

Physical Chemistry – Kinetics and Thermodynamics (CHMY 373, formerly CHEM 371) Autumn 2009

This is the first semester of a two-semester course in physical chemistry. We will study physical principles as they apply to molecular systems and chemical reactions. Our focus for most of the semester will be thermodynamics, which is concerned with transformations of energy in molecular systems. Thermodynamics is relevant for understanding of chemical equilibria and the relationship among chemical and physical processes, work, heat and electricity. In addition, we will study the rates of chemical reactions. The second semester (CHMY 371, formerly CHEM 372) will be devoted to quantum theory and spectroscopy. Quantum theory is necessary for understanding the electronic structures of atoms and molecules, and is the basis for most spectroscopic techniques that are used to investigate the composition and structure of chemical systems.

There is also a one-semester course, Applied Physical Chemistry (CHMY 360, formerly CHEM 370), taught in the Spring. The two semester course, CHMY 373 and CHMY 371, will provide more in-depth treatment of physical chemistry and will be more mathematically demanding.

Time & Place: MWF 12:10-1:00 pm CHEM 102
 R 2:10-4:00 pm HS411

Instructor: Klara Briknarova

Office: CHEM 111, aka Mouse House (across from CHEM 102)

Office hours: MWF 11:00 am – 12:00 pm, R 1:00-2:00 pm, or by appointment

Phone: 243-4408

Email: klara.briknarova@umontana.edu

Text: Atkins & de Paula, Physical Chemistry, 8th edition (Also available in split volumes. We will use Volume 1: Thermodynamics and Kinetics.)

ERES: Solutions to end-of-chapter problems, quizzes and exams will be posted on the electronic reserve system (ERES). To access this, go to Library Research on the main UM web page, then select CHMY373.01 in the Reserves (ERES) window. A password will be provided to you in class.

Prerequisites: In order to succeed in this class, you need to have working knowledge of chemistry, understand basic physical concepts, convert between different units, and be comfortable with mathematical operations including integration and derivatives.

Homework: The end-of-chapter exercises will provide you feedback on how well you understand the material, and they will help you to master it. I will use some of these exercises in the quizzes and exams.

Tests and quizzes: There will be a weekly quiz on most Thursdays (bring a calculator!), three exams during the semester, and a comprehensive final exam. Each exam will contribute 20% of your grade. The average of your quizzes will count as one exam grade. You may drop your three lowest quiz grades (including any missed quizzes), but makeup quizzes will not be given. Exams II and III will be a multi-choice exams issued by the American Chemical Society. There may be opportunities to earn extra points during the semester.

Tentative schedule:

M 8/31, W 9/2, R 9/3 (Quiz 1), F 9/4

M 9/7

W 9/9, R 9/10 (Quiz 2), F 9/11

M 9/14, W 9/16, R 9/17 (Quiz 3), F 9/18

M 9/21 4:30 pm

M 9/21, W 9/23, R 9/24 (Quiz 4), F 9/25

M 9/28, W 9/30,

R 10/1

F 10/2

M 10/5, W 10/7, R 10/8 (Quiz 5), F 10/9

M 10/12, W 10/14, R 10/15 (Quiz 6), F 10/16

M 10/19, W 10/21, R 10/22 (Quiz 7), F 10/23

M 10/26, W 10/28, R 10/29 (Quiz 8), F 10/30

M 11/2 4:30 pm

M 11/2, W 11/4

R 11/5

F 11/6

M 11/9

W 11/11

R 11/12 (Quiz 9), F 11/13

M 11/16, W 11/18, R 11/19 (Quiz 10), F 11/20

M 11/23

W 11/25, R 11/26, F 11/27

M 11/30, W 12/2, R 12/3 (Quiz 11), F 12/4

M 12/7, W 12/9

R 12/10

F 12/11

R 12/17 8:00-10:00 am

Chapter 1: The properties of gases

No class (Labor Day)

Chapter 2: The first law

Chapter 3: The second law

Last day to add/drop a class on CyberBear

Chapter 4: Physical transformations of pure substances

Exam I

Chapter 5: Simple mixtures

Chapter 6: Phase diagrams

Chapter 7: Chemical equilibrium

Last day to add/drop class with add/drop form

Exam II (ACS Thermodynamics)

Chapter 21: Molecules in motion

No class (Veterans Day)

Chapter 22: The rates of chemical reactions

Chapter 23: The kinetics of complex reactions

No class (Thanksgiving)

Chapter 24: Molecular reaction dynamics

Exam III (ACS Dynamics)

Review

Final Exam (CHEM 102)