Grande Prairie Regional College
Department of Science: Chemistry
Forty-Fifth Session: 2010 – 2011

Course Outline: Organic Chemistry CH2610 A2

CH2610 A2: Organic Chemistry I; Prerequisite, CH1010 or CH1030

INSTRUCTOR: Dr. John P. Sloan
Office # J207
Phone # 780-539-2004
E-mail SLOAN@GPRC.AB.CA
WileyPlus Web Site: https://edugen.wiley.com/edugen/secure/index.uni

LECTURE: CH2610 T, R 11:30 – 12:20 in J204

ALBERTA TRANSFER CREDIT
(Ref: 2009-2010 Guide to Transfer Credit at Alberta Post-Secondary Institutions)

GPRC:	CH2610 (3)
U of Alberta:	CHEM 261 (3) or AUCHE 250 (3)
U of Calgary:	CHEM 351 (3)
U of Lethbridge:	CHEM 2500 (3)
Athabasca U:	CHEM 350 (3)
Canadian UC:	CHEM 241 (4)
Concordia UC:	CHEM 261 (3)

COURSE OUTLINE:

LECTURE COMPONENT:

A study of the fundamental principles of the chemistry of carbon compounds. The study is based on a reaction mechanism approach to the functional group chemistry of alkanes, alkenes, alkynes, cycloalkanes, alkyl halides, alcohols and ethers. Topics include: structure and bonding; physical properties; acidity and basicity; conformations of molecules; stereochemistry; addition, elimination and substitution reactions; structure-reactivity relationships; and introduction to methods for structure determination.

A representative selection of molecules found in agricultural, biological, environmental, industrial, medical, and pharmatheutical applications of organic chemistry will be discussed, e.g., molecules found in agrochemicals, fibres, food additives, perfumes, polymers, and prescription drugs.

LABORATORY COMPONENT:

Laboratory Techniques in organic chemistry; preparation of some organic compounds, and; methods of qualitative organic analysis.

TUTORIAL COMPONENT:

Problem solving and discussion sessions. Weekly assignments will be given in two formats, namely:

1. WileyPlus Interactive-On-Line, including on-line grading, and;
2. WileyPlus Posted Ten-Question-Assignments for completion On-Line or through Hand-Writing.

Detailed solutions to the, "Ten-Question-Assignments", will be posted on WileyPlus after the due dates for the assignments. The WileyPlus web site is: https://edugen.wiley.com/edugen/secure/index.uni

NOTES:

1. Lectures, Time and Place
   CH2610 A2 T, R 11:30 - 12:20 in J204

2. Laboratory Component, Time and Place
   CH2610 L1 M 14:30 - 17:20 in J116
   CH2610 L2 T 14:30 - 17:20 in J116

3. Tutorial Component, Time and Place
   CH2610 S1 F 8:30 - 9:20 in J204

4. Office Hours: Individual and group assistance will normally be available in office J207 during regular college business hours outside of formal class lecture, laboratory and tutorial hours.

TEXT BOOKS AND LABORATORY ITEMS:

<u>The following text book is required:</u>

CH2610

Solomons, T.W.G., and C.B. Fryhle, *Organic Chemistry*, 10th Edition, Wiley, 2011, including access to the WileyPlus web site at: https://edugen.wiley.com/edugen/secure/index.uni.

And
A Three Ring Binder to Hold: Sloan, J.P., *Organic Chemistry Experiments, Chemistry 2610/2630*, Grande Prairie Regional College, 2010/2011.

Molecular Models are highly recommended, namely:

Molecular Model Set for Organic Chemistry, Prentice Hall.

Study Guides, Solutions Manuals, and Wiley Plus are supplementary items, namely:

1. Fernandez, J.E., and Solomons, T.W.G., *Study Guide and Solutions Manual to Organic Chemistry*, 10th Edition, 2011;
2. Wiley Plus at the web site: https://edugen.wiley.com/edugen/secure/index.uni

Note:

1. All required and supplementary books, molecular structure model sets, safety glasses, and lab coats are available at the College Bookstore. *Organic Chemistry Experiments*, by J.P. Sloan, will be given as handouts in advance of each lab period. These are to be inserted in a three ring binder.

EVALUATION:

Examination Schedule and Composition of the Final Grade:

1. Midterm Exam # 1, Friday October 8 ---------- 15%
2. Midterm Exam # 2, Friday November 12 ---------- 20%
2. Final Exam to be scheduled between December 9 – 18 ------- 30%
3. Laboratory ---------- 25%
4. Tutorial Grading Component ---------- 10%

100%

The Grades are based on the alpha grading system. The Registrar's Office will convert alpha grades to four-point equivalence for the calculation of grade point averages. Alpha grades, 4-point equivalence, and grade descriptors are as follows:

Alpha Grade	4-Point Equivalence	Percentage Guidelines	Descriptor
A^+	4.0	90 – 100	Excellent
A	4.0	85 – 90	
A-	3.7	80 – 84	Very Good First Class Standing
B+	3.3	77 – 79	
B	3.0	73 – 76	Good
B-	2.7	70 – 72	
C+	2.3	67 – 69	Satisfactory
C	2.0	63 – 66	
C-	1.7	60 – 62	
D+	1.3	55 – 59	Poor*
D	1.0	50 – 54	Minimal Pass*
F	0.0	0 – 49	Failure
WF	0.0	0	Fail, withdraw after the deadline

* Other post secondary institutions may not award transfer credit for grades of D and D+.

Notes:

1. The Mid-Term Exams will be of 1.5 hours duration and the Final Exam will be of 3 hours duration.

2. Between 5 and 15% of exam content will be taken from a combination of weekly assignments, Wiley Plus, and questions in the organic chemistry textbook by Solomons and Fryhle.

3. A pass grade is essential for the Laboratory Component.

4. The Tutorial Grading Component will contribute to 10% of the final grade and will consist of two components as determined by the Instructor with input from the class. The two components are;
   4.1 Printed assignments consisting of ten questions per assignment, and;
   4.2 On-line Wiley Plus tests prepared by the Instructor and marked electronically, with feedback to the students.

5. Assistance with assignments will be given upon request.

6. Regular attendance in Lecture, Laboratory, and Tutorial Components is a Course Requirement.

Grande Prairie Regional College Calendar 2009 - 2010: Course Description (p 177).

CH2610 3(3-1-3)UT, 105 Hours, Organic Chemistry I

The correlation of structure and bonding in carbon compounds with the physical properties and chemical reactivity of organic molecules. Discussion will be based on functional groups with emphasis on hydrocarbons and derivatives that contain halogens, oxygen, sulphur and the hydroxyl group. Introduction to stereochemistry, three dimensional structure, reaction mechanisms, especially addition to double bonds, nucleophilic substitution and elimination reactions, and methods of structure determination. The study covers the functional group chemistry of alkanes, alkenes, alkynes, alcohols, ethers and sulfides.

Prerequisites: CH1010 or CH1030

Notes: Credit will be granted for only one of CH1610 or CH2610

Transfer: UA, UC, UL, AU, AF, CU, CUC, KUC

STATEMENT ON PLAGIARISM AND CHEATING:

Please refer to pages 49-50 of the College calendar regarding plagiarism, cheating and the resultant penalties. These are serious issues and will be dealt with severely.

CHEMISTRY 2610: READING, STUDYING, AND PRACTICE PROBLEMS

All references are to T.W.G. Solomons and C.B. Fryhle, *Organic Chemistry,* **10th Edition, Wiley, 2011**.

Fall Semester

Weeks of
Sept 2 & 6: THE BASICS: Bonding and Molecular Structure: Read and Study Chapter 1.

Practice Problems: You are encouraged to work all of the in-chapter problems, and you are required to complete the assignments given in-seminar-class and from WileyPlus. Routinely doing problems in organic chemistry leads to understanding of the theory, and good grades in organic chemistry.

In the words of Solomons and Fryhle:
"*One way to check your progress is to work each of the in-chapter problems when you come to it. These problems have been written just for this purpose and are designed to help you decide whether or not you understand the material that has just been explained.*"

And, in the words of Wade:
"*It's easy to fool yourself into thinking you understand organic chemistry when you actually do not. As you read through this book, all the facts and ideas may make sense, yet you have not learned to combine and use those facts and ideas. An examination is a painful time to learn that you do not really understand the material.*

The best way to understand organic chemistry is to use it. You will certainly need to read and reread all the material in the chapter, but this level of understanding is just the beginning. Problems are provided so you can work with the ideas, applying them to new compounds and new reactions that you have never seen before. By working problems, you force yourself to use the material and fill in the gaps in your understanding. You also increase your level of self-confidence and your ability to do well on exams".

Problems/Page	#'s	In-Chapter	1.1 to 1.25
	47	End of Chapter	1.26 to 1.50
	50	Challenge Problems	1.46 to 1.50
	51	Learning Group Problems	1 to 8

Week of Sept 13: FAMILIES of CARBON COMPOUNDS: Functional Groups, Intermolecular Forces, and Infrared (IR) Spectroscopy. Read and Study Chapter 2.

Problems/Page	#'s:	In-Chapter	2.1 to 2.28
	93	End of Chapter	2.29 to 2.54
	96	Challenge Problems	2.55 to 2.58
	96	Learning Group Problems	1 to 8

Week of Sept 20: AN INTRODUCTION TO ORGANIC REACTIONS and THEIR MECHANISMS: ACIDS AND BASES IN ORGANIC CHEMISTRY. Read and Study Chapter 3.

Problems/Page	#'s:	In-Chapter	3.1 to 3.17
	132	End of Chapter	3.18 to 3.40
	134	Challenge Problems	3.41 to 3.45

135 Learning Group Problems 1 to 4

Week of Sept 27: NOMENCLATURE AND CONFORMATIONS OF ALKANES AND CYCLOALKANES.
Read and Study Chapter 4

Problems/Page #'s: In-Chapter 4.1 to 4.22
182 End of Chapter 4.23 to 4.46
184 Challenge Problems 4.47 to 4.51
180 Learning Group Problems 1 to 4

Week of Oct 4: STEREOCHEMISTRY: CHIRAL MOLECULES. Read and Study Chapter 5.

Problems/Page #'s: In-Chapter 5.1 to 5.32
225 End of Chapter 5.33 to 5.49
228 Challenge Problems 5.50 to 5.53
228 Learning Group Problems 1 to 3
Additional Problems - The CD accompanying the text book includes a set of computer molecular model stereochemistry exercises that are keyed to the text

Weeks of Oct 11: IONIC REACTIONS: Nucleophilic Substitution and Elimination Reactions of Alkyl Halides. Read and Study Chapter 6.

Problems/Page #'s: In-Chapter 6.1 to 6.19
277 End of Chapter 6.20 to 6.47
282 Challenge Problems 6.48 to 6.56
283 Learning Group Problems 1 to 2

Week of Oct 18: ALKENES AND ALKYNES I: Properties and Synthesis.
Elimination Reactions of Alkyl Halides. Read and Study Chapter 7.

Problems/Page #/s: In-Chapter 7.1 to 7.24
323 End of Chapter 7.25 to 7.48
327 Challenge Problems 7.49 to 7.54
327 Learning Group Problems 1 to 8

Week of Oct 25: ALKENES AND ALKYNES II: Addition Reactions. Read and Study Chapter 8.

Problems/Page #'s: In-Chapter 8.1 to 8.25
376 End of Chapter 8.26 to 8.65
381 Challenge Problems 8.66 to 8.70
382 Learning Group Problems 1 to 4

Week of Nov 1: RADICAL REACTIONS. Read and Study Chapter 10.

Problems/Page #'s: In-Chapter 10.1 to 10.19
496 End of Chapter 10.20 to 10.33
499 Challenge Problems 10.34 to 10.41
400 Learning Group Problems 1 to 2

Week of Nov 8: ALCOHOLS AND ETHERS.: Synthesis and Reactions. Read and Study Chapter 11.

Problems/Page #'s:	In-Chapter	11.1 to 11.24
541	End of Chapter	11.25 to 11.53
545	Challenge Problems	11.54 to 11.58
546	Learning Group Problems 1 to 3	

Week of Nov 15: ALCOHOLS FROM CARBONYL COMPOUNDS: OXIDATION-REDUCTION AND ORGANOMETALLIC COMPOUNDS. Read and Study Chapter 12.

Problems/Page #'s:	In-Chapter	12.1 to 12.9
576	End of Chapter	12.10 to 12.37
581	Challenge Problems	12.38 to 12.40
582	Learning Group Problem	

Week of Nov22: CONJUGATED UNSATURATED SYSTEMS. Read and Study Chapter 13.

Problems/Page #'s:	In-Chapter	13.1 to 13.14
624	End of Chapter	13.15 to 13.47
629	Challenge Problems	13.48 to 13.51
630	Learning Group Problems 1 to 2	

Weeks of Nov 29 & Dec 6: Review Class, e.g. review of a Practice Final Exam.

CHEMISTRY 2610: READING, STUDYING, AND PRACTICE PROBLEMS

All references are to T.W.G. Solomons and C.B. Fryhle, *Organic Chemistry*, **9th Edition, Wiley, 2008.**

Fall Semester

Weeks of
Sept 2 & 6: THE BASICS: Bonding and Molecular Structure: Read and Study Chapter 1.

Practice Problems: You are encouraged to work all of the in-chapter problems, and you are required to complete the assignments given in-seminar-class and from WileyPlus. Routinely doing problems in organic chemistry leads to understanding of the theory, and good grades in organic chemistry.

In the words of Solomons and Fryhle:
"*One way to check your progress is to work each of the in-chapter problems when you come to it. These problems have been written just for this purpose and are designed to help you decide whether or not you understand the material that has just been explained.*"

And, in the words of Wade:
"*It's easy to fool yourself into thinking you understand organic chemistry when you actually do not. As you read through this book, all the facts and ideas may make sense, yet you have not learned to combine and use those facts and ideas. An examination is a painful time to learn that you do not really understand the material.*

The best way to understand organic chemistry is to use it. You will certainly need to read and reread all the material in the chapter, but this level of understanding is just the beginning. Problems are provided so you can work with the ideas, applying them to new compounds and new reactions that you have never seen before. By working problems, you force yourself to use the material and fill in the gaps in your understanding. You also increase your level of self-confidence and your ability to do well on exams".

Problems/Page #'s		
In-Chapter		1.1 to 1.15
47	End of Chapter	1.16 to 1.38
50	Learning Group Problem	

Week of Sept 13: REPRESENTATIVE CARBON COMPOUNDS: Functional Groups, Intermolecular Forces, and Infrared (IR) Spectroscopy. Read and Study Chapter 2.

Problems/Page #'s:		
In-Chapter		2.1 to 2.19
87	End of Chapter	2.20 to 2.48
90	Learning Group Problem	

Week of Sept 20: AN INTRODUCTION TO ORGANIC REACTIONS:
ACIDS AND BASES IN ORGANIC CHEMISTRY. Read and Study Chapter 3.

Problems/Page #'s:		
In-Chapter		3.1 to 3.14
124	End of Chapter	3.15 to 3.42
127	Learning Group Problem	

Week of Sept 27: NOMENCLATURE AND CONFORMATIONS OF ALKANES AND CYCLOALKANES.
Read and Study Chapter 4

Problems/Page #'s: In-Chapter 4.1 to 4.21
178 End of Chapter 4.22 to 4.54
180 Learning Group Problems

Week of Oct 4: STEREOCHEMISTRY: CHIRAL MOLECULES. Read and Study Chapter 5.

Problems/Page #'s: In-Chapter 5.1 to 5.29
218 End of Chapter 5.30 to 5.44
220 Learning Group Problems
Additional Problems - The CD accompanying the text book includes a set of computer molecular model stereochemistry exercises that are keyed to the text

Weeks of Oct 11: IONIC REACTIONS: Nucleophilic Substitution and Elimination Reactions of Alkyl Halides. Read and Study Chapter 6.

Problems/Page #'s: In-Chapter 6.1 to 6.12
252 End of Chapter 6.13 to 6.48
268 Learning Group Problems

Week of Oct 18: ALKENES AND ALKYNES I: Properties and Synthesis.
Elimination Reactions of Alkyl Halides. Read and Study Chapter 7.

Problems/Page #/s: In-Chapter 7.1 to 7.17
306 End of Chapter 7.18 to 7.46
310 Learning Group Problems

Week of Oct 25: ALKENES AND ALKYNES II: Addition Reactions. Read and Study Chapter 8.

Problems/Page #'s: In-Chapter 8.1 to 8.26
356 End of Chapter 8.27 to 8.68
361 Learning Group Problems.

Week of Nov 1: RADICAL REACTIONS. Read and Study Chapter 10.

Problems/Page #'s: In-Chapter 10.1 to 10.22
461 End of Chapter 10.23 to 10.34
463 Learning Group Problems.

Week of Nov 8: ALCOHOLS AND ETHERS. Read and Study Chapter 11.

Problems/Page #'s: In-Chapter 11.1 to 11.24
509 End of Chapter 11.25 to 11.51
512 Learning Group Problems.

Week of Nov 15: ALCOHOLS FROM CARBONYL COMPOUNDS: OXIDATION-REDUCTION AND ORGANOMETALLIC COMPOUNDS. Read and Study Chapter 12.

Problems/Page #'s: In-Chapter 12.1 to 12.10
542 End of Chapter 12.11 to 12.29
545 Learning Group Problems.
546 First Review Problem Set 1 to 25.

Week of Nov22: CONJUGATED UNSATURATED SYSTEMS. Read and Study Chapter 13.

Problems/Page #'s: In-Chapter 13.1 to 13.15
589 End of Chapter 13.16 to 13.46
594 Learning Group Problems.

Weeks of Nov 29 & Dec 6: Review Class, e.g. review of a Practice Final Exam.