UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: Chemistry **IMPLEMENTATION DATE**: June 1994

Revised: Nov. 1996

Chemistry 102	General Chemistry II	4
SUBJECT/NUMBER OF COURSE CREDITS	**DESCRIPTIVE TITLE**	**UCFV**

CALENDAR DESCRIPTION: CHEM 102 is a continuation of CHEM 101. The topics covered in CHEM 102 are essentially the same as those presented in CHEM 112; however, in CHEM 102 these topics are treated in less detail. Experiments performed in the laboratory component of the course will complement the material covered in lectures.

RATIONALE:

COURSE PREREQUISITES: CHEM 101

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT	**Lecture**	**46**	**hrs**	**Student Directed Learning**	**hrs**
	Laboratory	**32**	**hrs**	**Other - specify:**	
	Seminar		**hrs**		
	Field Experience		**hrs**	**Exams**	**6 hrs**
				TOTAL	**84 HRS**

MAXIMUM ENROLMENT: 35

Is transfer credit requested? : Yes 9 No

AUTHORIZATION SIGNATURES:

Course Designer(s): N.S. Dance, P.W. Slade, Lillian Martin **Chairperson**: T. Cooper

Curriculum Committee

Department Head: E. Kroeker **Dean**: K. Wayne Welsh

PAC: Approval in Principle _____ **PAC: Final Approval**: November 20, 1996

(Date) **(Date)**

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SYNONYMOUS COURSES:

(a) replaces N/A
(course #)

(b) cannot take CHEM 112 for further credit
(course #)

SUPPLIES/MATERIALS:

Laboratory supplies required.

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS:

Chemistry, 1st ed., Staanley R. Radel and Marjorie H. Navidi (West)
UCFV Laboratory Manual for Chemistry 101 and 102.

REFERENCES:

General Chemistry, Brady and Humiston (John Wiley & Sons)
Chemistry: A Conceptual Approach, 6th ed., Mortimer Wadsworth
Chemistry, Bailar et al (Academic Press)

OBJECTIVES:

General

Students should be able to comprehend the fundamental principles of chemistry and apply them to basic problems and new situations, using basic mathematics where required. The rational and critical thought processes will be continually challenged and developed.

Specific: Students should be able to:

a) Develop fundamental theories from experimental data and/or observations.
b) Appreciate the connection between the theoretical and experimental.
c) Be aware of the need for an ordered yet flexible approach to the varied topics.
d) Be aware of the need for care, precision, and accuracy in the subject generally and in the laboratory particularly.
e) Appreciate and be competent in combining the uncertainties inherent in experimental data.

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METHODS:

Presentation of the course will be by interrelated class (theory), seminar, and laboratory sessions. Class sessions will promote active student participation to ensure continual mutual feedback in order to reinforce the learning process. Films and audio-visual aids will be used where appropriate.

Problem assignments will be continually given. Some selected problems will be collected and marked.

STUDENT EVALUATION PROCEDURE:

This will be flexible, yet will be based on the following:

Laboratory (reports and techniques)	25-30%
Midterm examinations (2 or 3)	30-40%
Problem assignments and class participation	5-10%
Final examination	25-35%

COURSE CONTENT:

Oxidation-reduction: Chapter 11 - Definitions, balancing redox equations by oxidation state change and half-equation methods.

Thermodynamics: Chapter 19 - Systems and state functions. First law, enthalpy, Hess's Law and calculations. Second Law, Gibbs' Free Energy, entropy, applications of Second Law. Free energy and equilibrium. Third Law.

Electrochemistry: Chapter 20 - Electrochemical cells, standard electrode potentials, Nernst equation and simple calculations. Electrolysis, Faraday's Laws and calculations, examples of electrolysis (dry cell, industry, corrosion, fuel cells, solar cells).

Chemical kinetics and equilibrium: Chapters 14, 15 - The rate of reaction - its variation with temperature and concentration. Rate laws. Rate order. Half-life of first reaction. Collision Theory. Reaction mechanisms. Catalysis.

The state of equilibrium, the Law of Mass Action, effect on equilibrium of change in temperature, pressure, concentration, and catalysts. Homogeneous and heterogeneous equilibria.

Acids, bases, and ionic equilibria: Chapters 16, 17, and 18 - Arrhenius and Bronsted-Lowry concepts. Self-ionization of water, pH and simple calculations, strong acids and bases, weak acids and bases. Buffer solutions and hydrolysis, common ion effect. Solubility and solubility products.

Organic chemistry: Chapter 23 - Nature of bonding and structures, isomerism, nomenclature and reactions as demonstrated by the major classes: alkanes, alkenes, alkynes, aldehydes, ketones, carboxylic acids, and derivatives. Simple syntheses and reactions of the latter classes. Amino acids and peptide bonds.

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LABORATORY EXPERIMENTS

To be selected from:

1. Oxidation-Reduction Titration: Determination of Hypochlorite in Bleaching Solutions.
2. Gravimetric Determination of Nickel as the Dimethylglyoximate.
3. Electrochemistry: Electrochemical and Electrolytic Cells.
4. Chemical Equilibrium: Qualitative Experiments.
5. Measurement of pH and Buffer Capacity.
6. Organic Chemistry: The Reactions of Hydrocarbons and Alcohols.
7. Preparation of Aspirin.
8. Preparation of Benzoic Acid.
9. Biochemistry: Proteins.
10. Spectrophotometric Study of Chromic Ions and Its Applications.
11. Kinetics: The Iodine Clock Reaction.