



**DEPARTMENT of SCIENCE**  
**COURSE OUTLINE – WINTER 2020**

**CH2610 A3 & CH2610 B3: Organic Chemistry I – 3 (3-1-3) 105 Hours for 15 Weeks**

**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; Tues 11:30 – 14:30.

**CALENDAR DESCRIPTION:**

Reference: Grande Prairie Regional College Academic Calendar 2019-2020.

**CH2610 3 (3-1-3) UT 105 Hours 15 Weeks Organic Chemistry I** The correlation of structure and chemical 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, sulfur 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. Engineering students who take this course will receive 4.5 credits of transfer to UofA. Transfer: UA, UC, UL, AU\*, AF, CU, CUC, GMU, KUC\*

\* An asterisk (\*) beside any transfer institution indicates important transfer information. Consult the Alberta Transfer Guide.

**PREREQUISITE(S)/COREQUISITE:** CH1010 or CH1030 Notes: Credit will be granted for only one of CH1610 or CH2610. Transfer: UA, UC, UL, AU\*, AF, CU, CUC, GMU, KUC\*. \* An asterisk (\*) beside any transfer institution indicates important transfer information. Consult the Alberta Transfer Guide.

**RESOURCE MATERIALS:**

1. Recommended Text, however; the Text is expensive and alternative on-line free resources are available: Solomons, T.W.G., C.B. Fryhle, S.A. Snyder, *Organic Chemistry*, 12th Edition, Wiley, 2016, including access to the WileyPlus web site at: <https://edugen.wiley.com/edugen/secure/index.uni>. ISBN: 978-1-118-87576-6  
Note: The 11<sup>th</sup> Edition is acceptable; namely:  
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>. ISBN: 978-1-118-13357-6

2. A Three Ring Binder to Hold: Sloan, J.P., *Organic Chemistry Experiments, Chemistry 2610/2630*, Grande Prairie Regional College, 2019/2020.
3. Molecular Models are highly recommended, namely: Molecular Model Set for Organic Chemistry, Prentice Hall. Note: Molecular Models may be checked out from John Hiebert for use.
4. Organic Chemistry, 12e Study Guide / Student Solutions Manual (12th Edition);  
Craig B. Fryhle, Scott A. Snyder, Robert G. Johnson, Jon Antilla, Paperback, 744 Pages;  
Published 2016, ISBN: 978-1-119-07732-9  
Note: The 11<sup>th</sup> Edition Solutions Guide to the 11<sup>th</sup> Edition Text Book is:  
Study Guide and Solutions Manual, 11<sup>th</sup> Edition, authored by Jon Antilla, University of South Florida,  
Robert Johnson, Xavier University, Craig Fryhle, Graham Solomons, and Scott Snyder.  
ISBN: 978-1-118-14790-0 is an Optional Item.

Note: *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.

**DELIVERY MODE(S):** Organic Chemistry I, consists of CH2610 A3, B3, S1, S2, S3, L1, L2 & L3 and is delivered in Lecture, Seminar and Laboratory Components.

#### **COURSE OBJECTIVES:**

The course 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.

#### **LEARNING OUTCOMES:**

The Learning Outcomes of Organic Chemistry I is for students to be aware of their ability to apply their understanding of the theory of Organic Chemistry as presented in the course and as outlined in the Calendar Description and in this course outline. The Learning Outcomes includes the students being able to apply their understanding of Organic Chemistry to related issues and problems in addition to the specific issues and problems directly addressed throughout the course. The learning outcomes of the students are directly related to the grades earned by the students in the course.

**TRANSFERABILITY: ALBERTA TRANSFER CREDIT**

(Ref: Alberta Council of Admissions and Transfers, updated May 31, 2016)

**GPRC CH2610 (3) Transfers to:**

Athabasca CHEM 350 (3) <sub>53</sub>	Burman U CHEM 241 (3)	Concordia U CH 261 (3)
King's U CHEM 3xx (3) <sub>51</sub>	MacEwan CHEM 261 (3)	U of C CHEM 351 (3)
U of A CHEM 261 (3) OR AUCHE 250 (3)		UofL CHEM 2500 (3)

**GPRC CH2630 (3) Transfers to:**

Athabasca CHEM 360 (3) <sub>54</sub>	Burman U CHEM 242 (3)	Concordia U CH 263 (3)
King's U CHEM 351 (3)	MacEwan CHEM 263 (3)	U of C CHEM 353 (3)
U of A CHEM 263 (3) OR AUCHE 252 (3)		U of L CHEM 2600 (3)

**TRANSFERABILITY: ALBERTA TRANSFER CREDIT**

Summary of Alberta Transfer Credit for GPRC CH2610 (3) and CH2630 (3):

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)
Burman U:	CHEM 241 (3)	CHEM 242 (3)
Concordia UC:	CHEM 261 (3)	CHEM 263 (3)
King's UC:	CHEM 3xx (3)	CHEM 351 (3)

**\*Warning:** Although we strive to make the transferability information in this document up-to-date and accurate, **the student has the final responsibility for ensuring the transferability of this course to Alberta Colleges and Universities.** Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at Alberta Transfer Guide main page <http://www.transferalberta.ca> or, if you do not want to navigate through few links, at <http://alis.alberta.ca/ps/tsp/ta/tbi/onlineSearch.html?SearchMode=S&step=2>

**\*\* Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. Students are cautioned that it is their responsibility to contact the receiving institutions 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 13 -----	20%
2.	Final Exam to be scheduled between April 15 – 25 -----	35%
3.	Laboratory -----	20%
4.	Tutorial/Seminar/Assignment 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, 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 nine assignments with ten questions per assignment.
5. Assistance with assignments will be given upon request.

### GRADING CRITERIA: (The following criteria may be changed to suite the particular course/instructor)

Please note that most universities will not accept your course for transfer credit **IF** your grade is **less than C-**.

Alpha Grade	4-point Equivalent	Percentage Guidelines	Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	93-100	C+	2.3	67-70
A	4.0	87-92	C	2.0	63-66
A-	3.7	83-86	C-	1.7	60-62
B+	3.3	79-82	D+	1.3	55-59
B	3.0	75-78	D	1.0	50-54
B-	2.7	71-74	F	0.0	00-49

### Please Note:

- That most universities will not accept your course for transfer credit **IF** your grade is **less than C-**
- Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions.
- Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability.

## **COURSE SCHEDULE/TENTATIVE TIMELINE:**

The Course Schedule consists of Lecture, Laboratory and Tutorial Components. A brief description of these components and the course schedule 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.

### **Seminar/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:**

1. Lectures, Time and Place: CH2610 A3 M, W 8:30 - 9:50 in A305
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. Seminar/Tutorial Component, Time and Place: CH2610 S2 F 8:30 - 9:20 in H211  
CH2610 S1 F 10:00 - 11:20 in L229
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 seminar/tutorial hours.

**TENTATIVE TIMELINE:**

The tentative timetable follows, “Student Responsibilities”, and the, “Statement on Plagiarism and Cheating”.

**STUDENT RESPONSIBILITIES:****STATEMENT ON PLAGIARISM AND CHEATING:**

Cheating and plagiarism will not be tolerated and there will be penalties. For a more precise definition of plagiarism and its consequences, 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 <http://www.gprc.ab.ca/about/administration/policies/>

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

## TENTATIVE TIMELINE:

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

### CH2610 A3, Organic Chemistry I:

Schedule for Reading, Studying and Practice Problems

#### References to:

**T.W.G. Solomons, C.B. Fryhle and S.A. Snyder, *Organic Chemistry*, 12th Edition, Wiley, 2016.**

#### WINTER SEMESTER

Weeks of Jan 6 & 13: 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 1 to 9. 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 13: 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

Week of Jan 20: AN INTRODUCTION TO ORGANIC REACTIONS and THEIR MECHANISMS: ACIDS AND BASES IN ORGANIC CHEMISTRY. Read & Study Chapter 3, including the Concept Map on page 143.

Problems/Page #'s:	In-Chapter	3.1 to 3.19
137	End of Chapter	3.20 to 3.43
139	Challenge Problems	3.44 to 3.48
140	Learning Group Problems	1 to 4

Week of Jan 27: NOMENCLATURE and CONFORMATIONS of ALKANES and CYCLOALKANES. Read and Study Chapter 4, and read the Concept Map on page 192.

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 3: STEREOCHEMISTRY: CHIRAL MOLECULES. Read & Study Chapter 5, and read the Concept Map on page 239.

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 10: 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 281.

Problems/Page #'s:	In-Chapter	6.1 to 6.19
284	End of Chapter	6.20 to 6.41
288	Challenge Problems	6.42 to 6.49
290	Learning Group Problems	1 to 2

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

Week of Feb 24: ALKENES AND ALKYNES I: Properties and Synthesis. Elimination Reactions of Alkyl Halides. Read and Study Chapter 7, read Summary and Review Tools on pages 327, 328, 329, 334, 335 and 336.

Problems/Page #'s:	In-Chapter	7.1 to 7.26
329	End of Chapter	7.27 to 7.57
332	Challenge Problems	7.58 to 7.64
333	Learning Group Problems	1 to 4.



Week of March 2: 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 8.61
387	Challenge Problems	8.62 to 8.63
388	Learning Group Problems	1 to 4

Week of March 9: RADICAL REACTIONS. Read and Study Chapter 10, and read the, “Concept Map – Mechanism Review of Radical Reactions”, on page 488.

Problems/Page #'s:	In-Chapter	10.1 to 10.17
492	End of Chapter	10.18 to 10.35
495	Challenge Problems	10.36 to 10.43
496	Learning Group Problems	1 to 2

Week of March 16: 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 533.

Problems/Page #'s:	In-Chapter	11.1 to 11.24
535	End of Chapter	11.25 to 11.56
539	Challenge Problems	11.57 to 11.60
540	Learning Group Problems	1 to 3

Week of March 23: 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 570 and 571.

Problems/Page #'s:	In-Chapter	12.1 to 12.8
572	End of Chapter	12.9 to 12.36
577	Challenge Problems	12.37 to 12.39
577	Learning Group Problem	

Week of March 30: CONJUGATED UNSATURATED SYSTEMS. Read and Study Chapter 13, and read the, “Concept Map”, on page 616.

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

Week of April 6 & 13: Class Review including Review of the Practice Final Exam.

## TENTATIVE TIMELINE:

The Tentative Timetable for CH 2610 A3 & CH2610 B3, Organic Chemistry I, is as follows:

### CH2610 A3, Organic Chemistry I:

Schedule for Reading, Studying and Practice Problems

#### References to:

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

#### WINTER SEMESTER

Weeks of Jan 6 & 13: 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 assignments 1 to 9. 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.”*

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*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 13: 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

Week of Jan 20: 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 27: 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 3: 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 10: 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 17-21: No Classes: Family Day is Feb 17, and Winter Break is Feb 18 - 21.

Week of Feb 24: 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 2: 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 9: 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 16: 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 23: 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 March 30: 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

Week of April 6 & 13: Class Review including Review of the Practice Final Exam.