Division of Applied Science & Management
School of Science
Fall, 2015

COURSE OUTLINE

CHEM 210

ORGANIC CHEMISTRY I

45 HOURS
3 CREDITS

PREPARED BY: _____ DATE: _____
Ernie Prokopchuk, Instructor

APPROVED BY: _____ DATE: _____
Margaret Dumkee, Dean ASM

YUKON COLLEGE

Course Outline prepared by E. Prokopchuk, May 29, 2015.

Yukon College
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Division of Applied Science & Management
CHEM 210
Credit Course
Fall, 2015

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: TBD

E-MAIL: eprokopchuk@yukoncollege.yk.ca

TIME:Tues & Thur 1:00 – 2:30pm (lecture)
Fri 8:30 – 11:30 (lab)

TELEPHONE: 668-8865

DATES: Sept. 8 – Dec. 18, 2015

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 covered in the textbook in chapter 1 and will be briefly reviewed during the first class.

EQUIVALENCY or TRANSFERABILITY

In progress. For more information about transferability contact the Applied Science office.
See the website http://bctransferguide.ca/ for a more complete list of transfers within British Columbia, including to university colleges.

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 will be posted online throughout the term.

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 usually a strong correlation between regular attendance and academic performance.

Students are required to attend all labs unless excused by the instructor for valid reasons. More than one unexcused absence from a lab will normally result in a failing grade for the lab and for the course.

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 involve a number of questions or problems related to the course material. Students will have at least one week to complete each assignment. Late assignments will be penalized 10% for each day late. 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 8, 2015 and November 5, 2015) worth 15% each held during scheduled class time. The final examination is worth 30%. The exam date will be announced as soon as it is known. Please note: discretionary travel is not a valid excuse to miss the final exam!

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

Solomons, G; Fryhle, C.; Snyder, S. 2014. Organic Chemistry. 11th ed. John Wiley & Sons, Inc.

Laboratory Manual for Chemistry 210 (available at the first lab session)

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.

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 *(the exact chapters and timing will depend on the choice of textbook)*

Week	Chapter	Topic
0.5,1	1,2	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 acisd/bases - carbocations and carbanions
4,5	4, 10	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	7,8,10	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	11	Alcohols - structure and nomenclature - properties - synthesis - reactions - conversion of alcohols to alkyl halides Ethers - synthesis - reactions Epoxides - synthesis - reactions
12,12.5	12	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.*