

## MODULE DESCRIPTOR

### Module Title

Advanced Analytical Techniques

|           |                |             |         |
|-----------|----------------|-------------|---------|
| Reference | AS4040         | Version     | 8       |
| Created   | April 2023     | SCQF Level  | SCQF 10 |
| Approved  | January 2005   | SCQF Points | 15      |
| Amended   | September 2023 | 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 Examine the principles and applications of selected advanced analytical/bioanalytical techniques.
- 2 Critique the advantages and disadvantages of selected advanced analytical/bioanalytical techniques.
- 3 Perform chemometric calculations and appraise statistical data effectively.

### Indicative Module Content

Advanced Inorganic Analysis: advanced electrochemical methods, advanced ICP-OES, ICP-MS. 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       |
| <i>Actual Placement hours for professional, statutory or regulatory body</i> |           |           |

**ASSESSMENT PLAN**

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

**Component 1**

Type: Practical Exam      Weighting: 100%      Outcomes Assessed: 1, 2, 3  
 Description: PowerPoint Presentation and oral assessment.

**MODULE PERFORMANCE DESCRIPTOR****Explanatory Text**

Component 1 (Practical exam) comprises 100%. A minimum of a Grade D is required to pass the module.

| Module Grade | Minimum Requirements to achieve Module Grade:                                  |
|--------------|--------------------------------------------------------------------------------|
| <b>A</b>     | A                                                                              |
| <b>B</b>     | B                                                                              |
| <b>C</b>     | C                                                                              |
| <b>D</b>     | D                                                                              |
| <b>E</b>     | E                                                                              |
| <b>F</b>     | F                                                                              |
| <b>NS</b>    | 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.