LCHEM4127 Organic Chemistry I Course Descriptor

Course Code	LCHEM4127	Discipline	Natural Sciences and Engineering
UK Credit	20	US Credit	5
FHEQ Level	4	Date Approved	November 2022
Pre-requisites	LCHEM4119 General Chemistry and LCHEM4114 General Chemistry Lab or equivalent		
Co-requisites			

Course Overview

The overall objective of this course is to introduce students to the foundations of organic chemistry by focusing on the molecular structures, properties, and chemical reactivity of the various orbital hybridisation states that carbon atoms can adopt in alkanes (including cycloalkanes), alkenes and alkynes. The course also covers different aspects of isomerism observed in organic compounds as well as the major reaction mechanisms (substitution, elimination and addition), with respect to structural changes and electron flow. Students will learn and become proficient with the following phenomena: the structure and bonding of organic compounds; the acid-base properties of functional groups present in the molecular structure; the role of thermodynamics and kinetics in organic reactions; how structure and stereochemistry influence reactions of alkanes and alkyl halides; the synthesis and reactions of alkenes, alkynes and alcohols. Understanding these principles will provide the students with a comprehensive basis for undertaking subsequent organic chemistry courses which cover more complex molecular structures, reaction mechanisms and advanced concepts in bond breaking/making. The laboratory component of the course provides an introduction to the techniques, methods and principles found in the practice of organic chemistry, building on the laboratory and technical writing skills developed in general chemistry and extending them to the field of organic chemistry.

Learning Outcomes

Knowledge And Understanding

On successful completion of the course, students will be able to:

K1a Demonstrate knowledge and understanding of the fundamental principles of organic chemistry.

K2a Describe the bonding in and molecular structures of alkanes, alkenes, alkynes and alcohols as well as the types of hybridization and isomerism that occurs in the three groups of hydrocarbons.

K3a Recognise the major classes of organic reactions: substitution, elimination, and addition and the specificities of each.

K4a Understand how the thermodynamics of organic reactions define the direction and kinetics define the rate at which they proceed and how catalysts or reaction conditions can influence reaction rates.

K5a Describe how stereochemistry and the presence of functional groups influence the chemical properties of molecules, with focus on those of biological importance including enzymes, receptors and pharmaceuticals.

Subject Specific Skills

On successful completion of the course, students will be able to:

S1a Explain how only 4 elements (carbon, hydrogen, oxygen and nitrogen) can combine to generate the large molecular diversity of nature;

S2a Carry out laboratory–based practice and research that requires familiarity with the glassware and equipment used in synthesising, extracting, separating, crystallising and analysing organic compounds;

S3a Use symbolic chemical notation to show how bonds break and form and electrons flow within and between molecules during organic reactions.

S4a Integrate the above knowledge and skills to design reaction sequences and predict their outcomes

Transferable and Professional Skills

On successful completion of the course, students will be able to:

T1a Apply their understanding of organic chemistry to solve problems in a wide array of chemical tasks and molecular applications.

T2a Make important decisions based on experimental results, observation and other forms of evidence, while not relying on/employing supposition.

T3a Apply objective scientific methods to explain natural phenomena and to predict the impact of human interventions.

T3a Display a developing technical proficiency of written scientific and technical nomenclature that demonstrates an ability to communicate clearly and accurately when producing structured and coherent scientific or technical pieces.

T3a Display a developing technical proficiency in written English and an ability to communicate clearly and accurately in structured and coherent pieces of writing.

Teaching and Learning

Teaching and learning strategies for this course will include:

A minimum of 50 contact hours, typically to include interactive group teaching, co-curriculars, individual meetings, in-class presentations, exams, conducting laboratory experiments, evaluating results, and drawing appropriate conclusions from those results.

Course information and supplementary materials are available on the University's Virtual Learning Environment (VLE).

Students will receive individualised developmental feedback on their work for this course.

Students are required to attend and participate in all the formal and timetabled sessions for this course. Students are also expected to manage their directed learning and independent study in support of the course.

Assessment

Formative

Students will be formatively assessed in class through class activities, and during office hours. Formative assessments are ones that do not count towards the final grade but will provide students with developmental feedback.

Summative

AE:	Assessment Activity	Weighting (%)	Online submission	Duration	Length
1	Examination	20	No	1hour	N/A
2	Examination	45	No	2 hours	N/A
3	Set Exercises	10	Yes	20 to 30 hours to complete	N/A
4	Written assignment	25	Yes	N/A	4000 Words

Further information on the structure of summative assessment elements can be found in the Summative Assessment Briefs

Feedback

Students will receive feedback in a variety of ways: written (including via email correspondence); oral (within office hours or on an *ad hoc* basis) and indirectly through class discussion.

Feedback on examinations is provided through generic internal examiners' reports and are made available to the student on the VLE. For all other summative assessment methods, feedback is made available to the student either via email, the VLE or another appropriate method.

Indicative Reading

Note: Comprehensive and current reading lists for courses are produced annually in the Course Syllabus or other documentation provided to students; the indicative reading list provided below is used as part of the approval/modification process only.

Books

Textbooks:

- L.G. Wade, Jr., Organic Chemistry, Pearson, Ninth Edition
- *Solutions Manual* for Wade *Organic Chemistry*, 9th Edition, Pearson
- James W. Zubrick, The Organic Chem Lab Survival Manual, Wiley, Tenth Edition, 2016

Resources

- Molecular Model kits

Indicative Topics

Students will study the following topics:

- Structure and bonding, with focus on C, H, O, N atoms
- Acid-base chemistry and functional groups
- Alkane, alkene, alkyne structure and stereochemistry
- Thermodynamics and kinetics in chemical transformations/reactions
- Stereochemistry in organic chemistry

- Substitution reactions (both SN1 and SN2)
- Elimination reactions (E1 and E2)
- Addition reactions
- Reactions of alkanes, alkenes
- Synthesis and reactions of alkynes
- Synthesis and reactions of alcohols

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Version number	**Date approved**	**Date published**	**Owner**	**Proposed next review date**	**Modification (As per AQF4) & category number**
2.1	March 2023	March 2023	Robert N Hanson	November 2027	Category 1: Corrections/clarifications to documents which do not change approved content or learning outcomes.
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