PRIFYSGOL glyndŵr UNIVERSITY

MODULE SPECIFICATION FORM

Module Title: **Instrumental Analysis**	Level: 5	Credit Value: 20

Module code: SCI512	Cost Centre: GAFS	JACS3 code: F100

Semester(s) in which to be offered: 2	With effect from: September 2016

Office use only: To be completed by AQSU:	Date approved: July 2013 Date revised: July 2016 (updated to include BSc Chemistry with Education) Version no: 3

Existing/New: Existing	Title of module being replaced (if any):

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

Module duration (total hours): Scheduled learning & teaching hours Independent study hours	200 50 150	Status: core/option/elective (identify programme where appropriate):	Core

Programme(s) in which to be offered: BSc (Hons) Forensic Science BSc (Hons) Chemistry with Green Nanotechnology BSc (Hons) Chemistry with Education	Pre-requisites per programme (between levels): None

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 and X-ray diffraction techniques.

Expected Learning Outcomes:

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

Knowledge and Understanding:

1 Understand the working principles of various spectroscopic techniques.
2 Compare and contrast modern instrumental approaches to problem solving.
3 Critically assess appropriate instrumental methods for forensic analyses.
4 Assess information from multiple spectroscopic techniques to identify unknown samples.

Transferable/Key Skills and other attributes:

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

Assessment:

Assessment 1: Unseen written examination (50%)
Assessment 2: Open-book problem solving exercise (50%)

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting	Duration (eg, if exam or presentation)	Word count (or equivalent if appropriate)
1	1-3	Examination	50%	2 hours	
2	4	In-class test	50%	2 hours	

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
- ^{1}H-NMR spectroscopy
- ^{13}C-NMR spectroscopy
- X-ray diffraction
- Scanning electron microscope and transmission electron microscope

Bibliography:

Essential reading:

Field, L.D., Sternhell, S. and Kalman, J.R. (2013) *Organic Structure for Spectra*, *5th Edition,* Wiley-Blackwell.

Rubinson, J.F. and Rubinson, K.A. (2000) *Contemporary Instrumental Analysis*, Prentice Hall.

Other indicative reading:

Skoog, D.A., Holler, F.J. and Nieman, T.A. (1998) *Principles of instrumental analysis*, Orlando: Harcourt Brace College Publishers.