CH3H7-30 Advanced Chemistry for Industrial Placement

26/27

Department
Chemistry
Level
Undergraduate Level 3
Module leader
Andrew Marsh
Credit value
30
Module duration
20 weeks
Assessment
100% coursework
Study location
Distance or Online Delivery

Description

Introductory description

This module is only available to Chemistry students undertaking an industry placement in Year 3.

This module builds on core concepts covered in Year 1 and Year 2 modules and laboratories and expands knowledge and understanding of broad aspects of chemistry, while relating them to a real-world challenge and contexts.
The module content will be delivered remotely and will contain taught lecture elements of CH3H1 Analytical Science for Global Challenges, CH3G9 Catalysis, and CH3H5 Designing and Making Functional Organic Molecules.

Module web page

Module aims

By the end of the module, students should be able to use their knowledge to propose analytical approaches to tackle problems in a broad range of fields, including: biomedical, environmental, materials and heritage research.
By the end of the module, students should be able to use their knowledge to devise syntheses of

complex organic molecules.
By the end of this module, students should be able to describe the mechanisms of common homogeneous and heterogeneous reactions, understand how selectivity can be achieved in catalytic reactions, deduce new mechanisms and interpret unseen experimental data and suggest suitable catalysts for a given transformation.

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.

Analytical Science
The section is split into 4 topics covering a separate technique/family of techniques, with the applications and case studies forming a coherent narrative across the topics.

1. Introduction and Chromatography
2. Mass Spectrometry
3. XRD and Diffraction Methods
4. NMR in Drug Design

Designing and Making Functional Organic Molecules
This section is split into 4 coherent topics:

1. Pericyclic and cyclisation reactions
2. Reactive intermediates
3. Protecting group chemistry and peptide synthesis
4. Asymmetric reactions and atropisomerism

Catalysis
This section is split into 3 topics:

1. Bio/organocatalysis.
2. Homogenous transition metal catalysis
3. Heterogenous catalysis.

Learning outcomes

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

- Describe and critically assess a wide range of instrumental techniques and methods relevant to analytical science, inluding data analysis.
- Critically analyse the synthesis of complex known molecules understanding and understand why commercial routes are chosen.
- Suggest suitable catalysts for a given transformation and predict how modifications to a given catalyst will impact productivity, reaction selectivity, and reaction outcome.

Research element

As a part of the assessment for this module students will be required to conduct independent research focused on introduction of an innovation in the laboratory at their workplace.

Interdisciplinary

This module combines aspects of analytical science, synthetic organic chemistry and catalysis in a context of student's own industrial placement experience.

Subject specific skills

Data analysis and interpretation, including data fitting methods and error analysis.
Ability to develop strategies, via retrosynthetic analysis, for the synthesis of functional organic molecules.
Deduce new mechanisms and interpret unseen experimental data related to catalysis problems.
Ability to interpret and evaluate contemporary and frontier directions of chemistry research.

Transferable skills

Communication
Critical Thinking
Digital Literacy
Information Literacy
Problem Solving
Professionalism
Sustainability

Study

Study time

Type	Required
Lectures	60 sessions of 1 hour (40%)
Private study	15 hours (10%)
Assessment	75 hours (50%)
Total	150 hours

Private study description

N/A

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 A1

Assessment component	Weighting	Study time	Eligible for self-certification
Problem sets	100%	75 hours	Yes (extension)

Submission of problem sets following each part of the module (three in total).

Reassessment component is the same

Feedback on assessment

Individual feedback provided via Moodle/Tabula

Availability

Courses

This module is Core for:

- UCHA-F110 Undergraduate Master of Chemistry (with Industrial Placement)
  - Year 3 of F110 MChem Chemistry (with Industrial Placement)
  - Year 3 of F112 MChem Chemistry with Medicinal Chemistry with Industrial Placement
- Year 3 of UCHA-4M Undergraduate Master of Chemistry Variants