



ccnm
CANADIAN COLLEGE OF
NATUROPATHIC MEDICINE

COURSE OUTLINE 2021

Course:	Organic Chemistry
Course Code:	SOC100
Times & Location:	Online Tutorial: Tuesdays 7:30 pm – 9:00 pm EST
Course Coordinator:	Dr. Melanie Facca, BSc, MS, ND
Instructor:	Dr. Melanie Facca, BSc, MS, ND
Office Location:	Online

Evaluation:

	WEIGHTING	TEST DATE / DUE DATE
Module Quizzes	10%	8 Self-Scheduled Quizzes
Assignments	5%	2 Assignments (2.5% each)
Midterm Test	30%	
Course Participation	5%	
Final Exam	50%	

Plagiarism and cheating are academic offenses and will be treated seriously by the College. Students should refer to the College's policies on academic misconduct posted on in the Academic Calendar.

Required Text:

McMurray, Ballantine, Hoeger & Peterson. *Fundamentals of General, Organic and Biological Chemistry*: 2017, 8th Edition.). Published by Pearson.

Course Description:

SOC100 is a three-credit, 8-week introductory course designed to build on knowledge acquired in SGC100. In SOC100, students will learn the fundamental concepts of organic chemistry. The nomenclature and properties of organic compounds including hydrocarbons, alcohols, aldehydes, ketones, carboxylic acids, esters, ethers, thiols, amines and amides will be studied in detail. The chemistry of these compounds and their physical properties are examined in depth.

The application of organic chemistry to naturopathic principles is integrated throughout the course; providing students with a unique opportunity to learn organic chemistry within the context of naturopathic medicine. Incorporation of a virtual laboratory component enhances and re-enforces course material and allows the student to experience a practical application of organic chemistry while maintaining the convenience of an online chemistry course. SOC100 provides the necessary pre-requisite knowledge required for the ND program.

Prerequisites

General Chemistry (SGC100) or an equivalent course from a recognized university is a prerequisite for Organic Chemistry, SOC100.

Course Outcomes:

On completion of the course the student will be expect to:

- Demonstrate a basic understanding of organic chemistry.
- Demonstrate knowledge of the fundamental laws and vocabulary as they pertain to organic chemistry.
- Demonstrate knowledge of organic chemistry nomenclature.
- Apply organic chemistry to Naturopathic principles.
- Demonstrate knowledge of the chemical reactions of basic organic chemistry.
- Explain the physical and chemical properties of organic compounds.
- Apply knowledge of organic chemistry to a clinical setting.
- Demonstrate knowledge of the principles and process of the chemical experiment.

Pedagogy:

The course is delivered in a blended learning style which combines online self-study modules with weekly live interactive online tutorial sessions from 7:30 p.m. - 9 p.m. EST (one evening per week) with the course instructor.

Evaluation:

The passing grade is 60%, and evaluations/assessments will consist of, eight quizzes (10%), two assignments (5%), one midterm test (30%), class participation (5%) and a final exam (50%). The midterm and final exam are conducted online.

SOC100 Organic Chemistry

Course Schedule

Class	Date	Topic	Modules
1	Week 1	Introduction to course	
2	Week 2	Modules 1, 2 & 3	<ul style="list-style-type: none">• Introduction to Organic Chemistry: Hydrocarbons• Introduction to Organic Chemistry: Alkanes (Ch 12)• Alkenes, Alkynes and Aromatic Compounds (Ch 13)
3	Week 3	Modules 4 & 5	<ul style="list-style-type: none">• Alcohols and Ethers• Some Compounds with Sulfur, Oxygen or a Halogen (Ch 14)
	Week 4	Midterm	No Webinar (Includes Modules 1-5)
4	Week 5	Module 6, 7 & 8	<ul style="list-style-type: none">• Aldehydes and Ketones (Ch 15)• Amines (Ch 16)• Amides
5	Week 6	Module 9 & 10	<ul style="list-style-type: none">• Carboxylic Acids and Their Derivatives (Ch 17)• Esters
6	Week 7	Module 11 & 12	<ul style="list-style-type: none">• Polymers• Organic Compounds in Health and the Environment
	Week 8	Final Exam	Final Exam is cumulative

The Academic Department reserves the right to make schedule changes.

SOC100 Organic Chemistry Session Learning Outcomes

Tutorial 1

Course Introduction: SOC100 Organic Chemistry

By the end of this session, the student will be able to:

- Navigate SOC100 Moodle course shell and Zoom programs
- Understand course requirements, including textbook readings, evaluations and deadlines
- General overview of Modules 1 and 2

Deadline: Post a brief introduction on "Please introduce yourself" forum before the start of the tutorial.

Tutorial 2

Introduction to Organic Chemistry: Hydrocarbons, Introduction to Organic Chemistry: Alkanes and Alkenes, Alkynes and Aromatic Compounds.

By the end of this session, the student will be able to:

- Identify the general structural characteristics of organic molecules, in particular, the tetravalent nature of carbon and the different ways in which it can be expressed.
- identify properties characteristic of organic and inorganic substances
- Define functional group.
- Identify the functional groups in organic molecules.
- Recognize structural (constitutional) isomers and functional group isomers.
- Draw structural, condensed, and line formulas for simple chemical compounds.
- Convert any given structural, condensed, or line formula into its corresponding alternative.
- Determine if two given structures are the different conformers of the same molecule, different structural isomers, or different molecules.
- Name an alkane given its structure and draw an alkane given its name.
- Identify the physical properties of alkanes.
- Determine the basic reactions of alkanes.
- Draw the isomeric products formed during the halogenation of simple alkanes.
- Identify a cycloalkane from its structure.
- Name a cycloalkane given its structure and draw a cycloalkane given its name.
- Identify the functional groups present in alkenes and alkynes.
- Differentiate between saturated and unsaturated molecules.
- Name a simple alkene or alkyne given its condensed or line structure.
- Draw the condensed or line structure of an alkene or alkyne given its name.
- Identify cis–trans isomers of alkenes.
- Identify the physical properties of alkenes and alkynes.
- Identify the different types of organic reactions.
- Predict the addition products obtained when alkenes react with H_2 , Cl_2 , HCl , or H_2O .
- Identify "unsymmetrically substituted" and "symmetrically substituted" alkenes.
- Utilize Markovnikov's rule when addition reactions to unsymmetrically substituted alkenes occur.
- Predict what polymer forms given an alkene monomer.
- Identify the structures of aromatic compounds.
- Explain the importance and function of resonance in aromatic compounds.
- Name simple monosubstituted or disubstituted aromatic compounds.
- Predict the products obtained when aromatic compounds react with concentrated HNO_3 , Cl_2 , Br_2 , or concentrated H_2SO_4

Deadline: Complete Modules 1, 2 and 3 before the start of the tutorial.

Tutorial 3

Alcohols and Ethers and Some Compounds with Sulfur, Oxygen or a Halogen

By the end of this session, the student will be able to:

- give the common names for thiols and ethers.
- draw condensed or skeletal formulas for thiols and ethers.
- describe the classification of alcohols.
- describe the solubility of alcohols in water.
- write balanced chemical equations for the combustion, dehydration and oxidation of alcohols.
- Describe the structural differences between alcohols, phenols, and ethers.
- Explain why alcohols have higher boiling points than compounds of similar molecular weight (MW).
- Write systematic names for simple alcohols.
- Draw the structure of an alcohol given its name, in both condensed and line structure format.
- Classify an alcohol as primary, secondary, or tertiary.
- Define and identify glycol.
- Describe the properties of alcohols.
- Describe hydrophobic and hydrophilic alcohols.
- Predict the products obtained upon dehydration of an alcohol.
- Predict the oxidation products of a primary, secondary, and tertiary alcohol.
- Identify a phenol.
- Explain why alcohols and phenols are weak acids.
- Identify an ether.
- Distinguish between an ether and an alcohol.
- Identify a thiol.
- Explain how a thiol is converted into a disulfide and vice versa.
- Identify an alkyl or aryl halide.
- Identify a chiral carbon.

Deadline: Complete Modules 4 and 5 before the start of the tutorial.

Tutorial 4

Aldehydes and Ketones, Amines and Amides

By the end of this session, the student will be able to:

- Identify a carbonyl group and describe its polarity and shape. Describe the characteristics of fatty acids and fatty acid esters.
- Name and draw simple aldehydes and ketones given a structure or a name.
- Describe the polarity, hydrogen bonding, and water solubility of aldehydes and ketones.
- Identify common aldehydes and ketones and their uses.
- Identify the products formed from the oxidation of aldehydes (and see that ketones do not oxidize in the same way).
- Identify the products of the reduction of aldehydes and ketones.
- Identify the differences between hemiacetals, hemiketals, acetals, and ketals.
- Predict the products of hemiacetal, hemiketal, acetal, and ketal formation and their hydrolysis.
- Identify and classify an amine as primary, secondary, or tertiary.
- Name a simple amine given its structure or draw an amine given its name.
- Describe amine properties such as hydrogen bonding, solubility, boiling point, and basicity.
- Identify a heterocyclic amine.
- Identify and draw the products formed when an amine reacts with acid.
- Identify a quaternary ammonium ion and describe its properties.
- Describe the sources of alkaloids, name some examples, and tell how their properties are typical of amines.
- Give the IUPAC and common names of amides.
- Draw the condensed structural formulas for the products of formation and hydrolysis of amides.

Deadline: Complete Module 6, 7 and 8 before the start of the tutorial.

Tutorial 5

Carboxylic Acids and Their Derivatives and Esters

By the end of this session, the student will be able to:

- Compare and contrast the structures, reactions, hydrogen bonding, water solubility, boiling points, and acidity or basicity of carboxylic acids, esters, and amides.
- Name simple carboxylic acids, esters, and amides given a structure and write a structure given a name.
- Describe the acidity of different carboxylic acids and predict the products obtained when they react with strong bases.
- Describe how esters and amides are formed from carboxylic acids.
- Predict the hydrolysis products of esters and amides.
- Give the IUPAC and common names for esters.
- Write the balanced chemical equation for the formation of an ester.
- Draw the condensed structural formulas for the products from acid and base hydrolysis of esters.
- Describe the formation and uses of polyesters and polyamides.
- Recognize and draw the structures of phosphate esters and their ionized forms.

Deadline: Complete Module 9 and 10 before the start of the tutorial.

Tutorial 6

Polymers and Organic Compounds in Health and the Environment

By the end of this session, the student will be able to:

- Identify addition and condensation polymerization reactions.
- Differentiate between natural and synthetic polymers.
- Describe the everyday applications of natural and synthetic polymers.
- Recognize the environmental and health impacts of synthetic polymers.
- Describe the formation and uses of polyesters and polyamides.
- Identify volatile organic compounds (VOC's).
- Describe the health impacts of VOC's.
- Identify pesticides and herbicides as organic compounds.
- Describe the health impacts of pesticides and herbicides to humans and the environment.

Deadline: Complete Module 11 and 12 before the start of the tutorial.