

## REGULAR COURSE SYLLABUS

School of: Letters, Arts & Sciences

Department: Chemistry

CIP Code: 40.0506

Prefix & Course Number: CHE 3190

Crosslisted With\*: \_\_\_\_\_

Course Title: Survey of Physical Chemistry

Check All That Apply: Required for Major:  Required for Minor: \_\_\_\_\_ Specified Elective: \_\_\_\_\_

Required for Concentration:  Elective: \_\_\_\_\_ Service Course: \_\_\_\_\_

Credit Hours: 4 (4+0)

Total Contact Hours per semester (assuming 15-16 week semester):

Lecture 60 Lab 0 Internship 0 Practicum 0 Other (please specify type and hours): \_\_\_\_\_

Schedule Type(s): L Grading Mode(s): L

Variable Topics Courses (list restrictions, including the maximum number of hours that can be earned\*\*):

\_\_\_\_\_  
\*\* NOTE: This information must be included in the course description.

Restrictions (Variable Topics Course): \_\_\_\_\_

Prerequisite(s): CHE 3000, MTH 1410, PHY 2010, or PHY 2311, or permission of instructor

Corequisite(s): None

Prerequisite(s) or Corequisite(s): \_\_\_\_\_

Banner Enforced:

Prerequisite(s):

Corequisite(s):

Prerequisite(s) or Corequisite(s):

Catalog Course Description:

This course provides a survey of the principles of thermodynamics, equilibrium, atomic/molecular structure, electrochemistry, kinetics, quantum mechanics, and spectroscopy. It is designed to meet the requirements for the B.A. in chemistry and the B.S. in Chemistry with the Criminalistics concentration.

APPROVED:

Charles H. Tondal  
Department Chair OR Program Director

11/15/05  
Date

Dal Ramsey  
Dean OR Associate Dean

11/18/05  
Date

Ronda S. Curran  
Associate VP, Academic Affairs

2/6/06  
Date

Date

Prefix and Course Number: CHE 3190

**Required Reading and Other Materials will be equivalent to:**

Elements of Physical Chemistry, P.W. Atkins, 3<sup>rd</sup> Edition, W.H. Freeman, 2000.

With Biological Application or comparable text.

**Specific, Measurable Student Behavioral Learning Objectives:**

Upon completion of this course the student should be able to:

1. Given appropriate data for chemical and mechanical systems, calculate work, heat exchange, energy change, entropy change, Gibbs free energy change, temperature change for chemical and mechanical processes.
2. Explain phase changes physically and theoretically.
3. Calculate vapor pressure, freezing and boiling point, osmotic pressure for solutions of various concentrations.
4. Given appropriate data, determine whether a reaction is spontaneous.
5. Explain the differences between ideal and non-ideal solutions.
6. Explain valence bond theory, molecular orbital theory, crystal field.
7. Use the theories in #6 to predict molecular shapes and energy levels.
8. Explain the use of the Schrodinger equation in calculating atomic and molecular parameters.
9. Explain the theoretical basis and uses for UV, visible, infrared, microwave, and NMR spectroscopy.
10. Interpret simple UV, visible, infrared, microwave, and NMR spectra.
11. Explain the collision theory of chemical kinetics.
12. Given appropriate data, calculate the order of chemical reactions.
13. Write cell reactions and calculate electrode potentials for electrochemical cells.
14. Calculate equilibria constants and positions for chemical reactions.

**Detailed Outline of Course Content (Major Topics and Subtopics) or Outline of Field Experience/Internship (experience, responsibilities and supervision) (format: I, A, 1, a, etc.):**

- I. Properties of Gases
- II. Thermodynamics
- III. Equilibria
- IV. Electrochemistry
- V. Kinetics
- VI. Atomic Structure
- VII. Bonding
- VIII. Cohesion/Molecular Structure
- IX. Spectroscopy

**Evaluation of Student Performance (format: 1, a, i, ii, etc.):**

Students will be given periodic in class quizzes. These tests will be supplemented by take home tests. A final exam one hundred minutes long will terminate the course. The final grade determination will be based on the student's performance on the tests, final exam, and the instructor's evaluation of homework assignments.