Division of Applied Science & Management
School of Science
Fall, 2017

COURSE OUTLINE

CHEM 210

ORGANIC CHEMISTRY I

3 CREDITS

PREPARED BY Ernie Prokopchuk, Instructor DATE: May 17, 2017

APPROVED BY: Margaret Dumkee, Dean DATE: May 17, 2017

APPROVED BY ACADEMIC COUNCIL, March 31, 2014

Division of Applied Science & Management
CHEM 210
Credit Course
Fall, 2017

CHEM 210 ORGANIC CHEMISTRY I

INSTRUCTOR: Ernie Prokopchuk, PhD

OFFICE HOURS: Wed. 10 am – 1 pm
**Open door policy is in effect*

OFFICE LOCATION: A2513

CLASSROOM: A2603

E-MAIL: eprokopchuk@yukoncollege.yk.ca

TIME: Tues & Thurs 1–2:30pm (lecture)
Fri 1:00 – 4:00 (lab)

TELEPHONE: 668-8865

DATES: Sept. 8 – Dec. 20, 2016

COURSE DESCRIPTION

Students are introduced to fundamental concepts of structure and bonding in organic molecules, including stereochemistry and chirality while undertaking a systematic study of various classes of organic molecules including alkanes, alkenes, alkynes, haloalkanes, alcohols, ethers, and epoxides. The mechanisms of common reactions are covered with an emphasis on understanding how the movement of electrons is used to rationalize these processes. Students are also introduced to the design of organic syntheses. The mandatory labs introduce students to standard organic laboratory techniques while further illustrating concepts covered in class.

PREREQUISITES

CHEM 110 with a minimum grade of C. CHEM 111 is recommended.

Students are expected to come to this course with an understanding of concepts covered in CHEM 110 including atomic structure, electron configurations, molecular formulas, basic bonding theory (Lewis structure and hybridization), and intermolecular forces. Much of this material is will be briefly reviewed in class.

EQUIVALENCY or TRANSFERABILITY

See the website http://bctransferguide.ca/ for a more complete list of transfers within British Columbia.
See the website http://alis.alberta.ca/ps/tsp/ta/tbi/onlinesearch.html for information on transfers within Alberta.

LEARNING OUTCOMES

After completing this course, students will be able to

- provide the IUPAC name for organic molecules and provide the structure of a molecule based on its name
- recognize common classes of organic molecules and be familiar with their physical and chemical properties
- accurately predict the outcomes of common reactions involving saturated and unsaturated hydrocarbons, alcohols, ethers, and epoxides
- use electron arrows to describe reaction mechanisms for common reactions of saturated and unsaturated hydrocarbons, alcohols, ethers, and epoxides
- design multistep organic syntheses using reactions that students know
- carry out common organic laboratory procedures using common organic laboratory equipment

DELIVERY METHODS

Course material is delivered mainly through classroom instruction.

Material is regularly posted on Moodle, the course LMS. This material will include assignments, course announcements, links to content on LibreTexts (https://chem.libretexts.org/), suggested practice problems, an exact copy of everything written on the screen during class, and other useful or interesting material related to the course. Please be aware that any notifications generated by Moodle are sent to your Yukon College email address. It is essential that you regularly check this email account, or set it up to automatically forward to your preferred email account.

Weekly labs provide students with hands-on experience of standard laboratory techniques as well as providing examples of some of the reactions discussed in class. Lab expectations are outlined in the lab manual.

COURSE FORMAT (3-3-0)

Lectures: Three hours per week.
Labs: Three hours per week.

ASSESSMENTS

Attendance
While lecture attendance is not graded, it is strongly recommended. There is a strong correlation between regular attendance and academic performance.

Assignments
There will be at least 5 assignments due on an approximately bi-weekly basis worth a total of 10% of the final grade. Assignments will consist of various questions or problems related to the course material. Students will have at least one week to complete each assignment. Late assignments will not be accepted (receiving a mark of 0) once graded assignments have been returned to the class.

Tests and Examinations
There will be two term tests (October 5, 2017 and November 2, 2017) worth 15% each held during scheduled class time. The final examination is worth 30% and will take place during the Final Exam period (Dec 8 – Dec 21). The exam date will be announced as soon as it is known.

Laboratory component
The labs are a mandatory component of the course. Unauthorized absence from a lab will result in a mark of zero for that lab. In order to receive a passing grade in the lab, a student must attend lab sessions and complete the experiments. If a lab period is missed, the report cannot be submitted unless arrangements are made with the instructor. Expectations for the labs are detailed in the lab manual.

EVALUATION

Term test 1	15%
Term test 2	15%
Assignments	10%
Exam (3 hours)	30%
Laboratory	30%
Total	**100%**

Students must pass (get at least 50%) both the laboratory and the lecture component in order to pass the course.

REQUIRED TEXTBOOKS and MATERIALS

As a step to making education more affordable, we will be using LibreTexts as our textbook. Some copies of traditional textbooks will be placed on reserve in the library. If you wish to purchase a textbook for your own reference, I can suggest some good options.

The Laboratory Manual for Chemistry 210 will be provided.

ACADEMIC AND STUDENT CONDUCT

Information on academic standing and student rights and responsibilities can be found in the Academic Regulations:
https://www.yukoncollege.yk.ca/programs/pages/academic_calendar

PLAGIARISM

Plagiarism is a serious academic offence. Plagiarism occurs when students present the words of someone else as their own. Plagiarism can be the deliberate use of a whole piece of another person's writing, but more frequently it occurs when students fail to acknowledge and document sources from which they have taken material. Whenever the words, research or ideas of others are directly quoted or paraphrased, they must be documented according to an accepted manuscript style (e.g., APA, CSE, MLA, etc.). Resubmitting a paper which has previously received credit is also considered plagiarism. Students who plagiarize material for assignments will receive a mark of zero (F) on the assignment and may fail the course. Plagiarism may also result in dismissal from a program of study or the College.

YUKON FIRST NATIONS CORE COMPETENCY

Yukon College recognizes that a greater understanding and awareness of Yukon First Nations history, culture and journey towards self-determination will help to build positive relationships among all Yukon citizens. As a result, to graduate from ANY Yukon College program, you will be required to achieve core competency in knowledge of Yukon First Nations. For details, please see www.yukoncollege.yk.ca/yfnccr.

ACADEMIC ACCOMMODATION

Reasonable accommodations are available for students requiring an academic accommodation to fully participate in this class. These accommodations are available for students with a documented disability, chronic condition or any other grounds specified in section 8.0 of the Yukon College Academic Regulations (available on the Yukon College website). It is the student's responsibility to seek these accommodations.

If a student requires an academic accommodation, he/she should contact the Learning Assistance Centre (LAC) at (867) 668-8785 or lassist@yukoncollege.yk.ca.

TOPIC OUTLINE

Week	Unit	Topic
0.5,1	1	Review of fundamental concepts: - bonding - formal charges - resonance - polar bonds
1,2	2	Functional groups - haloalkanes - alcohols and phenols - ethers - amines - aldehydes & ketons - carboxylic acids, esters, amides - nitriles Physical properties and structure - intermolecular forces IR spectroscopy
3	3	Acids and bases - Bronsted acids/bases - acid base equilibria - structure and acidity - solvent and acidity - organic bases - Lewis acids/bases - carbocations and carbanions
4,5	4	Alkanes and cycloalkanes - nomenclature - properties - conformational analysis - ring stability - substituted cycloalkanes – cis/trans isomerism - polycyclic alkanes - reactions - halogenation and radical mechanisms - alkyl radicals
5,6	5	Stereochemistry - chirality and entantiomers - biological importance

		- identifying/naming enantiomers - molecules with multiple chiral centres - Fischer projections - D and L designations for monosaccharides - resolution of enantiomers

7,8	6	Nucleophilic substitutions and elimination reactions
		- alkyl halides
		- nucleophiles
		- leaving groups
		- SN2 reactions
		  - kinetics and mechanism
		  - stereochemistry
		- SN1 reactions
		  - mechanism
		  - stereochemistry
		- Elimination reactions of alkyl halides
		  - E2 reaction
		  - E1 reaction

9,10	7,8	Alkenes and Alkynes - (E)/(Z) diastereomers - relative stabilities - synthesis of alkenes and alkynes - carbocation stability and rearrangements - terminal alkyne acidity - conversion of alkynes to nucleophiles - hydrogenation reactions - organic synthesis Electrophilic addition reactions - regiochemistry – Markovnikov's rule - stereochemistry of addition - alcohol formation - haloalkane formation - halohydrin formation carbenes oxidation and oxidative cleavage of alkenes and alkynes radical additions to alkenes
11	9	Alcohols - structure and nomenclature - properties - synthesis - reactions - conversion of alcohols to alkyl halides Ethers - synthesis - reactions Epoxides

		- synthesis - reactions
12,12.5	10	Oxidation and reduction in organic chemistry Alcohols from carbonyl compounds Oxidation of alcohols Organometallic compounds - preparation - reactions - alcohols from Grignard Reagents

**Specific dates of topic coverage may be subject to change. Some topics may not be covered depending on time constraints.*