability to solve quantitative, mathematically rigorous problems in the different areas of physical chemistry

**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.

**Discussion Meetings:** Tuesday      3:30-4:30 pm      2074 Malott

These discussion sessions are optional, but will provide you with an opportunity to ask questions and discuss concepts that you are unclear about, or spend time learning how to work problems associated with the material. This is your opportunity to actively engage with the material and enhance your learning.

**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**

**Required Textbook:** Physical Chemistry for the Life Sciences, 2<sup>nd</sup> Edition  
Peter Atkins and Julio De Paula  
Oxford University Press  
ISBN #: 978-0-19-956428-6

**Calculators:** You will only be allowed to use one of two approved simple, nonprogrammable scientific calculators (Texas Instruments 30XA or Casio FX260) for any exams or quizzes. These are readily available and can be purchased for <\$15.

**iClickers:** This course will use *iClickers* during class. You will be asked to answer several questions during each lecture using the *iClickers* so please be sure to bring your clicker to class each day. Responses for clicker questions will be graded based on participation. Please attempt to answer all questions to the best of your ability. Actively engaging in the material in this way during lecture will provide an additional opportunity for both learning the material and testing your understanding. *If you have not already, you will need to register your clicker in Blackboard in order to receive credit for your responses. Access the iClicker registration page under the Student Tools tab in the course Blackboard site and follow the instructions.*

**Course Requirements:** This course will cover a variety of physical chemistry topics and attempt to explore the applications of the concepts in biology and biochemistry. We will cover thermodynamics, chemical and physical equilibrium, kinetics, quantum mechanics, and spectroscopy. There will be a series of short in class or online quizzes to test your knowledge of the material and identify problems early. In addition, we will have three special evening exams as well as a comprehensive final examination. Homework will be assigned and solutions provided, but the homework will not be graded. It is to your benefit to complete the homework as completely as possible before consulting the solutions. During class, you will be asked to answer *iClicker* questions about the material we have been covering in the course. These questions will also contribute to your overall grade for the course. The distribution of credit for the course will be as described in the following section. **Chem 520 will also have points associated with the lab part of the course, which will be detailed in another document.**

### **Grading**

Grading will be based (at a minimum) on the traditional scale (with no +/-): 90-100%=A, 80-89%=B, 70-79%=C, 60-69%=D, <60%=F. The grading scale may be lowered, but will not be raised.

<b>Chem 510</b>	
Hour Exams (3x100 pts)	300 pts
Quizzes*	200 pts
Participation**	50 pts
Final Exam	150 pts
<b>Total</b>	<b>700 pts</b>

<b>Chem 520</b>	
Hour Exams (3x100 pts)	300 pts
Quizzes*	200 pts
Participation**	50 pts
Final Exam	150 pts
Lab Score	300 pts
<b>Total</b>	<b>1000 pts</b>

\*Quizzes may be given online or in class. The lowest quiz score will be dropped from the calculation.

\*\*Participation points come from clicker questions, in class activities or problem solving, and notecards. These will be graded for completion only, not accuracy. If you complete 80% of these, you will get full credit for the participation points, below 80%, you will only get the percentage of the points you have earned.

**Exam/Quiz Policy:** Exams and quizzes will be given only during the scheduled time, **no makeup exams will be given.** Excused absences consist of confirmed illness, unavoidable emergencies, etc. Excused absences should be cleared in advance if at all possible. *You must let the instructor know immediately if you will be unable to attend an exam or a quiz.* Unexcused absences will result in a grade of zero (0) for the exam/quiz in question.

**Disabilities:** Any student in this course who has a disability that may prevent him/her from fully demonstrating his/her abilities should contact me privately 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:** While you are encouraged to work together on your homework and help each other learn the material, the work you turn in (assignments, exams, quizzes, etc.) must be your own

independent work. Academic misconduct includes but is not limited to plagiarism, and improper use of references or online resources, receiving unauthorized aid, and disruption of classes. 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. See <https://documents.ku.edu/policies/governance/USRR.htm#art2sect6> for more info on this issue.

“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.” Student assignments or exams may also be photocopied at the discretion of the instructor without the knowledge or consent of the students.

**Recording of lectures:** Course materials prepared by the instructor, together with the content of all lectures and review sessions presented by the instructor, are the property of the instructor. Video and audio recording of lectures and review sessions without the consent of the instructor are prohibited. Upon request, the instructor will usually grant permission for students to make audio recordings of lectures, on the condition that such recordings are only used as a study aid by the individual student making the recording. Unless explicit permission is obtained from the instructor, such recordings may not be modified and must not be transferred or transmitted to any other person, whether or not that person is enrolled in the course.

**Commercial Note-taking:** The content of this course is protected by copyright. Course materials and your notes are only for the use of students enrolled in the course. The sale of such materials is specifically prohibited. See KU policy: <http://policy.ku.edu/provost/commercial-note-taking>.

**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.

For Chem 520: 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.

**Tentative Course Schedule**

<b>Date</b>	<b>Topic</b>	<b>Chapter</b>	<b>Notes</b>
Aug 21-25	Introduction/Thermodynamics, Energy, Work Heat	1	
Aug 28-Sept 1	Thermochemistry	1	
Sept 4-8	Entropy and 2 <sup>nd</sup> Law	2	<b>Labor Day Mon. Sept 4, No Class</b>
Sept 11-15	Entropy and 2 <sup>nd</sup> Law	2	
Sept 18-22	Free Energy	2-3	<b>Exam #1</b> <b>Wed. Sept 20 5:50-7:50 pm</b> <b>1001 Malott</b>
Sept 25-29	Free Energy and Equilibrium	3	
Oct 2-6	Physical Equilibrium, Mixtures	3	
Oct 9-13	Chemical Equilibrium	4	
Oct 16-20	Acid/Base Equilibrium Ion transport	4/5	<b>Fall Break Mon. Oct 16, No Class</b>
Oct 23-27	Chemical Kinetics	6	<b>Exam #2</b> <b>Wed. Oct 25, 5:50-7:50 pm</b> <b>1001 Malott</b>
Oct 30--Nov 3	Chemical Kinetics	7	
Nov 6-10	Chemical Kinetics	8	
Nov 13-17	Quantum Mechanics	9	
Nov 20-24	Quantum Mechanics	9/10	<b>Thanksgiving, No Class Wed.-Fri.</b> <b>Nov 22-24</b>
Nov 27-Dec 1	Spectroscopy	11/12	<b>Exam #3</b> <b>Wed. Nov 29, 5:50-7:50 pm</b> <b>1001 Malott</b>
Dec 4-8	Spectroscopy	11/12	Stop Day, Fri. Dec 8, No Class
Dec 11-15	Final Exams		<b>Final Exam,</b> <b>Tues Dec 12, 7:30-10:00 am</b> <b>2048 Malott</b>

NOTE: Dates are tentative and subject to change. Updates will be provided throughout the course on blackboard and in class.