

CH161-30 Introduction to Organic Chemistry

22/23

Department

Chemistry

Level

Undergraduate Level 1

Module leader

Stefan Roesner

Credit value

30

Module duration

20 weeks

Assessment

20% coursework, 80% exam

Study location

University of Warwick main campus, Coventry

Description

Introductory description

N/A

[Module web page](#)

Module aims

The aim of this module is to provide students with a basic understanding of organic chemistry. As such it provides a fundamental look at organic chemical bonding, structure, reactivity, mechanism and synthesis of simple functional groups. Later parts of the module apply an understanding of organic chemistry to the synthesis and the chemistry of functional groups containing the carbonyl functional group and to two further areas: the structure, properties and reactivity of molecules of biological importance and of organic macromolecules including synthetic polymers. The content of this module will be assumed in ALL subsequent Chemistry modules. It provides all entering first years with a common foundational knowledge of organic chemistry.

This will be achieved by a range of teaching methods, primarily lectures and tutorials, but also student centered learning:-including directed reading, problems classes and workshops, set exercises, and computational exercises

The majority of the module content is drawn from components of A-level syllabuses. As such, most students will already be familiar with some aspects of the module syllabus, but the pattern of familiarity will be heterogeneous across the class. The primary aim of the module is to equip all students with the necessary scientific skills to succeed in their chemistry degree at Warwick. The module is structured to allow individual students to concentrate their time on those bits of the module with which they are unfamiliar.

The skills component will include a range of transferrable and chemistry-specific skills to support their studies and careers e.g. general IT and specific chemistry software training.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

1. Drawing of organic structures. Orbitals, sigma and pi bonding, shape, hybridisation, stereochemistry, isomerism, conformation.
2. Cation/anion stability, resonance, delocalisation, aromaticity, acidity, basicity, pKa
3. Mechanism and curly arrows, electrophiles, nucleophiles, radicals
4. Radical stability, mechanism
5. Acidity, free energy diagrams, reaction profiles
6. Substitution mechanisms, SN1, SN2
7. Addition reactions
8. Elimination reactions and chemistry of alkenes and alkynes
9. Chemistry of alcohols, ethers, amines, oxidation and reduction
10. Aromatic electrophilic substitution
11. Carbonyl chemistry, addition, substitution
12. Hydrolysis reactions
13. Grignard, alkyl lithium, conjugate additions
14. Carbonyl enolate chemistry
15. Claisen condensations, aldol condensation, Mannich reactions
16. 1,3-Dicarbonyl compounds and reactions
17. Biomolecules, aminoacids, peptides, proteins
18. Biomolecules, DNA, RNA
19. Lipids, fatty acid synthesis, detergents
20. Macromolecules, synthetic polymers, addition polymerisation, condensation polymerisation

The skills component is designed to develop a range of transferrable and chemistry-specific skills to support students' studies and careers, e.g. general IT and specific chemistry software training.

Learning outcomes

By the end of the module, students should be able to:

- Demonstrate an understanding and awareness of different reactions in organic chemistry and why and how they take place.
- Demonstrate an understanding of the structure, shape, properties and reactivity of organic molecules including their acidity, mechanisms and reactions.
- Have a basic understanding of mechanisms and their stereochemical consequences of nucleophilic substitution, elimination, electrophilic additions/substitutions, oxidations and reduction.
- Have a basic understanding of mechanisms carbonyl and enolate chemistry.
- Understand the basic principles of macromolecules, including the structure, reactivity and properties of synthetic and natural polymers.
- Use their knowledge of general mechanism and reactivity to postulate mechanisms of organic reactions using curly arrows.
- Use their knowledge to be able to design short syntheses of organic molecules.
- Understand the roles of lipids, aminoacids, and DNA in biological chemistry and their structure, reactivity, synthesis and physical properties. Demonstrate a knowledge of fatty acid biosynthesis.
- Be able to use generic and chemistry-specific computer software packages e.g. chemical drawing, spreadsheets and graph drawing packages.

Indicative reading list

Essential Text (required) Clayden, Greeves, Warren and Wothers, Organic Chemistry, Oxford, second edition 2012
Advised text (not required) Mechanism in Organic Chemistry, 6th Edition, Peter Sykes, Pearson Prentice Hall
Introduction to Stereochemistry, RSC Chemistry Student Guides, Clark, Kitson, Mistry, Taylor, Taylor, Akamune, Lloyd

Interdisciplinary

Spans the boundary between chemistry and biochemistry.

Subject specific skills

Teamwork
Digital skills and literacy
Intercultural learning and diversity awareness

Transferable skills

Teamwork
Digital skills and literacy
Intercultural learning and diversity awareness

Study

Study time

Type	Required
Lectures	55 sessions of 1 hour (18%)
Tutorials	6 sessions of 1 hour (2%)
Other activity	7 hours (2%)
Private study	232 hours (77%)
Total	300 hours

Private study description

N/A

Other activity description

1 hr Non Assessed Class Test 5 hr revision lectures/workshop

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group D3

	Weighting	Study time
Assessed work- combined skills components IT assignments (Excel and graph drawing, and Chemistry drawing software)	20%	
In-person Examination	80%	
<ul style="list-style-type: none">• Answerbook Green (8 page)• Periodic Tables• Students may use a calculator• Graph paper		

Feedback on assessment

Class test-annotated scripts returned.\r\nCohort level examination feedback to be provided via Moodle.\r\nWritten feedback for assessed work components.\r\n

[Past exam papers for CH161](#)

Availability

Post-requisite modules

If you pass this module, you can take:

- CH3E9-15 Advanced Organic Chemistry and Laboratory
- CH271-15 Mechanistic and Biological Chemistry
- CH270-15 Selective Organic Synthesis

Courses

This module is Core for:

- UCHA-4 Undergraduate Chemistry (with Intercalated Year) Variants
 - Year 1 of F101 Chemistry (with Intercalated Year)
 - Year 1 of F122 Chemistry with Medicinal Chemistry (with Intercalated Year)
- UCHA-3 Undergraduate Chemistry 3 Year Variants
 - Year 1 of F100 Chemistry
 - Year 1 of F100 Chemistry
 - Year 1 of F121 Chemistry with Medicinal Chemistry
- UCHA-F110 Undergraduate Master of Chemistry (with Industrial Placement)
 - Year 1 of F100 Chemistry
 - Year 1 of F110 MChem Chemistry (with Industrial Placement)
 - Year 1 of F112 MChem Chemistry with Medicinal Chemistry with Industrial Placement
- Year 1 of UCHA-F107 Undergraduate Master of Chemistry (with Intercalated Year)
- UCHA-F109 Undergraduate Master of Chemistry (with International Placement)
 - Year 1 of F109 MChem Chemistry (with International Placement)
 - Year 1 of F111 MChem Chemistry with Medicinal Chemistry (with International Placement)
- UCHA-4M Undergraduate Master of Chemistry Variants
 - Year 1 of F100 Chemistry
 - Year 1 of F105 Chemistry
 - Year 1 of F110 MChem Chemistry (with Industrial Placement)
 - Year 1 of F109 MChem Chemistry (with International Placement)
 - Year 1 of F125 MChem Chemistry with Medicinal Chemistry
- Year 1 of UCHA-F127 Undergraduate Master of Chemistry with Medicinal Chemistry (with Intercalated Year)