EFFECTIVE: JANUARY 2002

Douglas College

CURRICULUM GUIDELINES

A.	Division:	**Academic**	Date: **Oct 13, 2000**			
B.	Department / Program Area	**Science and Technology**	New Course		Revision	**X**
			If Revision, Section(s) Revised		**H, P**	
			Date Last Revised:		**May 18, 1994**	

C:	**CHEM 410**	D:	**Physical and Inorganic Chemistry**	E:	5
	Subject & Course No.		Descriptive Title		Semester Credits

F: Calendar Description:

This course investigates several topics in physical chemistry, including phase equilibria, spectroscopy, kinetics, and the thermodynamics of electrolyte solutions, and then applies the principles of thermodynamics and bonding to the study of coordination compounds. The laboratory stresses instrumental methods in inorganic chemistry.

G: Allocation of Contact Hours to Type of Instruction / Learning Settings

Primary Methods of Instructional Delivery and/or Learning Settings:
Lecture/Laboratory

Number of Contact Hours: (per week / semester for each descriptor)
Lecture 4 hours
Laboratory 3 hours

Number of Weeks per Semester: **14**

H: Course Prerequisites:

CHEM 210 (C or better)

I: Course Corequisites:

None

J: Course for which this Course is a Prerequisite

None

K: Maximum Class Size:

Lecture: 36 Laboratory: 18

L: PLEASE INDICATE**:**

		Non-Credit					
		College Credit Non-Transfer					
	X	College Credit Transfer:	Requested		Granted	**X**	

	SEE BC TRANSFER GUIDE FOR TRANSFER DETAILS (www.bccat.bc.ca)					
M:	Course Objectives / Learning Outcomes With the aid of the relevant thermodynamic data, a periodic table, an equation sheet, and a calculator, the student will be able to:					

N: Course Content:

1. **Applications of Spectroscopy**

   Electromagnetic spectrum and molecular transitions; UV/Visible spectroscopy: instrumentation, use and limitations of Beer's Law; Infrared Spectroscopy: instrumentation, interpretation of spectra; NMR: theory and instrumentation, prediction and identification of spectra; atomic absorption; gas-liquid chromatography.

2. **Phase Equilibria**

   One and two component systems, Gibbs phase rule, review of ideal solutions, tie-line

3. **Solutions of Electrolytes**

   Theories of strong and weak electrolytes, ionic strength, activity and activity coefficient; use of activities of electrolytes in pH and equilibrium calculations.

4. **Chemical Kinetics**

   (a) **Elementary Reactions**

   Rate, rate law, half-life, integrated rate equation for zero, first, and second order reactions, determination of order, rate and activation energy; collision theory and transition state theory.

   (b) **Composite Reaction Mechanisms**

   Parallel and consecutive reactions, steady-state treatment, rate-determining steps, equilibrium constants, free radical mechanisms, enzyme catalyzed reactions.

5. **Coordination Compounds**

   Nomenclature, Werner Coordination Theory, bonding: Valence Bond Theory, Crystal Field Theory, Molecular Orbital Theory; isomerism, stability constants: factors effecting stability, determination of stability constants; kinetics and mechanisms of reactions of coordination complexes.

Laboratory Content

The following experiments will be performed during the laboratory period:

1. Quantitative UV/Vis Spectroscopy
2. Determination of Keto-Enol Equilibrium Constants by NMR
3. Binary Solid-Liquid Phase Diagram
4. Geometric Isomers of a Cr(III) Complex
5. Gas Chromatography
6. Kinetics of H_2O_2 Decomposition
7. Kinetics of the Iodination of Acetone
8. Preparation and Identification of Co(III) Complexes
9. Paramagnetic Susceptibility: (a) Gouy Balance (b) NMR
10. Inorganic Term Project

O:	Methods of Instruction The course will be presented using lectures, classroom demonstrations, problem sessions and class discussions. Films and audio-visual materials will be used where appropriate. Problem sets will be assigned regularly to be handed in and marked. The laboratory consists of performance of ten experiments and a two-week inorganic chemistry project.
P:	Textbooks and Materials to be Purchased by Students Laidler, K.J.; Meiser, J.H. *Physical Chemistry,* 3rd Edition, Houghton Mifflin, Boston, New York, 1999 White, J.E.; *College Outline Series: Physical Chemistry;* Harcourt Brace Jovanovich, San Diego, 1987. Douglas College, *Chemistry 410 Laboratory Manual,* 2000. Basolo, F.; Johnson, R.C.; *Coordination Chemistry;* Science Reviews, 1986.
Q:	Means of Assessment The student's performance in the course will be based on the following evaluations: **1. Lecture Material (70%)** (a) Three tests will be given, each worth 20%. These tests will cover (a) (b) Problem assignments will be assigned on a regular basis (about seven) to be **2. Laboratory (30%)** The laboratory grade will be based on the written report (including accuracy of any experimentally obtained values) of each experiment performed (24%). The report for the inorgani
R:	Prior Learning Assessment and Recognition: specify whether course is open for PLAR Not open for PLAR at this time.

Course Designer(s)		Education Council / Curriculum Committee Representative
Dean / Director		Registrar