METROPOLITAN STATE COLLEGE *of* DENVER
Office of Academic Affairs

REGULAR COURSE SYLLABUS

School of: Letters, Arts & Sciences

Department: Chemistry

CIP Code: 40.0506

Prefix & Course Number: CHE 3250 **Crosslisted With*:** ____

Course Title: Physical Chemistry I

Check All That Apply: Required for Major: X 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): None

Prerequisite(s): MTH 2420, PHY 2010 OR PHY 2311, CHE 3000

Corequisite(s): None

Prerequisite(s) or Corequisite(s): ____

Banner Enforced:
Prerequisite(s): X
Corequisite(s): X
Prerequisite(s) or Corequisite(s): X

Catalog Course Description:

This course is a comprehensive study of the principles of gas dynamics, thermodynamics, equilibrium, solution properties, kinetics, and a survey of electrochemistry and reaction dynamics. Literature searches related to historical and current topics in chemistry will be required.

APPROVED:

Charles G. Tindall — 11/8/05
Department Chair **OR** Program Director — Date

Hal Harris — 11/15/05
Dean **OR** Associate Dean — Date

Linda S. Curran — 2/6/06
Associate VP, Academic Affairs — Date

*If crosslisted, attach completed Course Crosslisting Agreement Form

Prefix and Course Number: CHE 3250

Required Reading and Other Materials will be equivalent to:
Physical Chemistry, 4th Edition, K.J. Laidler, J.H. Meiser, B.C. Sanctuary, Houghton Mifflin Company, 2003

Specific, *Measurable* Student Behavioral Learning Objectives:
Upon completion of this course the student should be able to:

1. Calculate state properties of gases.
2. Given appropriate information, calculate ΔU, ΔH, ΔS, ΔG, for any change in state or chemical reaction.
3. Given appropriate data, predict spontaneity and equilibrium positions for chemical systems.
4. Interpret the function of heat engines in terms of the laws of thermodynamics.
5. Interpret phase diagrams for multi-component systems.
6. State and explain the laws of thermodynamics and the phase rule.
7. Given appropriate data, calculate colligative properties of solutions.
8. Given appropriate data, calculate activities and activity coefficients for solutions.
9. Explain the Debye-Huckel theory of ionic electrolytes.
10. Calculate cell potentials of electrochemical cells.
11. Given appropriate data, calculate chemical potentials for any state.
12. Given appropriate data, calculate the T, p, n, and V dependence of any the thermodynamic quantity.
13. Formulate integrated rate laws from experimental data and determine concentration of species at any moment in time.
14. Apply steady-state treatment to reaction mechanisms.
15. State the focus and techniques of chemical dynamics.

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.):

1. Properties of Gases
2. Kinetic-Molecular Theory of Gases
3. The First Law of Thermodynamics
4. The Second Law of Thermodynamics
5. Equilibrium
6. Determination of Standard Thermodynamic Functions
7. Solutions
8. Equilibrium Electrochemistry
9. Chemical Kinetics
10. Reaction Dynamics

Evaluation of Student Performance (format: 1, a, i, ii, etc.):
Students will be given periodic examinations. These examinations will be supplemented by homework assignments. A final exam will terminate the course. The final grade determination will be based on the student's performance on the examinations, homework, and the final exam.