Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	SCI545
Module Title	Analytical Methods in Applied Science
Level	5
Credit value	20
Faculty	FSLS
HECoS Code	100413
Cost Code	GAFS
Pre-requisite module	N/A

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
BSc (Hons) Forensic Science	Core
BSc (Hons) Forensic Science with Placement Year	Core

Breakdown of module hours

Learning and teaching hours	30 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	0 hrs
Project supervision hours	0 hrs
Active learning and teaching hours total	**30 hrs**
Placement hours	0 hrs
Guided independent study hours	170 hrs
Module duration (Total hours)	**200 hrs**

Module aims

This module will introduce students to the main techniques used for the isolation and chemical analysis of trace materials, including general chemical separation and analysis, chromatographic methods, immunoassay, and electrophoresis etc., with the case studies to demonstrate their applications in forensic fields.

Module Learning Outcomes

At the end of this module, students will be able to:

1	Explain the principles of common chemical analysis and separation techniques.
2	Evaluate strengths and limitations of different chromatographic methods used in trace analysis.
3	Develop the ability to apply knowledge and skills in chemical analysis to solve problems in forensic and biochemical sciences.
4	Evaluate the importance of chemical analysis in forensic and biochemical sciences.

Assessment

Indicative Assessment Tasks:
This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Assessment 1: Unseen exam containing 10 multiple choice questions and approximately 8 short answer questions, focusing on the fundamental knowledge and principles in analytical methods.

Assessment 2: Approximately 10 problem-solving questions, focusing on calculations, data processing and the applications of analytical methods in forensic and biochemical sciences, will be issued near the end of semester.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1-2	Examination	Two hours	50	N/A
2	3-4	Coursework	1,000 words	50	N/A

Derogations

None

Learning and Teaching Strategies

The module will be delivered in line with the University's Active Learning Framework and will involve:

Lectures: To provide students with a comprehensive overview of the key concepts and principles.

Discussions and Seminars: To allow students to engage with the materials and explore different perspectives on the applications of analytical methods in the fields related to their programme of study while also providing an opportunity for students to ask questions and clarify concepts.

Problem solving workshops: To test students' knowledge and understanding of the concepts covered and train their calculation skills in analytical chemistry.

Online resources and videos: To supplement classroom learning by providing students with additional information and visual aids to further their understanding of the materials.

Self-directed study: To empower students to take responsibility for their own learning and to explore topics of interest in more depth.

Welsh Elements

Students will be able to submit their work through the medium of Welsh. Students will receive introductory Welsh lessons suitable for police staff.

Indicative Syllabus Outline

- Introduction to analytical chemistry.
- Examples of statistical sampling methods in chemical analysis.
- Gravimetric analysis
- Volumetric analysis.
- Extraction of trace materials.
- Fundamental principles of chromatography.
- Methods of chromatography, including the most popular techniques.
- Chromatographic analysis in arson crime investigations.
- Fundamental principles of electrophoresis.
- Immunochemical methods.
- Analytical methods specific to colorant materials such as dyes, inks and paints.
- Chemical analysis of polymers, such as hair and fibres
- Case studies to demonstrate the applications of chemical separation and analytical techniques in forensic field.

Indicative Bibliography

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads:

Skoog, D.A., West, D.M., Holler, F.J. & Crouch, S.R. (2021), *Fundamentals of Analytical Chemistry, 10th Edition*, United States: Cengage Learning.

Other indicative reading:

Bell, S. (2022), *Forensic Chemistry, 3rd Edition*, Abingdon: CRC Press.

Lottspeich, F. & Engels, J.W. (2018), *Bioanalytics: Analytical Methods and Concepts in Biochemistry and Molecular Biology*, Germany: Wiley.

Administrative Information

For office use only	
Initial approval date	14/10/2020
With effect from date	September 2021
Date and details of revision	07/01/2026: Major Modification to change module aims and assessment type. 10/05/2022: Revalidation of BSc (Hons) Forensic Science programme (module update)
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