MODULE DESCRIPTOR

Module Title

Advanced Analytical Techniques

Reference	AS4040	Version	7
Created	April 2022	SCQF Level	SCQF 10
Approved	January 2005	SCQF Points	15
Amended	May 2022	ECTS Points	7.5

Aims of Module

To enable students to evaluate the principles, applications and limitations of a selection of advanced analytical science and statistical techniques.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1	Discuss the principles, applications, advantages and disadvantages of selected advanced analytical/bioanalytical techniques.
2	Perform chemometric calculations and appraise statistical data effectively.

Indicative Module Content

Advanced Inorganic Analysis: Advanced electrochemical methods, Advanced ICP-OES, ICP-MS, TIMS. Advanced Organic Analysis: Biosensors, immunodiagnostic techniques. Mass spectrometry: advanced ionisation methods, advanced MS analysers, Tandem MS. Other advanced chromatographic and spectroscopic techniques e.g. lasers, chemical speciation, IRMS. Chemometrics: Factorial Design, Simplex Optimisation, Pattern Recognition techniques, including Principal Components Analysis.

Module Delivery

This is a lecture based module supplemented by tutorials and computer-based workshops. Visiting speakers may be involved in the delivery of material.

Indicative Student Workload	Full Time	Part Time
Contact Hours	40	N/A
Non-Contact Hours	110	N/A
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	N/A
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Practical Exam	Weighting:	60%	Outcomes Assessed:	1
Description:	PowerPoint Presentation and oral assessment				

Component 2

Type:	Practical Exam	Weighting:	40%	Outcomes Assessed:	2
Description:	Computer-based chemometrics exercise				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

The first grade represents Component 1 (PE1) weighted as major and the second, Component 2 (PE2), weighted as minor. A minimum module grade of D is required for a pass, with compensation of grade E in Component 1 or Component 2 permitted. Non-submission of either component will result in an NS grade.

Module Grade	Minimum Requirements to achieve Module Grade:
A	AA, AB
B	AC, AD, BA, BB, BC, CA
C	AE, BD, BE, CB, CC, CD, DA, DB, EA
D	CE, DC, DD, DE, EB, EC
E	AF, BF, CF, DF, ED, EE, EF, FA, FB, FC, FD
F	FE, FF
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	Successful completion of Stage 3 Forensic and Analytical Science or equivalent.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

1. BRERETON, R.G. Chemometrics: Data Analysis for the Laboratory and Chemical Plant. 2003. Wiley.
2. MONK, P. M. S. Fundamentals of Electroanalytical Chemistry. 2002. Wiley
3. GARDINER, W.P. Statistical Analysis Methods for Chemists: A Software-Based Approach. 1997. Royal Society Chemistry.
4. WATSON, J. T. and SPARKMAN, O.D. Introduction to Mass Spectrometry: Instrumentation, Applications and Strategies for Data Interpretation. 2008. Wiley.
5. MILLER, J. N. and MILLER, J.C. Statistics and Chemometrics for Analytical Chemistry. 2010. Prentice Hall.