Module Title **Analytical Science 1** **Keywords** Statistics, Calibration, Introduction to Spectroscopy, Molecular Spectroscopy, Mass Spectrometry, Introduction to chromatography, hplc, gc, tlc	Reference AS2040 SCQF Level SCQF 8 SCQF Points 15 ECTS Points 7.5 Created May 2002 Approved September 2004 Amended May 2011 Version No. 4

This Version is No Longer Current

The latest version of this module is available here

Prerequisites for Module

Analytical Techniques for Life Sciences (AS1802) or equivalent.

Corequisite Modules

None.

Precluded Modules

None.

Aims of Module

To provide students with the principles and applications of a range of chromatographic and spectroscopic techniques. To develop the understanding of error in analytical science and the appropriate methods of statistical methods for the assessment of analytical data. To provide students with the Introduction to analytical spectroscopy: absorption and emission of radiation by molecules. Beer-Lambert Law. Instrumentation, techniques, applications of ultra-violet/visible and infrared spectrophotometery. Introduction to mass spectrometry.

Indicative Student Workload

Contact Hours	Full Time	Distance Learning
Assessment	2	2
Lectures	26	0
Tutorials	4	0
Directed Study		
Directed Study	42	69
Private Study		
Private Study	76	79

Mode of Delivery

This course is delivered mostly by formal lectures supplemented by

principles of simple and advanced calibration methods.

Learning Outcomes for Module

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

1. Describe and understand different types of error in analytical science and how they interact, knowing how to form reliable hypotheses, carry out significance testing and perform simple data analysis tasks.
2. Explain the theoretical principles of molecular spectroscopy and a range of chromatographic techniques, and describe the instrumentation and applications of these techniques.
3. Explain the theoretical principles and applications of a range of simple and advanced calibration techniques.

Indicative Module Content

Calibration methods: normal, standard additions, internal standards.
Statistics for analytical science: Understanding errors, statistical tutorials. Statistics and calibration will involve the use of appropriate software packages.
The course will be delivered to distance learning students via the University's Virtual Learning Environment.

Assessment Plan

	Learning Outcomes Assessed
Component 1	1,2
Component 2	1,3

Component 1: Closed book examination

Component 2: Computer based assignment.

Indicative Bibliography

1. CURRELL, G. AND DOWMAN, A. *Essential Mathematics and Statistics for Science* . Current Edition. Wiley-Blackwell. Chichester, United Kingdom.
2. SKOOG, D. A., HOLLER, F. J. AND CROUCH, S. R. *Principles of Instrumental Analysis* . Current Edition. Thomson Brooks/Cole.
3. PRICHARD, F.E. Quality Assurance in Analytical Chemistry . Current Edition. Chemistry Laboratory. Wiley.

Understanding errors, statistical tests, statistical significance testing. Analysis of variance.

Chromatographic separations: gas, high performance liquid and thin layer chromatography, capillary electrophoresis. The Van Deempter Equation.

4.MONK, P.M. Fundamentals of Electroanalytical Chemistry . Current Edition. Wiley