



## DEPARTMENT OF SCIENCE

### COURSE OUTLINE: CH2610 A3, B3, Organic Chemistry I, Winter 2014

**INSTRUCTOR:** Dr. John P. Sloan                      **PHONE:** 780-539-2004  
**OFFICE:** Office # J207                                      **E-MAIL:** jsloan@gprc.ab.ca

**OFFICE HOURS:** Mon & Wed 10:00 – 11:30 & 13:00 – 14:30; Thursday 14:30 – 16:00.

**PREREQUISITE(S)/COREQUISITE:** CH1010 or CH1030

#### REQUIRED TEXT/RESOURCE MATERIALS:

1. Solomons, T.W.G., C.B. Fryhle, S.A. Snyder, *Organic Chemistry*, 11th Edition, Wiley, 2014, including access to the WileyPlus web site at: <https://edugen.wiley.com/edugen/secure/index.uni>.
2. A Three Ring Binder to Hold: Sloan, J.P., *Organic Chemistry Experiments, Chemistry 2610/2630*, Grande Prairie Regional College, 2013/2014.
3. Molecular Models are highly recommended, namely: Molecular Model Set for Organic Chemistry, Prentice Hall.
4. Study Guide and Solutions Manual (978-1-118-14790-0) is an optional item; namely:
  - 4.1 The Study Guide and Solutions Manual for Organic Chemistry, 11<sup>th</sup> Edition, authored by Jon Antilla, University of South Florida, Robert Johnson, Xavier University, Craig Fryhle, Graham Solomons, and Scott Snyder.

Note: Solomons et al, *Organic Chemistry*, 11<sup>th</sup> Edition including access to WileyPlus; safety glasses; and lab coats are available at the College Bookstore. *Organic Chemistry Experiments*, by J.P. Sloan, will be given as hand outs in advance of each lab period. These are to be inserted in a three ring binder. Use of Molecular Models is encouraged.

**CALENDAR DESCRIPTION:** 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

**CREDIT/CONTACT HOURS:** CH2610 3(3-1-3)UT, 105 Hours, Organic Chemistry I

**DELIVERY MODE(S):** Organic Chemistry I, consisting of CH2610 A3, B3, S1, S2, S3, L1, L2 and L3, will be delivered in Lecture, Tutorial and Laboratory Components.

**OBJECTIVES (OPTIONAL):** The objective of Organic Chemistry I is for students to become proficient in their understanding of the theory of Organic Chemistry as outlined in the Calendar Description and in this Course Outline.

**TRANSFERABILITY: ALBERTA TRANSFER CREDIT**

(Ref: Alberta Council of Admissions and Transfers, 2013-2014, updated January 2, 2014)

GPRC:	CH 2610 (3)	CH 2630 (3)
U of Alberta:	CHEM 261 (3) or AUCHE 250 (3)	CHEM 263 (3) or AUCHE 252 (3)
U of Calgary:	CHEM 351 (3)	CHEM 353 (3)
U of Lethbridge:	CHEM 2500 (3)	CHEM 2600 (3)
Grant MacEwan U:	CHEM 261 (3)	CHEM 263 (3)
Athabasca U:	CHEM 350 (3)	CHEM 360 (3)
Canadian UC:	CHEM 241 (4)	CHEM 242 (4)
Concordia UC:	CHEM 261 (3)	CHEM 263 (3)
King's UC:	CHEM 3xx (3)	CHEM 351 (3)

## GRADING CRITERIA:

The Grades will be 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:

<b>Alpha Grade</b>	<b>4-Point Equivalence</b>	<b>Percentage Guidelines</b>	<b>Descriptor</b>
A <sup>+</sup>	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

\* Grades of D and D+ may not be acceptable to other post-secondary institutions. Students are cautioned that it is their responsibility to contact the receiving institution to ensure transferability.

## EVALUATIONS:

### Examination Schedule and Composition of the Final Grade:

1.	Midterm Exam # 1, Friday February 14 -----	20%
2.	Midterm Exam # 2, Friday March 14 -----	20%
2.	Final Exam to be scheduled between April 16 – 28 -----	35%
3.	Laboratory -----	20%
4.	Tutorial Grading Component -----	5%
		<u>100%</u>

### 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.
5. A pass grade is essential for the Laboratory Component.
6. The Tutorial Grading Component will contribute to 5% of the final grade and will consist of ten assignments with ten questions per assignment.
5. Assistance with assignments will be given upon request.

## STUDENT RESPONSIBILITIES:

Students are responsible for regular attendance in Lecture, Laboratory, and Tutorial Components of the Organic Chemistry I course. They are also responsible for submission of assignments and laboratory reports according to the course policy; and for attending the exams according to the Exam Schedule.

## STATEMENT ON PLAGIARISM AND CHEATING:

Refer to the Student Conduct section of the College Admission Guide at

<http://www.gprc.ab.ca/programs/calendar/> or the College Policy on Student Misconduct: Plagiarism and Cheating at [www.gprc.ab.ca/about/administration/policies/\\*\\*](http://www.gprc.ab.ca/about/administration/policies/**)

\*\*Note: all Academic and Administrative policies are available on the same page.

## COURSE SCHEDULE/TENTATIVE TIMELINE:

The Course Schedule consists of Lecture, Laboratory and Tutorial Components. A brief description of the components is as follows:

### 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 pharmaceutical 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 with weekly problem sets. Regular assignments will be given and marked. There will be ten assignments with each assignment consisting of ten questions.

Detailed solutions to the, "Ten-Question-Assignments", will be posted on Moodle after the due dates for the assignments.

The WileyPlus web site for additional resources is: <https://edugen.wiley.com/edugen/secure/index.uni>

### The Course Schedule is:

- Lectures, Time and Place:  
CH2610 A3 T, R 13:00 - 14:20 in L123  
CH2610 B3 T, R 11:30 - 12:50 in L123
- Laboratory Component, Time and Place:  
CH2610 L1 M 14:30 - 17:20 in J116  
CH2610 L2 T 14:30 - 17:20 in J116  
CH2610 L3 W 14:30 - 17:20 in J119
- Tutorial Component, Time and Place:  
CH2610 S1 F 8:30 - 9:20 in J229  
CH2610 S2 F 10:00 - 10:50 in J229  
CH2610 S2 F 11:30 - 12:20 in J202
- 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.

**TIMETABLE:** The Timetable for CH 2610 A3, Organic Chemistry I, is as follows:

## CH2610 A3, B3, Organic Chemistry I: Schedule for Reading, Studying and Practice Problems

References are to T.W.G. Solomons, C.B. Fryhle and S.A. Snyder, *Organic Chemistry*, 11th Edition, Wiley, 2014.

### WINTER SEMESTER

Weeks of

Jan 7: THE BASICS: Bonding and Molecular Structure: Read and Study Chapter 1, including the Concept Map on page 54.

**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 you may complete additional organic chemistry problems using WileyPlus. Routinely doing problems in organic chemistry leads to understanding of the theory, and to earning 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 1.28
49	End of Chapter	1.29 to 1.50
52	Challenge Problems	1.51 to 1.56
53	Learning Group Problems	1 to 8

Week of Jan 14: FAMILIES of CARBON COMPOUNDS: Functional Groups, Intermolecular Forces, and Infrared (IR) Spectroscopy. Read and Study Chapter 2, including the Concept Map on page 103.

Problems/Page #'s:	In-Chapter	2.1 to 2.28
99	End of Chapter	2.29 to 2.53
102	Challenge Problems	2.54 to 2.57
102	Learning Group Problems	1 to 8

Week of Jan 21: AN INTRODUCTION TO ORGANIC REACTIONS and THEIR MECHANISMS: ACIDS AND BASES IN ORGANIC CHEMISTRY. Read & Study Chapter 3, including the Concept Map on page 141.

Problems/Page #'s:	In-Chapter	3.1 to 3.17
137	End of Chapter	3.18 to 3.40
139	Challenge Problems	3.41 to 3.45
140	Learning Group Problems	1 to 4

Week of Jan 28: NOMENCLATURE and CONFORMATIONS of ALKANES and CYCLOALKANES. Read and Study Chapter 4, and read the Concept Map on page 190.

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

Week of Feb 4: STEREOCHEMISTRY: CHIRAL MOLECULES. Read & Study Chapter 5, and read the Concept Map on page 238.

Problems/Page #'s:	In-Chapter	5.1 to 5.32
234	End of Chapter	5.33 to 5.51
237	Challenge Problems	5.52 to 5.55
235	Learning Group Problems	1 to 3

Additional Problems - The WileyPlus accompanying the text book includes a set of computer molecular model stereochemistry exercises that are keyed to the text

Weeks of Feb 11: IONIC REACTIONS: Nucleophilic Substitution and Elimination Reactions of Alkyl Halides. Read and Study Chapter 6, and read the, "Summary and Review Tools – Mechanism Review: Substitution versus Elimination", on page 290.

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

Week of Feb 18-22: No Classes: Family Day is Feb 17 and Winter Break is Feb 18 – 21.

Week of Feb 25: ALKENES AND ALKYNES I: Properties and Synthesis.

Elimination Reactions of Alkyl Halides. Read and Study Chapter 7, read Summary and Review Tools, and the Concept Map on pages 335 and 336.

Problems/Page #/s:	In-Chapter	7.1 to 7.24
329	End of Chapter	7.25 to 7.49
332	Challenge Problems	7.50 to 7.55
333	Learning Group Problems	1 to 5.

Week of March 4: ALKENES & ALKYNES II: Addition Reactions. Read & Study Chapter 8, and read, “Summary and Review Tools; Summary of Alkene Addition Reactions, and Synthetic Connections of Alkynes and Alkenes II”, on page 389 and 390.

Problems/Page #'s:	In-Chapter	8.1 to 8.25
383	End of Chapter	8.26 to 8.65
387	Challenge Problems	8.66 to 8.67
388	Learning Group Problems	1 to 4

Week of March 11: RADICAL REACTIONS. Read and Study Chapter 10, and read the, “Concept Map – Mechanism Review of Radical Reactions”, on page 497.

Problems/Page #'s:	In-Chapter	10.1 to 10.17
492	End of Chapter	10.20 to 10.33
495	Challenge Problems	10.34 to 10.41
496	Learning Group Problems	1 to 2

Week of March 18: ALCOHOLS & ETHERS: Synthesis & Reactions. Read & Study Chapter 11, and read the, “Summary and Review Tools – Some Synthetic Connections of Alkenes, Alkynes, Alcohols, Alkyl Halides and Ethers”, on page 541.

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

Week of March 25: ALCOHOLS FROM CARBONYL COMPOUNDS: OXIDATION-REDUCTION AND ORGANOMETALLIC COMPOUNDS.

Read and Study Chapter 12, and read the, “Summary and Review Tools – Synthetic Connections of Alcohols and Carbonyl Compounds”, on pages 879 and 880.

Problems/Page #'s:	In-Chapter	12.1 to 12.10
572	End of Chapter	12.11 to 12.38
577	Challenge Problems	12.39 to 12.41

577 Learning Group Problem

Week of April 1: CONJUGATED UNSATURATED SYSTEMS. Read and Study Chapter 13, and read the, "Concept Map", on page 625.

Problems/Page #'s:	In-Chapter	13.1 to 13.17
618	End of Chapter	13.18 to 13.50
623	Challenge Problems	13.51 to 13.54
624	Learning Group Problems	1 to 2

Weeks of April 8 & April 15: Review Class, e.g. review of a Practice Final Exam.

**TIMETABLE:** The Timetable for CH 2610 A3, Organic Chemistry I, is as follows:

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

### WINTER SEMESTER

Weeks of

Jan 7: THE BASICS: Bonding and Molecular Structure: Read and Study Chapter 1.

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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 Jan 14: 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 Jan 21: AN INTRODUCTION TO ORGANIC REACTIONS  
and THEIR MECHANISMS:  
ACIDS AND BASES IN ORGANIC CHEMISTRY. Read & 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 Jan 28: 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 Feb 4: STEREOCHEMISTRY: CHIRAL MOLECULES. Read & 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 WileyPlus accompanying the text book includes a set of  
computer molecular model stereochemistry exercises that are keyed to the text

Weeks of Feb 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 Feb 18-22: No Classes: Family Day is Feb 17 and Winter Break is Feb 18 – 21.

Week of Feb 25: 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 March 4: ALKENES & ALKYNES II: Addition Reactions. Read & 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 March 11: 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 March 18: ALCOHOLS & ETHERS: Synthesis & Reactions. Read & 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 March 25: 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 April 1: 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 April 8 & April 15: Review Class, e.g. review of a Practice Final Exam.