



ORGANIC CHEMISTRY II

CHEM 211

Course Description

This course is a further study of the chemistry of carbon compounds from a functional group perspective. The course covers structure and nomenclature of specific organic compounds like thiols, aldehydes, ketones, amines, esters, benzene, phenol, carboxylic acids and their derivatives, along with Hofmann elimination reaction, Sn1, Sn2, E1 and E2 reactions. Emphasis is given on organic compounds reactions, preparations, uses, simple mechanisms and their biomedical relevance such as in proteins, drugs, etc.

Credit: 3 credits

Repeatable: No

Course Structure

The course will be presented in different formats: Lectures with PowerPoints, self-directed learning, discussions and student assignments etc.

Competencies

This course emphasizes competencies to enhance skills essential for a future health care professional.

- Knowledge
 - **Demonstrate content knowledge and skills in foundational courses required by biomedical professionals**
 - **Demonstrate information literacy**
 - Demonstrate quantitative reasoning
 - **Demonstrate longitudinal learning through coursework**
- Critical Thinking
 - **Develop the skills of self-reflection and peer assessment to improve personal performance.**
 - **Demonstrate the ability to analyze literature and written material**
 - **Demonstrate the ability to distinguish between well-reasoned and poorly reasoned arguments**
- Communication Skills
 - **Demonstrate effective presentation skills to faculty and peers.**
 - **Demonstrate effective listening skills**
 - **Demonstrate effective written communication**

Objectives:

Upon completion of CHEM 211 course, the student should be able to describe:

- Aldehydes and Ketones: Their structure, Physical and chemical properties. Nomenclature (I.U.P.A.C), Synthesis, Differences in reactivity, Identification of organic compounds that are aldehydes and ketones and their impact on human health. Reactions.
- Carboxylic acids: Their structure, Physical and Chemical properties. Nomenclature (I.U.P.A.C), Synthesis, Acid strength and their impact on human health and reactions: Nucleophilic Substitution, Nucleophilic Acyl Substitution reactions, Reaction at Alpha and Beta Carbon and the Formation of Carboxylic acids derivatives and their impact.
- Carboxylic acids derivatives: Structure, Physical and chemical properties. Nomenclature (I.U.P.A.C), Synthesis, reactivity and their biological application.
- Nucleophilic Substitution Reactions: Classification (S_N1 and S_N2) and their characteristics, factors which reduce the reaction rate, Nucleophilic strength, Front side and back side attack and reaction mechanism.
- Elimination Reactions: Classification (E1 and E2) and their characteristics, factors which reduce the reaction rate and reaction mechanism. Competition between E1 and S_N1, E2 and S_N2.
- Aromatic hydrocarbon: Structure of Benzene, Nomenclature (I.U.P.A.C), Substitution on the benzene ring: Mono, di and Poly substitution. Reactions of benzene ring structure and their impact of human health and the environment.
- Aromatic hydrocarbon: Structure of phenol, Nomenclature (I.U.P.A.C), Physical properties (Acidity) and their impact on human health, Reaction mechanisms.
- Amines: Structure, Nomenclature (I.U.P.A.C), Classification (primary, secondary and tertiary), synthesis, reaction mechanism and their biological impact.
- Hoffman Elimination Reaction: Mechanism, products form, Acylation and Alkylation and their biological impact
- Nitriles: Structure, Nomenclature (I.U.P.A.C), physical properties, Synthesis, reaction mechanism and their biological impact.
- Enols and Enolates: Structure, Synthesis and Reactivity
- Thiols: Structure, Nomenclature (I.U.P.A.C), physical properties and reactivity.

Schedule: Dates and times to be posted at the beginning of the term on the online calendar.

Course Topics/Outline

Activity #	Lecture Topics
Week 1	Aldehydes and Ketones
Week 2	Carboxylic acids, Quiz 1
Week 3	Carboxylic acids derivatives
Week 4	Nucleophilic substitution reactions
Week 5	Elimination Reactions, Quiz 2
Week 6	Review of week 1 to week 5 materials
Week 7	Mid-Term Exam
Week 8	Benzene ring structure
Week 9	Phenol

Week 10	Amines, Quiz 3
Week 11	Hoffman elimination reaction
Week 12	Nitriles, Enols and Enolates, Quiz 4
Week 13	Thiol and GENERALISE REVIEW
Week 14	End of Term Exam

Assignments:

Students required to research and submit a paper among various topics from the course outline.

Textbooks and Reference Materials:

Required Texts

Frederick A. Bettelheim, William H. Brown, Mary K. Campbell, Shawn O. Farrell, Omar J. Torres. Introduction to General, Organic and Biochemistry. 11th edition. Publisher: Cengage Learning.

Recommended Text

Francis A Carey, Robert M. Giuliano. Organic chemistry. 10th Edition. Publisher: McGraw-Hill Education.

John E. McMurry. Organic chemistry with biological applications. 3rd edition. Publisher: Cengage Learning.

Evaluation: Students are evaluated by four quizzes, a midterm exam, a final exam, assignments and their attendance.

Points:

	Points*
Assignments	10%
Quizzes	10%
Mid Term	30%
Final exam	40%
Attendance	10%
Total points	100%

*Points are approximate and may be adjusted during the term. Students will be notified of changes.

Grade:

Percent of Points	Letter Grade
95-100%	A(h)
90-94%	A
85-89%	B+
80-84%	B
75-79%	C+
70-74%	C
<70%	F

Attendance:

Students are expected to attend at least 80% of all scheduled learning activities. Attendance in the class will be recorded. Students attended 80% or more will be awarded with 10% on total scoring system. Please note that absences due to illness or misadventure will be factored into the 20% of allowable absences if informed respective faculty or the Dean of Students.

Policies:

Professional Demeanor

The student should be thoughtful and professional when interacting with faculty and other students. Inappropriate behavior includes the use of offensive language, gestures, or remarks with sexual overtones. Students should maintain a neat and clean appearance, and dress in attire that is generally accepted as professional.

Honesty

Students are expected to demonstrate honesty and integrity in all aspects of their education and in their interactions with faculty, administration, physicians, patients, and fellow students. They will not cheat, plagiarize, or assist others in the commission of these acts.

Faculty and Office Hours:

Dr. Eric Audain, Assistant Professor.

Student can schedule an appointment by email.