NORTHWESTERN POLYTECHNIC

SCIENCE DEPARTMENT

COURSE OUTLINE – Fall 2025

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

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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 16)	20%
Midterm Exam # 2 (tentatively November 20)	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

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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 E305
2. Laboratory Component: M 14:30 - 17:20 in J119
3. Seminar Component: M 11:30 - 12:20 in E305
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.

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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) and Mass Spectroscopy (MS):
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

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.

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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 17.17 to 17.49
809 Challenge Problems 17.50 to 17.55
810 Learning Group Problems 1 to 4

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.

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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

Amino Acids & Proteins & Nucleic Acids & Protein Synthesis

Read Chapters 24 & 25: Amino Acids and Proteins & Nucleic Acids and Protein Synthesis.
Chapter 24, read pages 1045 - 1089.

Problems/Page #'s:	In-Chapter	24.1	to 24.16
	1088	End of Chapter 24.17 to 24.23	
	1089	Challenge Problem	24.24
	1089	Learning Group Problems 1 to 2	

Chapter 25, read pages 1090 -01124.

Problems/Page #'s:	In-Chapter	25.1	to 25.11
	1122	End of Chapter 25.12 to 25.16	
	1124	Learning Group Problem	