CH3H2-15 Electrochemistry and Interfaces

26/27

Department
Chemistry
Level
Undergraduate Level 3
Module leader
Julie Macpherson
Credit value
15
Module duration
5 weeks
Assessment
20% coursework, 80% exam
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This module will describe the state-of-the-art in interfacial chemistry and electrochemistry; both are key to advances in nanotechnology, energy conversion, electrosynthesis, pollutant removal from water systems etc. Many of the concepts covered in this course are used practically in industrial and technology companies cutting across energy, environmental, pharma and healthcare.

Module aims

The module will introduce the student to the importance of the interface in (electro)chemical processes of importance. This module as well as providing the fundamentals, will highlight wide ranging key applications of societal importance.

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.

The module is split into 4 distinct topics:

Topic 1: Introduction to the Solid and Liquid Interface
Topic 2: Surface Characterization Techniques (structural and chemical) including microscopy and surface sensitive spectroscopy
Topic 3: Introduction to the Solid – Electrolyte Interface and Dynamic Electrochemical Measurements
Topic 4: Electrochemistry in Action

Learning outcomes

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

- Gain an appreciation of the importance of interfacial processes across chemistry
- Investigate interfacial chemistry and structure across the length scales from the nanoscale to industry scale
- Gain an appreciation of fundamentals of the electrode – electrolyte interface and introduction to dynamic electrochemistry
- Gain an appreciation of application of dynamic electrochemistry in electrocatalysis, fuel cells, electrosynthesis, environmental pollutant removal, biological and environmental species monitoring
- Exposure to the potential uses of AI

Indicative reading list

Reading lists can be found in Talis

Subject specific skills

Kinetics
Spectroscopy and Structural Characterisation
Experimental Chemistry

Transferable skills

Problem solving
Sourcing information
Understanding of the scientific method

Study

Study time

Type	Required
Lectures	22 sessions of 1 hour (15%)
Total	150 hours

Type	Required
Practical classes	3 sessions of 1 hour (2%)
Private study	125 hours (83%)
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 D1

	Weighting	Study time	Eligible for self-certification
Assessment component			
Group presentation	20%		No

Students will work in teams to design a 4 - 5 day lab experiment suitable for use in the Year 3 labs. A list of potential topics related to the course content will be provided to the students, and each team must design an experiment based around one of these.

Initial planning:

- Students will be encouraged to make use of AI (Chat-GPT or similar) to develop a rough outline for the experiment (students will be required to submit the query and response generated as part of their final report)
- The teams need to critically analyse this plan to identify any weaknesses in the proposed experimental methodology/analysis
- 5 slide presentation, each slide based around one of the points above and presented by a different student.

Reassessment component			
Written Reassessment of Undergraduate Laboratory			No

	Weighting	Study time	Eligible for self-certification
Experiment single assessment - based on original submitted work, how could the experiment be improved, based on original feedback, to submit a 2 page of A4 report			

Assessment component

Centrally-timetabled examination (On-campus) Written Examination	80%		No

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- Answerbook Pink (12 page)
- Graph paper
- Periodic Tables
- Students may use a calculator

Reassessment component is the same

Feedback on assessment

Cohort level examination feedback provided via Moodle following the Exam Board.

Past exam papers for CH3H2

Availability

Courses

This module is Optional for:

- UCHA-4 Undergraduate Chemistry (with Intercalated Year) Variants
  - Year 4 of F101 Chemistry (with Intercalated Year)
  - Year 4 of F122 Chemistry with Medicinal Chemistry (with Intercalated Year)
- UCHA-3 Undergraduate Chemistry 3 Year Variants
  - Year 3 of F100 Chemistry
  - Year 3 of F121 Chemistry with Medicinal Chemistry
- Year 4 of UCHA-F107 Undergraduate Master of Chemistry (with Intercalated Year)
- UCHA-F109 Undergraduate Master of Chemistry (with International Placement)
  - Year 3 of F109 MChem Chemistry (with International Placement)

    - Year 3 of F111 MChem Chemistry with Medicinal Chemistry (with International Placement)
- UCHA-4M Undergraduate Master of Chemistry Variants
    - Year 3 of F105 Chemistry
    - Year 3 of F125 MChem Chemistry with Medicinal Chemistry
- Year 4 of UCHA-F127 Undergraduate Master of Chemistry with Medicinal Chemistry(with Intercalated Year)