PHYSICAL CHEMISTRY I

CHEM 3423-270  
SUMMER 2014

Lectures: MTWRF 10:30 - 11:45 am, AH0355  
Office Telephone: 682-1611 x7407
Instructor: Dr. Courtney Vahlberg  
email: Courtney.L.Vahlberg-1@ou.edu
Office: AH 0355
Office Hours: MTWR 10:00 - 10:30am,11:45am – 12:15 pm

Lecture Schedule:
Chapter 1: The Nature of Physical Chemistry and the Kinetic Theory of Gases
Chapter 2: The First Law of Thermodynamics
**Exam 1:** Chapters 1 – 2  
July 11

Chapter 3: The Second and Third Laws of Thermodynamics
**Exam 2:** Chapters 1 – 3  
July 24

Chapter 4: Chemical Equilibrium
Chapter 5: Phases and Solutions
Chapter 6: Phase Equilibria
**Exam 3:** Chapters 4- 6  
August 5

Chapter 9: Chemical Kinetics I
Chapter 10: Chemical Kinetics II
**Final:** Chapters 1- 6, 9, 10  
August 15

*Take home quizzes will be handed out three class days prior to due date.

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* Class begins  
* Holiday  
* Exam 1 quiz 3*  
* Exam 2 quiz 6*  
* Exam 3 quiz 9*  
* Quiz 10  
* Quiz 12*  
* Final
Course Grading Scheme:

1. Homework Assignments (0%): Included in this syllabus are the reading and homework assignments for each unit. Working these problems will enable you to understand the course material at a satisfactory level. The problems encountered in the homework assignments will be of comparable difficulty to the problems encountered in the quizzes and examinations.

2. Quizzes (24%): Twelve quizzes will be given. Eight will be in-class, and four will be take-home (each due on an exam day). The dates of the quizzes are shown on the lecture schedule. The top eight quiz scores will be used, with each score contributing 3% to the final score. **No make-up quizzes will be given, regardless of the reason for missing the quiz.** For the in-class quizzes, you are allowed to use only the information provided on the quiz paper. You must bring your own periodic table and calculator.

3. Examinations (51%): Three 75-minute examinations will be given. The dates of the tests are shown on the lecture schedule. Each examination will contribute 17% to the final score. **No make-up examinations will be given.** For each examination, you may bring one 8 1/2 x 11 inch sheet of paper on which you may write anything (front and back). You must bring your own periodic table and calculator.

4. Final Examination (25%): The final examination will be given on Friday, August 15, during class time. It will be a comprehensive 75-minute examination over all of the course materials. **You must take the final to pass the course. No make-up final examination will be given.** You may bring one 8 1/2 x 11 inch sheet of paper on which you may write anything (front and back). You must bring your own periodic table and calculator.

5. Final Grade:

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**I do not curve grades.**

6. Grading Errors: Except for the final examination, all grading mistakes have to be resolved within one week after the quizzes or examinations are returned to the students. Grading mistakes found in the last week of classes or on the final examination have to be resolved immediately with the instructor.

*Solutions to homework problems, quizzes, and examinations will be available online.*
**Accommodation Policy:** Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact me as soon as possible so that we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities. The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the instructor as early in the semester as possible. Students with disabilities must be registered with the Office of Disability Services prior to receiving accommodations in this course. The Office of Disability Services is located in Goddard Health Center, Suite 166, phone 405/325-3852 or TDD only 405/325-4173.

**Codes and Policies of Behavior Policy:** Each student should acquaint himself or herself with the University codes, policies, and procedures involving academic misconduct, grievances, sexual and ethnic harassment, and discrimination based on physical handicap. Students engaging in academic misconduct (including cheating, plagiarism, and any other action that may improperly affect evaluation) will be subject to sanctions in accordance with the Norman Campus Academic Misconduct Code. I will recommend an "F" for the course and expulsion from the University for all such violations.

**Holidays:** It is the policy of the University to excuse absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required classwork that may fall on religious holidays. Students who plan to observe a religious holiday should notify me as soon as possible in order to make appropriate arrangements for classwork or rescheduling of examinations.

**Disclaimer:** I reserve the right to change by addition and/or subtraction any and/or all materials contained in this syllabus. This includes, but is not limited to, course content, assignments, scheduled dates, and fraction(s) of the final grade assigned to individual items within the course. Although your attendance at the lecture is not required, you are responsible for any announcements made in class, including changes in the quiz and examination schedule, course content, assignments, scheduled dates, and fraction(s) of the grade assigned to individual items within the course. If changes become necessary, I will announce them as early as possible.

**No use of personal electronic devices in the classroom for anything other than course work:** This is a problem-working class. If you need to use your cell phone, laptop, or other electronic device during class time, please leave the class room – quietly! – to do so.
UNIT 1: SECOND AND THIRD LAWS OF THERMODYNAMICS

Reading: Chapters 1 and 2
Homework for Chapter 1:  1.1, 1.4, 1.10, 1.11, 1.12, 1.13, 1.17, 1.18, 1.20, 1.24, 1.25, 1.28, 1.29, 1.36, 1.37, 1.40, 1.42, 1.49, 1.52, 1.58
Homework for Chapter 2:  2.2, 2.3, 2.4, 2.5, 2.6b, 2.7, 2.15, 2.16, 2.17, 2.20, 2.23, 2.32a, 2.38, 2.39, 2.40, 2.41, 2.44, 2.49, 2.50 (then repeat with a compression to half the original volume), 2.55, 2.60 (then repeat with a compression where \( P_{\text{gas}} \) is 1.5 bar and \( P_{\text{ext}} \) is a constant 2.0 bar), 2.64 (assume process is reversible), 2.69 (with \( n=0.75 \) mol)

UNIT 2: SECOND AND THIRD LAWS OF THERMODYNAMICS

Reading: Chapter 3

UNIT 3: EQUILIBRIUM AND PHASE EQUILIBRIA

Reading: Chapter 4 and Chapter 2.5 (extent of reaction)
Homework for Chapter 4:  4.1, 4.2, 4.3, 4.4, 4.7, 4.9, 4.15, 4.17, 4.24, 4.25, 4.32, 4.34, 4.35 (book answers are wrong for this one), 4.37, 4.40, 4.46

Useful values not included in the text:
\[ \Delta G^\circ(25\degree C) = -394.389 \text{ kJ/mol for CO}_2 \text{ and } \Delta G^\circ(25\degree C) = -137.16 \text{ kJ/mol for CO} \]

Reading: Chapter 5.1, 5.2, 5.4-5.7
Homework for Chapter 5:  5.1, 5.2, 5.3, 5.4, 5.7, 5.14, 5.19, 5.21

Reading: Chapter 6.1-6.6
Homework for Chapter 6:  6.3, 6.5, 6.6, 6.7, 6.8, 6.12, 6.14, 6.15, 6.16, 6.17, 6.22, 6.24, 6.26, 6.27

UNIT 4: CHEMICAL KINETICS I & II

Reading: Chapter 9

Reading: Chapter 10.1-10.6, 10.9
Homework for Chapter 10:  10.1, 10.2, 10.7, 10.8, 10.12, 10.16, 10.18, 10.20, 10.21, 10.25, 10.27, 10.36.