

University of Calgary
Department of Chemistry
Course Syllabus
Winter 2020

Course: CHEM 351 – Organic Chemistry I

Contact Information:

Lecture 01: MWF 10:00 - 10:50 in CHC 119

Instructor	email	phone	office	office hours
Dr. Bronwen Wheatley	bmmwheat@ucalgary.ca	403-220-8077	SA 144 C	please see D2L

Course Calendar Description:

An introduction to Organic Chemistry from a mechanistic perspective. Structure, bonding, and function, e.g. physical properties and reactivity. Stereochemistry; kinetics and thermodynamics. Spectroscopy (nuclear magnetic resonance, infrared, ultra-violet/visible, and mass spectrometric techniques). Substitution and elimination reactions of saturated functional groups - the chemistry of alkanes, alkyl halides, alcohols and their derivatives. Laboratory: Practical techniques.

Textbook and Course Materials:

There is no official textbook for this course; a suitable e-text is available through the Fall 2019 CHEM 351 site:

<http://www.chem.ucalgary.ca/courses/351/Carey5th/Carey.html>

Materials for the laboratory content will be drawn from the Fall 2019 CHEM 351 site:

<http://www.chem.ucalgary.ca/courses/351/index351-f19.html>

Additional content materials will be posted to D2L.

Students must bring their own lab coats, safety glasses, carbon-copy laboratory notebook, and combination lock to participate in labs.

Model kits are optional, but are allowed for the course and are allowed during examinations.

Tutorials:

Tutorials are expected to run every week in SA 204. Some tutorial activities will be D2L-based quizzes, others will be online nomenclature exercises, and still others will be on-paper worksheets. All tutorial activities contribute towards the course as a whole in content, and students will be strongly encouraged to attend tutorials to ask questions of the organic chemist present during that section.

Most tutorials will be graded; some for participation, and some for correct content. Tutorial activities will be designed to function in an open-book environment.

Course Topics:

The following topics will be addressed in the course:

- chemical bonding: structure and properties of ionic and covalent bonds, and nomenclature
- notation suitable for organic chemistry (e.g. line drawings, arrow conventions)
- resonance structures and notation
- valence bond theory and hybridization, MO theory applications
- organic functional groups
- intermolecular forces and physical properties
- thermodynamic stability
- pKa values and trends
- formal charges and oxidation states
- hydrocarbons
- saturation and IHD
- isomerism (constitutional, conformational, geometric, and different types of optical)
- conformational analysis and terminology
- structure determination and elemental analysis
- theory and practice of mass spectrometry, infrared spectroscopy, and nuclear magnetic resonance
- chemical reactions: including acid-base, radical halogenation, nucleophilic substitution, elimination
- nucleophilicity, basicity, and leaving group ability
- mechanisms' intermediates, regiochemistry, and stereochemistry
- synthetic pathways

The laboratory experiments are as follows:

- Solubility of organic compounds
- Melting point and boiling point determination
- Synthesis of acetaminophen and aspirin
- Isolation of the natural product caffeine
- Molecular models
- Chromatography
- Reactivity of hydrocarbons
- Spectroscopy
- Substitution reactions

Department Approval _____ Electronically Approved _____ Date _____ January 6, 2020 _____

Lab and Tutorial Schedule:

The week beginning...	Laboratory Experiment	Tutorial type
January 13	check-in and Solubility of organic compounds	self-instruction of nomenclature
January 20	Melting point and boiling point determination	self-instruction of nomenclature
January 27	Synthesis of aspirin	online quiz
February 3	Synthesis of acetaminophen	open tutorial in anticipation of 1 st midterm on February 7 th
February 10	Molecular models	online quiz
February 17	Reading Week – no lecture, lab, or tutorial	
February 24	Isolation of the natural product caffeine	in-person tutorial activity
March 2	Chromatography	open tutorial in anticipation of 2 nd midterm on March 6 th
March 9	no lab	in-person tutorial activity
March 16	Reactivity of hydrocarbons	online quiz
March 23	Spectroscopy	in-person tutorial activity
March 30	Substitution reactions	online quiz
April 6	check-out	online quiz

Please note:

- lecture content will approximately follow the order given in “Course Topics” above, but material to support the labs will be addressed prior to the appropriate experiment
- in-person tutorial activities will most likely be group activities, and students must attend their regularly scheduled tutorial section to participate
- the U of C is closed April 10th for Good Friday, and Easter Monday April 13th is a non-instructional day with no lectures
- the final exam will be Registrar-scheduled between April 18th and April 30th, inclusive