MODULE SPECIFICATION PROFORMA

Module Code:	SCI526

Module Title:	Instrumental Analysis

Level:	5	**Credit Value:**	20

Cost Centre(s):	GAFS	JACS3 **code**:	F100

School:	Applied Science, Computing & Engineering	**Module Leader:**	Dr Jixin Yang

Scheduled learning and teaching hours	48 hrs
Guided independent study	152 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered (not including exit awards)	Core	Option
BSc (Hons) Forensic Science	✓	☐
BSc (Hons) Chemistry	✓	☐

Pre-requisites
None.

Office use only
Initial approval: Mar 18 – validation of BSc Chemistry **Version no: 3**
With effect from: Sept 18
Date and details of revision: **Version no:**
5/8/20 Temporary change to assessment for 2020/21 post Covid.
29/09/2022 APSC approval to permanently change assessment 2 from in class test to coursework

Module Aims
This module will introduce students to the principles of spectroscopy and the main spectroscopic methods used in sample analysis, including UV, IR, Raman, Fluorescence, Mass, Atomic Absorption, NMR, SEM, TEM and X-ray diffraction techniques.

Intended Learning Outcomes

Key skills for employability

KS1	Written, oral and media communication skills
KS2	Leadership, team working and networking skills
KS3	Opportunity, creativity and problem solving skills
KS4	Information technology skills and digital literacy
KS5	Information management skills
KS6	Research skills
KS7	Intercultural and sustainability skills
KS8	Career management skills
KS9	Learning to learn (managing personal and professional development, self-management)
KS10	Numeracy

At the end of this module, students will be able to		Key Skills	
1	Understand the working principles of various spectroscopic techniques.	KS5	
2	Compare and contrast modern instrumental approaches to problem solving.	KS3	KS5
3	Critically assess appropriate instrumental methods for forensic analyses.	KS1	KS6
		KS8	
4	Assess information from multiple spectroscopic techniques to identify unknown samples.	KS3	KS4
		KS5	

Transferable skills and other attributes

- Literacy
- Numeracy
- Time management
- IT skills
- Note Taking

Derogations
N/A.

Assessment:

Indicative Assessment Tasks:

Assessment 1: Unseen written examination (50%) focusing on knowledge and applications of the spectroscopic techniques.

Assessment 2: Coursework (50%, word count ~1,000) contains around 10 problem solving exercise questions focusing on spectral analysis.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3	Examination	50	2 hours	
2	4	Coursework	50	2 hours	1000

Learning and Teaching Strategies:

Methods of delivery: Lectures
Problem solving workshops
Directed study via Moodle VLE
Student directed study

The basic factual material will be delivered by means of lectures. Lectures will be supported by workshops in which the students will be able to test their knowledge and understanding of the concepts covered. Students will further be able to develop their knowledge and understanding by reading additional course material and attempting problem sets and quizzes on Moodle VLE. Independent student-directed learning will enable students to delve more deeply into the subject material, enhancing their learning, while developing their IT skills.

Syllabus outline:

- Electromagnetic radiation and the electromagnetic spectrum
- Effects of EM radiation on matter and the Beer-Lambert law
- UV-vis spectroscopy
- IR spectroscopy
- Raman spectroscopy
- Fluorescence spectroscopy
- Atomic absorption spectroscopy
- Mass spectroscopy
- H-NMR spectroscopy
- C-NMR spectroscopy

- X-ray diffraction
- Scanning electron microscope and transmission electron microscope

Indicative Bibliography:

Essential reading

Field, L.D., Sternhell, S. and Kalman, J.R. (2013), *Organic Structures from Spectra*. 5th ed. Chichester: Wiley-Blackwell.

Other indicative reading

Skoog, D.A., Holler, F.J. and Nieman, T.A. (2007), *Principles of Instrumental Analysis*. 6th ed. Belmont, CA: Thomson Brooks/Cole.

Rubinson, J.F. and Rubinson, K.A. (2000), *Contemporary Instrumental Analysis.* Upper Saddle River, NJ: PrenticeHall.