Module specification

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Module Code	SCI555
Module Title	Forensic Instrumental Analysis
Level	5
Credit value	20
Faculty	FAST
HECoS Code	100413
Cost Code	GAFS

Programmes in which module to be offered

Programme title	**Is the module core or option for this programme**
BSc (Hons) Forensic Science	Option
BSc (Hons) Forensic Science with Placement Year	Option

Pre-requisites

SCI4xx Introduction to Chemistry

Breakdown of module hours

Learning and teaching hours	30 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	18 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	**48** hrs
Placement / work based learning	0 hrs
Guided independent study	152 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	10/05/2023
With effect from date	September 2023
Date and details of revision	
Version number	1

Module aims

This module will introduce students to the working principles of main spectroscopic techniques used in sample analysis, including UV, IR, Fluorescence, Mass, Atomic Absorption, NMR and X-ray diffraction. It will also cover several electron microscopic techniques. Highlights will be given to the applications of all these instrumental analysis methods in the forensic investigation.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Describe the working principles of various spectroscopic and electron microscopic techniques.
2	Identify strengths and limitations of individual instrumental approaches in their applications in forensic investigation.
3	Evaluate appropriate instrumental methods for forensic analyses.
4	Assess information from multiple spectroscopic techniques to identify unknown samples.

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: Examination (2 hours)

Focusses on theoretical knowledge and forensic applications of the spectroscopic and electron microscopic techniques. Upon their understanding of complex scientific concepts, the students need to demonstrate the ability to explain them using suitable language to a lay audience.

Assessment 2: Coursework (50%)

Contains around 10 problem solving exercise questions focusing on spectral analysis.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1-3	Examination	50
2	4	Coursework	50

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 instrumental analysis 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 spectral analysis based on various techniques with the focus on spectral analysis.
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.

Indicative Syllabus Outline

- Electromagnetic radiation and the electromagnetic spectrum
- Effects of EM radiation on matter and the Beer-Lambert law
- UV-vis spectroscopy
- IR spectroscopy
- Fluorescence spectroscopy
- Atomic absorption spectroscopy
- Mass spectroscopy
- NMR spectroscopy
- X-ray diffraction
- Electron microscopy
- Case studies on forensic applications of instrumental analysis covered in this module

Indicative Bibliography:

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

Essential Reads

Field, L.D., Li, H.L. & Magill, A.M. (2020), *Organic Structures from Spectra, 6th Edition,* United Kingdom: Wiley-Blackwell.

Other indicative reading

Rawtani, D., Hussain, C.M., Tharmavaram, M. & Pandey, G. (2020), *Handbook of Analytical Techniques for Forensic Samples: Current and Emerging Developments*, Netherlands: Elsevier Science.

Wolstenholme, R., Forbes, S. & Jickells, S. (2021), *Analytical Techniques in Forensic Science,* United Kingdom: Wiley.

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas.

Core Attributes
Engaged
Creative
Key Attitudes
Commitment
Curiosity

Resilience
Confidence
Adaptability

Practical Skillsets
Digital Fluency
Organisation
Leadership and Team working
Critical Thinking
Emotional Intelligence
Communication