

UNIVERSITY OF CALGARY  
FACULTY OF SCIENCE  
DEPARTMENT OF CHEMISTRY  
COURSE OUTLINE  
FALL 2016

**1. COURSE: CHEMISTRY 211, Foundations of Chemistry: Structure and Bonding**

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	PHONE	EMAIL	OFFICE HOURS
L01	TR	11:00-12:15	EEEL161	Dr. Julie Lefebvre	EEEL 237C	220-7604	<a href="mailto:jlefebv@ucalgary.ca">jlefebv@ucalgary.ca</a>	TBA

Course website via D2L: [CHEM 211 L01 - \(Fall 2016\) - Foundations of Chemistry: Structure and Bonding](#)

Departmental Office: SA 229, 220-5341, [chem.undergrad@ucalgary.ca](mailto:chem.undergrad@ucalgary.ca)

- 2. PREREQUISITES:** Chemistry 30 (or Continuing Education - Introduction to Chemistry) and one of Pure Mathematics 30 or Mathematics II (offered by Continuing Education). Mathematics 31 is strongly recommended. Students are responsible for ensuring that they meet all pre- and co-requisite requirements for each course in which they are registered. Students who do not meet these requirements will be deleted from the course.
- 3. Grading:** The University policy on grading and related matters is described sections [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Laboratory – Wet Experiments (5)	20 %
Laboratory – CTDs (5)	15 %
Graded in-class activities (3)	12 % ( <b>September 27<sup>th</sup>, October 20<sup>th</sup>, December 1<sup>st</sup></b> )
Midterm	18 % ( <b>November 8<sup>th</sup> – in class</b> )
Final Examination	35 % ( <b>To be scheduled by the Registrar</b> )

Each piece of work (laboratory worksheets and reports, quizzes, in-class assignments, midterm test or final examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade. The conversion between course percentage and letter grade is given below:

**Grading Scale:**

<b>A+</b>	<b>A</b>	<b>A-</b>	<b>B+</b>	<b>B</b>	<b>B-</b>
<b>92% - 100%</b>	<b>86% - 91.99%</b>	<b>81% - 85.99%</b>	<b>76% - 80.99%</b>	<b>72% - 75.99%</b>	<b>68% - 71.99%</b>
<b>C+</b>	<b>C</b>	<b>C-</b>	<b>D+</b>	<b>D</b>	<b>F</b>
<b>62% - 67.99%</b>	<b>58% - 61.99%</b>	<b>54% - 57.99%</b>	<b>50% - 53.99%</b>	<b>45% - 49.99%</b>	<b>&lt; 44.99%</b>

**Notes:**

- (1) A minimum 50% on the laboratory component (wet experiments and CTDs) AND completion and submission of no less than seven laboratory sessions (including wet experiments and CTDs) is required in order to satisfy prerequisite requirements (i.e. C-) for further Science courses.
- (2) A minimum 50% weighted average on the examinations (midterm and final examination) is required in order to satisfy prerequisite requirements (i.e. C-) for further Science courses.
- (3) Notes (1) and (2) mean that if a student scores below 50% in either the laboratory component or the examinations, then the *maximum* grade they can obtain in Chem 211 is a D+.

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize himself/herself with these regulations. See also [Section E.6](#) of the University Calendar. There are no deferred midterm examinations. The weight of a legitimately missed examination will be pro-rated among the remaining exams.

6. **Course Materials:**

- Textbook: "**Chemical – Human Activity, Chemical Reactivity**", 2<sup>nd</sup> Edition, by Mahaffy, Bucat, Tasker *et al.*, Nelson, 2014
- A self-duplicating laboratory notebook
- A full length lab coat
- Safety glasses
- A lock for lab drawer (combination preferred)
- A non-programmable scientific calculator (such as Casio FX 260)

**OPTIONAL MATERIALS:** It is highly recommended to students to purchase a molecular model kit (Molymod recommended); the use of a model kit will be permitted for all examinations. Students may opt to participate in lecture question activities using TopHat Monocle. This will be described in detail on the first day of class. Though this is not mandatory, students are strongly recommended to participate to build up concepts and problem solving skills. The average mark obtained on TopHat Monocle could be used to replace one low (non-zero) CTD mark.

7. **Examination Policy:** During exams students are allowed to bring only pencils, pens, erasers, their ID card, a molecular model kit (without manufacturer's instructions) and a **non-programmable calculators (recommended calculator is the CASIO fx-260 solar)**. If in doubt, check your calculator with your instructor prior to the examination (the programmable TI calculators are not acceptable). Students should also read the Calendar, [Section G](#), on Examinations.

Special Needs Students must be registered with Student Accessibility Services (see section 11(c)), and must identify themselves to their instructor as soon as possible.

8. **Approved Mandatory and Optional Course Supplemental Fees:** The Department of Chemistry has a laboratory glassware breakage fee. At the start of the course, each student is assigned a locker and checks-in to establish that they have a complete set of usable glassware. By signing for check-in, a student agrees that they are now responsible for the glassware until check out. Any equipment that is missing, unusable or has been replaced during the semester will be charged to the student. All students, even those who withdraw early from the course must check out of the laboratory before the last day of lectures. Any student who fails to check out before the last day of lectures for the term will be assessed a charge of \$30.00. If this fee is not paid by the last day of the final examination period of the term, an additional \$10.00 administrative fee will be charged and university services (registration, transcripts, etc.) may be withheld. *The last day of withdrawal from any half year course is stated in the [2016-2017 Calendar](#) as Friday, December 9<sup>th</sup>, 2016.*

9. **Writing across the curriculum statement:** In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports. See also [Section E.2](#) of the University Calendar.

10. **Human studies statement:** If you consent, your coursework may be used for educational research purposes once the course is over. Individual responses will remain anonymous and confidential. Grouped data will be used in academic presentations and publications. Participation in such research is voluntary and will not influence grades in this course. Students' signed consent forms will be withheld from course instructors until after final grades are submitted. Interested participants may also be recruited for focus group studies. More information will be provided at the time student participation is requested. See also [Section E.5](#) of the University Calendar.

11. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

(a) **Academic Misconduct:** (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties

(b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).

- (c) **Academic Accommodation Policy:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at [http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities\\_0.pdf](http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf). Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Chemistry, Dr. Farideh Jalilehvand, by email [ahugchem@ucalgary.ca](mailto:ahugchem@ucalgary.ca) or phone (403) 220-5353.
- (d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also: <http://www.ucalgary.ca/secretariat/privacy>.
- (f) **Student Union Information:** VP Academic Phone: 403 220-3911 Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca)  
 SU Faculty Rep. Phone: 403 220-3913 Email: [science1@su.ucalgary.ca](mailto:science1@su.ucalgary.ca), [science2@su.ucalgary.ca](mailto:science2@su.ucalgary.ca) and [science3@su.ucalgary.ca](mailto:science3@su.ucalgary.ca);  
 Student Ombuds Office: 403 220-6420 Email [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca) <http://ucalgary.ca/provost/students/ombuds>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- (h) **U.S.R.I.:** At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses ([www.ucalgary.ca/usri](http://www.ucalgary.ca/usri)). Your responses make a difference - please participate in USRI Surveys.

## 12. Additional course information:

**LEARNING OUTCOMES:** Students will learn about the structure and bonding in chemical species and how it influences the physical properties and reactivity of collection of chemical species. This course will also focus on critical thinking, problem solving and laboratory skills (including teamwork and communication skills).

Big Ideas	Enduring Understandings <i>Students will understand.....</i>
Critical thinking	Critical thinking is crucial to an experiential science like chemistry. Critical thinking requires constant re-evaluation of results and hypotheses.
Stoichiometry	Chemists describe chemical species using chemical formulae. Chemical formulas and equations are used to solve quantitative problems. Empirical measurements are used to quantify a collection of chemical species.
Atoms	The electronic structure of atoms is key to explain how atoms come together to form chemical species. Atomic spectra can be used to elucidate the electronic structure of atoms. The energy and spatial distribution of electrons in atoms are explained using quantum theory. Every element has a unique arrangement of electrons. The electron configurations of atoms can be used to explain the physical properties of the elements and their compounds.
Chemical Species	Bonding involves the rearrangement of valence electrons. Lewis diagrams show the connectivity between atoms as a result of the rearrangement of valence electrons. Some chemical species display resonance. Regions of significant polarity can be used to identify functional groups and name chemical species. Valence Shell Electron Pair Repulsion (VSEPR) structures show the spatial arrangement of atoms within chemical species. The same number and type of atoms can connect and orient themselves in space in several different ways,

	<p>which results in isomerism.  Valence Bond (VB) and Molecular Orbital (MO) theories are used to explain the spatial arrangement of bonding.  The spatial arrangement of atoms determines the charge distribution of a chemical species.</p>
Collection of Chemical Species	<p>Chemical substances are collections of chemical species that interact with each other.  The physical properties and chemical reactivity of substances depend on the intermolecular interactions between chemical species.</p>

**LABORATORY:** All information regarding the following laboratory related items can be found online through Desire 2 Learn (D2L).

**SAFETY COURSE:** All undergraduate students taking chemistry laboratories are required to complete an introductory course (approx. 50 minutes) on laboratory safety. This course is presented in an online format. ***The Safety Course must be completed before the first lab activity.*** Students who do not complete the safety lessons will subsequently be denied admission to the laboratories. While it will not count directly toward the final grade, the material is considered to be part of the course and is therefore appropriate for inclusion into laboratory prelabs and exams.

**CTD's and EXPERIMENTS:** Along with the lecture component of the course, students are scheduled for Critical Thinking Development (CTD) sessions and wet laboratory experiments in alternating weeks. The schedule is arranged such that in any given week all students in the entire course will perform either a CTD session or a wet laboratory experiment. ***All laboratory activities begin September 19<sup>th</sup>, 2016. During the first week of laboratory activities, you will be checking in and there will be an orientation / information session as well as the first CTD session. Consult your Peoplesoft schedule for exact times.***

**CTD sessions and wet laboratory experiments** are held in EEEL 249. Students wearing inappropriate laboratory attire or with incomplete pre-laboratory assignments will not be permitted to conduct experiments for safety reasons (see online lab manual for details).

The relevant information for each CTD session will be available online through Desire 2 Learn (D2L). You must bring your self-duplicating notebook to every CTD along with a copy of the additional posted material whenever applicable. The grade for a CTD session will be based on the required write-up.

For each wet experiment **you must consult the online Laboratory Manual posted in D2L, print out the portion of the manual for the wet experiment you will be doing, and complete the pre-laboratory assignment prior to attending any of your scheduled lab periods.** The grade for each experiment will be based on your pre-laboratory assignment, and the required experimental write-up.