CH911-10 Chromatography and Separation Science

22/23

Department
Chemistry
Level
Taught Postgraduate Level
Module leader
Nikola Chmel
Credit value
10
Module duration
2 weeks
Assessment
50% coursework, 50% exam
Study location
University of Warwick main campus, Coventry

Description

Introductory description

During this interdisciplinary module students will learn about theory and practice of different types of chromatography and their application in real-world scenarios. They will develop the skills necessary to decide how to decide which methods are the most appropriate for a given separation problem - whether for analysis or purification of, for example, synthetic polymers, biomolecules, or biopharmaceuticals. The module includes workshops on data interpretation and lab sessions providing students with hands on experience with several different chromatographic methods.

Module web page

Module aims

Learn about separation techniques for Life and Materials Sciences and use this knowledge in solving analytical problems.

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.

Theory of separation techniques.
Stationary phases (including ion exchange, ion pairing and chiral).
Mobile phases.
Thin layer chromatography and flash chromatography.
High performance liquid chromatography (HPLC).
Chiral chromatography.
Gas chromatography (system considerations and detection methods).
Gel permeation chromatography.
Related techniques (Supercritical Fluid Chromatography and Capillary Zone Electrophoresis).
Small molecules - content, purity, determination in formulated products.
Gel electrophoresis principles.
Capillary electrophoresis principles
Protein purification

During the practical course the students will gain hands-on experience on flash chromatography; thin layer chromatography (TLC); analysis and method development using GC (Gas chromatography) and HPLC for a range of carefully designed separation problems; using computer prediction software packages that will give an understanding of the influence of experimental variables in HPLC and GC method development

Learning outcomes

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

- know and understand the basic principles of chromatography.
- be familiar with main types of modern chromatographic techniques.
- know which techniques are appropriate for which materials.

Indicative reading list

The students are given comprehensive notes by the module leader
Skoog, West, Holler, Fundamentals of Analytical Chemistry, Saunders College Publishing, New York

Subject specific skills

(a) Subject knowledge and understanding
Understand the theory of chromatographic separation. Know what the main types of modern chromatographic and other separation techniques are.
Know what technique(s) are appropriate for different materials.
Understand and apply the different considerations for preparative and analytical methods.
(b) Key Skills
Operate instrumentation.
Design chromatographic experiments and carry them out.

Disseminate findings in a written report.
Present work orally using visual aids.
(c) Cognitive Skills
Realise that different techniques give different types of information that can be used together to build up more complete information.
(d) Subject-Specific/Professional Skills
Know how to prepare samples and collect data for each technique studied.
Know how to analyse data from each technique.
Be aware of industrial applications of the techniques studied.
Be able to apply separation techniques for the solving of analytical science problems.

Transferable skills

Critical thinking, problem solving, communication, teamwork and working effectively with others, information literacy (research skills), digital literacy, professionalism

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Study

Study time

Type	Required
Lectures	5 sessions of 3 hours (15%)
Practical classes	4 sessions of 3 hours (12%)
Supervised practical classes	2 sessions of 7 hours (14%)
Other activity	9 hours (9%)
Private study	50 hours (50%)
Total	100 hours

Private study description

Laboratory data interpretation, practical write ups and preparation, exam revision.

Other activity description

Literature research, poster preparation and presentation (timetabled activities)

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 C3

	Weighting	Study time	Eligible for self-certification
Poster presentations Group poster presentation	17%		No
Lab report Lab report equivalent to 3500 words	33%		Yes (extension)
Written exam OR Oral exam (locally held) Written exam (2 hours) – if more than 30 students enrolled Oral exam (15 min) – if 30 or less students.	50%		No

Feedback on assessment

Oral feedback on presentations, written feedback on lab reports to be returned to students within 20 working days.

Past exam papers for CH911

Availability

Courses

This module is Core for:

- Year 1 of TCHA-F1PX Postgraduate Taught Analytical and Polymer Science
- Year 1 of TCHS-F1PK Postgraduate Taught Polymer Chemistry
- Year 1 of TCHA-F1PW Postgraduate Taught Polymer Science

This module is Core optional for:

- Year 1 of TCHA-F1PL Postgraduate Taught Molecular Analytical Science

This module is Optional for:

- Year 1 of TCHA-F1PB MSc in Chemistry with Scientific Writing
- Year 1 of TCHA-F1PY Postgraduate Taught Analytical Science and Instrumentation
- Year 1 of TCHA-F1PE Postgraduate Taught Scientific Research and Communication

This module is Core option list A for:

- Year 2 of TCHA-F1PY Postgraduate Taught Analytical Science and Instrumentation

This module is Core option list B for:

- Year 1 of TCHA-F1PY Postgraduate Taught Analytical Science and Instrumentation

This module is Option list A for:

- Year 1 of RCHA-F1P9 Postgraduate Research Analytical Science
- Year 1 of TCHA-F1PW Postgraduate Taught Polymer Science