



DEPARTMENT OF SCIENCE

COURSE OUTLINE – Fall 2026

CH2630 (A2): Organic Chemistry II – 3 (3-1-3) 105 Hours for 15 Weeks

Northwestern Polytechnic acknowledges that our campuses are located on Treaty 8 territory, the ancestral and present-day home to many diverse First Nations, Metis, and Inuit people. We are grateful to work, live and learn on the traditional territory of Duncan's First Nation, Horse Lake First Nation and Sturgeon Lake Cree Nation, who are the original caretakers of this land.

We acknowledge the history of this land and we are thankful for the opportunity to walk together in friendship, where we will encourage and promote positive change for present and future generations.

INSTRUCTOR:	Dr. Melissa Gajewski	PHONE:	780-539-2023
OFFICE:	J207	E-MAIL:	mgajewski@nwpolytech.ca
OFFICE HOURS:	By appointment		

CALENDAR DESCRIPTION:

Continuation of the study of structural and chemical properties of the basic functional groups of organic compounds including aromatic compounds, aldehydes, ketones, carboxylic acids and their derivatives and amines. Illustration of these functional groups in natural products such as carbohydrates, amino acids and proteins, nucleic acids and lipids and discussion of the application of spectroscopic methods for structure determination in simple organic molecules.

PREREQUISITE(S):

CH2610

REQUIRED MATERIALS:

Recommended Resource Materials and Texts include:

1. 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
2. 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
3. Molecular Models are highly recommended, namely:
 - Molecular Model Set for Organic Chemistry, Prentice Hall.
4. Sloan, J.P., Organic Chemistry Experiments, Chemistry 2610/2630, Grande Prairie Regional College, 2023/2024. Printed from course webpage
5. Safety glasses, and lab coat

DELIVERY MODE(S):

Lecture style presentation of material followed by practice problems/discussion in seminar. Laboratory provides hands-on experience.

LEARNING OUTCOMES:

The Learning Outcomes of CH2630, Organic Chemistry II, are that Students gain an understanding of:

- H^1 and C^{13} NMR Spectroscopy, FTIR Spectroscopy and Mass Spectroscopy.
- Aromaticity and Aromatic Compounds.
- Electrophilic and Nucleophilic Aromatic Substitution Reactions and the effect of Electron-Withdrawing and Electron-Donating Groups on the Aromatic Ring.
- Carbanion-Enolate Anion Chemistry in Synthesis and Reactions of Acetoacetic Ester and Diethyl Malonate.
- Synthesis and Reactions of Aldehydes, Ketones, Carboxylic Acids, Derivatives of Carboxylic Acids (Acid Halides, Acid Anhydrides, Esters, Amides and Carboxylate Salts), Phenols and Amines.
- Carbohydrates, Lipids, Amino Acids and Proteins.

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

Upon Successful completion of CH2630, Organic Chemistry II, students will have a working knowledge of Organic Chemistry.

TRANSFERABILITY:

Please consult the Alberta Transfer Guide for more information. You may check the transferability of this course at the Alberta Transfer Guide main page

<http://www.transferalberta.alberta.ca>.

**** For courses with alpha (letter) grading, a 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:

Midterm Exam # 1 (tentatively October 15)	20%
Midterm Exam # 2 (tentatively November 19)	20%
Final Exam to be scheduled	30%
Laboratory	20%
Tutorial/Seminar/Assignment Grading Component	10%

A passing grade in the lab component of the course is needed to pass the course

GRADING CRITERIA:

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

Grading Chart for courses with Alpha Grading:

Alpha Grade	4-point Equivalent	Percentage Guidelines		Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	95-100		C+	2.3	67-69
A	4.0	85-94		C	2.0	63-66
A-	3.7	80-84		C-	1.7	60-62
B+	3.3	77-79		D+	1.3	55-59
B	3.0	73-76		D	1.0	50-54
B-	2.7	70-72		F	0.0	00-49

COURSE SCHEDULE/TENTATIVE TIMELINE:

The Course Schedule is:

1. Lectures: T, R 10:00 – 11:20 in J202
2. Laboratory Component: M 14:30 – 17:20 in J119
3. Seminar Component: M 11:30 – 12:20 in J204
4. Office Hours: Individual and group assistance will normally be available during regular college business hours

The Course Schedule consists of Lecture, Laboratory and Tutorial Components. The Tentative Timetable follows the Statement on Academic Misconduct A brief description of these components is as follows:

Lecture Component:

Continuation of the study of the fundamental principles of the chemistry of carbon compounds as commenced in Chemistry 2610. The study is based on a reaction mechanism approach to the functional group chemistry of arenes, aldehydes, ketones, carboxylic acids, esters, amides, amino acids and carbohydrates.

Topics include: structure and bonding; physical properties; acidity and basicity; conformations of molecules; stereochemistry; addition, elimination and substitution reactions; structure-reactivity relationships; aromaticity and aromatic substitution; and spectroscopic methods for structure determination including H^1 and C^{13} NMR (Nuclear Magnetic Resonance) and IR Infrared Spectroscopy.

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:

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.

STUDENT RESPONSIBILITIES:

Attendance of all lectures and seminars is strongly recommended. Laboratory attendance to each specific experiment is compulsory. A doctor's medical note is required for all excused absences. Students must maintain an overall average of 50% or better to pass this course. You are encouraged to participate in class discussions and ask questions. Help is available outside class time on an "as needed" basis

STATEMENT ON ACADEMIC MISCONDUCT:

Academic Misconduct will not be tolerated. For a more precise definition of academic misconduct and its consequences, refer to the Student Rights and Responsibilities policy available at <https://www.nwpolytech.ca/about/administration/policies/index.html>.

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



Schedule for Reading, Studying and Practice Problems, On-Line Resource
References and 12th Edition of T.W.G. Solomons, C.B. Fryhle & S.A. Snyder, Organic
Chemistry.

Spectroscopic Methods of Structure Determination.

Nuclear Magnetic Resonance (NMR):

Tools for Structure Determination. Read and Study Chapter 9, pages 391 – 447.

Problems/Page #'s:	In-Chapter 9.1 to 9.19
437	End of Chapter 9.20 to 9.43
446	Challenge Problems 9.44 to 9.49
446	Learning Group Problems 1 to 2

Concept Map's:	447	¹ H NMR Spectroscopy.
	446	¹³ C NMR Spectroscopy.
	456	¹³ C NMR and ¹ H NMR Chemical Shift Ranges

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

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

Aromatic Compounds.

Read and Study Chapter 14, pages 617 – 659.

Problems/Page #'s:	In-Chapter 14.1 to 14.15
651	End of Chapter 14.16 to 14.38
657	Challenge Problems 14.39 to 14.43
658	Learning Group Problems 1 to 5
Concept Map:	659 Aromatic Compounds.

Reactions of Aromatic Compounds.

Read and Study Chapter 15, pages 660 – 710.

Problems/Page #	In-Chapter	15.1 to 15.19
700	End of Chapter	15.20 to 15.56
706	Challenge Problems	15.57 to 15.66
707	Learning Group Problems	1 to 3

Concept Map's:

- 709 Summary of Mechanisms -Electrophilic Aromatic Substitution.
- 710 Some Synthetic Connections of Benzene and Aryl Derivatives.

Aldehydes and Ketones:

Nucleophilic Addition to the Carbonyl Carbon. Read and Study Chapter 16, pages 711 – 760.

Problems/page #'s:	In-Chapter	16.1 to 16.21
749	End of Chapter	16.22 to 16.55
755	Challenge Problems	16.56 to 16.57
756	Learning Group Problems	a to f.

Summary of Aldehyde and Ketone Addition Reactions: p 756, Section 16.15.

Summary of Mechanisms:

- 757 Acetals, Imines, and Enamines: Common Mechanistic Themes in Their Acid-catalyzed Formation from Aldehydes and Ketones.
- 758-759 Nucleophilic Addition to Aldehydes and Ketones Under Basic Conditions.
- 760 Some Synthetic Connections of Aldehydes, Ketones, and Other Functional Groups.

Carboxylic Acids and Their Derivatives:

Nucleophilic Addition-Elimination at the Acyl Carbon.

Read and Study Chapter 17, pages 761 – 810.

Problems/page #'s:	In-Chapter	17.1 to 17.16
	802	End of Chapter
	809	Challenge Problems
	810	Learning Group Problems

Summary of Reactions of Carboxylic Acids and Their Derivatives, Page 798, Section 17.12.



Reactions at the alpha-Carbon of Carbonyl Compounds: Enols and Enolates.

Read and Study Chapter 18, pages 811 – 848.

Problems/page #'s:	In-Chapter	18.1 to 18.14
	840	End of Chapter 18.15 to 18.37
	845	Challenge Problem 18.38
	846	Learning Group Problems 1 to 2

Summary of Reactions of Enolate Chemistry, Page 837, Section 18.10.

848 Summary of Mechanisms: Enolates: alpha-Substitution.

Condensation and Conjugate Addition Reactions of Carbonyl Compounds:

Read and Study Chapter 19, pages 849 – 889.

Problems/page #'s:	In-Chapter	19.1 to 19.22
	878	End of Chapter 19.23 to 19.60
	887	Challenge Problem 19.61 to 19.63
	887	Learning Group Problems 1 to 2

876 Summary of Important Reactions, Page 876, Section 19.9.

889 Synthetic Connections: Some Synthetic Connections Involving Enolates.

888 Summary of Mechanisms: Enolate Reactions with Carbonyl Electrophiles.

Amines.

Read and Study Chapter 20, pages 890 – 937.

Problems/Page #'s:	In-Chapter	20.1 to 20.18
	928	End of Chapter 20.19 to 20.51
	935	Challenge Problems 20.52 to 20.56
	936	Learning Group Problems 1 to 2

924 Summary of Preparation and Reactions of Amines, Page 924, Section 20.13