ORIGINAL COURSE IMPLEMENTATION DATE: September 2002
REVISED COURSE IMPLEMENTATION DATE: September 2019
COURSE TO BE REVIEWED (six years after UEC approval)**:** December 2021
Course outline form version: 05/18/2018

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: CHEM 113	**Number of Credits:** 5 Course credit policy (105)

Course Full Title: Principles of Chemistry I
Course Short Title:
(Transcripts only display 30 characters. Departments may recommend a short title if one is needed. If left blank, one will be assigned.)

Faculty: Faculty of Science	**Department (or program if no department):** CHEMISTRY

Calendar Description:

An introduction to chemistry with emphasis on theory of atomic and molecular structure and bonding. Work performed in the laboratory complements lecture material.

Note: Students with credit for CHEM 111 cannot take this course for further credit.

Prerequisites (or NONE):	(Chemistry 12 or CHEM 110) and (one of the following: Principles of Mathematics 12, Pre-calculus 12, MATH 093, MATH 095, MATH 096, or MATH 110).
Corequisites (if applicable, or NONE):	None
Pre/corequisites (if applicable, or NONE):	None

Antirequisite Courses *(Cannot be taken for additional credit.)*
Former course code/number:
Cross-listed with:
Dual-listed with:
Equivalent course(s): **CHEM 111**
(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)

Typical Structure of Instructional Hours

Lecture/seminar hours	45
Tutorials/workshops	12
Supervised laboratory hours	45
Experiential (field experience, practicum, internship, etc.)	
Supervised online activities	
Other contact hours:	
Total hours	**102**

Labs to be scheduled independent of lecture hours: ☐ No ☒ Yes

Special Topics *(Double-click on boxes to select.)*
This course is offered with different topics:
☒ No ☐ Yes *(If yes, topic will be recorded when offered.)*

Independent Study
If offered as an Independent Study course, this course may be repeated for further credit: *(If yes, topic will be recorded.)*
☒ No ☐ Yes, repeat(s) ☐ Yes, no limit

Transfer Credit
Transfer credit already exists: *(See **bctransferguide.ca**.)*
☐ No ☒ Yes
Submit outline for (re)articulation:
☐ No ☐ Yes *(If yes, fill in transfer credit form.)*

Grading System
☒ Letter Grades ☐ Credit/No Credit

Maximum enrolment (for information only): 36

Expected Frequency of Course Offerings:
annually *(Every semester, Fall only, annually, etc.)*

Department / Program Head or Director: Dr. Cory Beshara	**Date approved:**	October 12, 2018
Faculty Council approval	**Date approved:**	November 2, 2018
Dean/Associate VP: Dr. Lucy Lee	**Date approved:**	November 2, 2018
Campus-Wide Consultation (CWC)	**Date of posting:**	November 30, 2018
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	February 1, 2019

Learning Outcomes:

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

1. Explain the nature of light, using the concepts of frequency, wavelength, energy, and wave-particle duality.
2. Describe the Bohr model of the hydrogen atom and explain its inadequacies compared to the quantum model of the hydrogen atom.
3. Explain the concept of atomic orbitals and describe the shapes of the s, p, and d orbitals.
4. Explain how the periodic table is determined by the electronic configuration of the elements.
5. Explain several periodic properties of elements using the concepts of shielding and penetration.
6. Generate Lewis dot diagrams of molecules.
7. Predict the three-dimensional shapes of simple molecules.
8. Describe the bonding in a simple molecule using qualitative valence bond theory.
9. Describe the bonding in diatomic gases using molecular orbital theory.
10. Describe and name simple organic molecules containing common functional groups (alkanes, alkenes, alkynes, alcohols, alkl halides, ethers, aldehydes, ketones, carboxylic acids, esters, amines and amides).
11. Draw diagrams of the conformations of alkane derivatives.
12. Identify and name different stereoisomers of organic molecules.
13. Safely and efficiently perform basic chemical procedures in the laboratory.
14. Accurately record experimental data and observations in the laboratory.
15. Work efficiently and respectfully as a team with other students to complete selected laboratory experiments.
16. Communicate experimental results and analyses clearly through written laboratory reports.
17. Demonstrate laboratory knowledge and skills including the use of quantitative glassware and analytical balances with acceptable precision, and the application of basic spectrophotometric techniques.
18. Exhibit rudimentary skills with Gaussian Molecular Modelling software.

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion.)*

Lectures, labs, group problem-solving sessions.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials *(If more space is required, download Supplemental Texts and Resource Materials form.)*

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	Fritzke, G., Webb, J.	UFV Lab Manual	☒	UFV	current
2.	Petrucci, R.H., et al	General Chemistry: Principle and Modern Applications	☒	Pearson	current

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

Molecular Model Kit, available in the UFV Bookstore

Typical Evaluation Methods and Weighting

Final exam:	40%	Quizzes/tests:	10%	Assignments:	10%	Portfolio:	%
Midterm exams:	20%	Lab reports and techniques	20%	Practicum:	%	Other:	%

Typical Course Content and Topics

1. Atomic structure and atomic spectra. Introduction to quantum theory.
2. Electronic structure of many-electron atoms. Periodic trends in atomic properties.
3. Chemical bonding. Ionic and covalent bonds. Lewis diagrams.
4. Molecular structure. VSEPR model. Valence bond and molecular orbital theories.
5. Intermolecular interactions. Interactions involving ions, dipoles and induced dipoles, and their relation to physical properties of matter.
6. Introduction to organic chemistry. Nomenclature, functional groups, structure and bonding, stereochemistry, and conformational analysis.

Typical laboratory experiments include:

- Qualitative analysis of anions
- Gravimetric analysis of Ni
- Redox titration
- Back titration
- Spectrophotometry of Cr(III) ions
- Molecular geometries
- Periodic properties
- Introduction to chromatography
- Naming and structure of organic molecules