UNIVERSITY OF THE FRASER VALLEY

OFFICIAL COURSE OUTLINE (page 1)

COURSE IMPLEMENTATION DATE:	September 2002
COURSE REVISED IMPLEMENTATION DATE:	May 2009
COURSE TO BE REVIEWED: *(four years after UPAC approval)*	February 2013 *(month, year)*

OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.

Shaded headings are subject to change at the discretion of the department – see course syllabus available from instructor

CHEM 114	Chemistry	5
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UCFV CREDITS

Principles of Chemistry II

COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course provides an introduction to the principles of thermodynamics and aqueous equilibria. The structures, nomenclature and reactivity of organic compounds are also introduced. Work performed in the laboratory complements lecture material. With Chemistry 113, this course will satisfy the requirements of students wishing to pursue an honours or majors program in science.

PREREQUISITES: CHEM 113
COREQUISITES: none
PRE or COREQUISITES:

SYNONYMOUS COURSE(S):
(a) Replaces: **CHEM 112**
(b) Cross-listed with:
(c) Cannot take: for further credit.

SERVICE COURSE TO: *(department/program)*

TOTAL HOURS PER TERM: 102

STRUCTURE OF HOURS:

Lectures:	45	Hrs
Seminar:		Hrs
Laboratory:	45	Hrs
Field experience:		Hrs
Student directed learning:		Hrs
Other (specify): Tutorial	12	Hrs

TRAINING DAY-BASED INSTRUCTION:
Length of course:
Hours per day:

OTHER:
Maximum enrolment: **36**
Expected frequency of course offerings: Winter and Summer
(every semester, annually, every other year, etc.)

WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	☒ Yes	☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)	☐ Yes	☐ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	☒ Yes	☐ No

Course designer(s):	**Noham Weinberg**		
Department Head:	**Arthur Last**	Date approved:	**February 22, 2008**
Supporting area consultation (UPACA1)		Date of meeting:	**December 5, 2008**
Curriculum Committee chair:	**Norm Taylor**	Date approved:	**January 9, 2009**
Dean/Associate VP:	**Dan Ryan**	Date approved:	**January 22, 2009**
Undergraduate Program Advisory Committee (UPAC) approval		Date of meeting:	**February 27, 2009**

LEARNING OUTCOMES:

Upon successful completion of this course, students will be able to:

1. Understand and apply the basic concepts of chemical thermodynamics, aqueous equilibria, and organic chemistry.
2. Safely perform laboratory work with an appropriate degree of accuracy and precision.

METHODS: *(Guest lecturers, presentations, online instruction, field trips, etc.)*

Lectures, labs, group problem-solving sessions.

METHODS OF OBTAINING PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

☒ Examination(s) ☐ Portfolio assessment ☐ Interview(s)

☐ Other (specify):

☐ PLAR cannot be awarded for this course for the following reason(s):

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]

Petrucci-General Chemistry and Bryce-Essential Organic Chemistry (Custom Edition).
Chemistry 114 Lab Manual
Molecular Model Kit (available in the UFV Bookstore).

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Labs	20%
Assignments and tests	80%

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

1. **Principles of thermodynamics**. First and Second laws. Enthalpy, entropy, and Gibbs energy. Nernst equation and thermodynamics of redox processes.
2. **Equilibria**. Aqueous equilibria. Le Châtelier's principle and relationship to kinetics. Solubility. Brønsted Lowry and Lewis acids and bases. Buffers, pH titrations.
3. **Organic Chemistry.** *Common organic families:* Alkanes, alkenes, alcohols, alkyl halides, ethers, aldehydes, ketones, carboxylic acids, esters, amines, amides, amino acids. *Isomerism:* Structural, stereo, positional, functional group and geometric isomers. *Chirality*. *IUPAC Nomenclature*: Naming of simple compounds, E/Z/trans/cis and R/S nomenclature. *Alkanes*: Conformations of ethane, propane, and butane Monohalogenation of simple alkanes, including mechanism. Homolytic and heterolytic bond fission. *Alkenes*: Preparation and reactions. Addition of H_2, Br_2, Cl_2 and hydrogen halides. Markovnikov's Rule and Zaitsev's rule. *Alkyl halides*: Preparation from alkenes. Nucleophilic substitution. S_N1 and S_N2 mechanisms. *Esters*: Hydrolysis, fats and soap formation. *Amines:* Basicity of amines. Reaction with carboxylic acid derivatives to form amides. *Amino acids*: Structures and predominant species at a given pH. Chirality. *Peptides*: Structure, formation and examples. *Alcohols:* Primary, secondary and tertiary alcohols and reactions. *Aldehydes and Ketones*: Preparation and reactions, including oxidation of aldehydes. Chain form of carbohydrates. *Carboxylic acids*: Structural changes and pKa. Neutralization. Esterification.

LABORATORY CONTENT:

[Choice of experiments may vary by instructor. An example of experiments for this course might be:]

1. Determination of sodium, calcium and magnesium ions in a sample of seawater
2. Thermodynamics: The entropy and enthalpy of solution for potassium hydrogen tartrate in water
3. Chemical Equilibrium: Reversible reactions and chemical equilibrium
4. Determination of an equilibrium constant
5. Potentiometric acid-base titrations and identification of an amino acid
6. Investigation of buffer systems
7. Extraction: The determination of a partition coefficient
8. Preparation and analysis of benzoic acid
9. Chemistry of some organic chemical compounds
10. Organic molecular models