



MODULE SPECIFICATION

Code: USSJRX-30-M **Title:** Forensic Analysis and Toxicology **Version:** 1

Level: M **UWE credit rating:** 30 **ECTS credit rating:** 15

Module type: Standard

Owning Faculty: Health and Life Sciences **Field:** Applied Sciences

Faculty Committee approval: Quality and Standards Committee **Date:** April 2011

Approved for Delivery by: N/A

Valid from: September 2012 **Discontinued from:**

Pre-requisites:
None

Co-requisites:
None

Entry Requirements:
N/A

Excluded Combinations:
None

Learning Outcomes:

The student will be able to:

- demonstrate an advanced knowledge of the analytical techniques commonly applied to forensic scientific evidence;
- critically evaluate methods of analysis for a wide range of forensic evidence;
- critically discuss the selection, preservation and analysis of specimens in forensic toxicology;
- demonstrate knowledge of the pharmacokinetics and metabolism of drugs of abuse to direct the appropriate choice of analyte for toxicological analysis;
- optimise analytical methods for complex forensic analyses;
- interpret analytical results for presentation in a forensic context.

Syllabus Outline:

Forensic Analysis: Advanced issues relating to the use of GC, HPLC, FTIR, UV-vis spectrophotometry, X-ray analysis and mass spectrometry (including combined techniques) for a wide range of forensic evidence types. Selection of method for complex analyses considering a range of analytes, matrices, sample size and concentration in a forensic context. Examples may include drugs, poisons, fire accelerants, explosives, firearms discharge residues, paint, glass, plastics, soil, inks, fibres, dyes. Key requirements for forensic casework.

Sampling issues and sample preparation – extraction and/or matrix matching. Presumptive testing of drugs. Optimisation of analytical methods, especially for chromatography, mass spectrometry and atomic spectroscopy. New and specialised chromatographic techniques (such as 2-dimensional GC), and electrochemical sensors/biosensors as applied to forensic analysis. Evaluation of methods including appropriate statistical testing. Interpretation of results – statistical significance, valid comparisons and conclusions in context with reference to research literature and databases. Communication to a lay audience (jury in court).

Forensic Toxicology: Commonly encountered synthetic routes to poisons and drugs. Potential hazards of investigating illicit laboratories – principles and strategies. Elements of risk assessment.

Pharmacokinetics and metabolism of drugs of abuse and other toxic substances, including synergistic and idiosyncratic effects. Ante-mortem and post-mortem testing for a range of metabolites. Selection of analyte and specimen type; evidence integrity and preservation. Quality control and regulatory aspects. Interpretation of toxicological results – research data, individual variation, multiple factors.

Teaching and Learning Methods:

The module will be primarily delivered in the form of lectures, workshops and tutorials with some laboratory sessions to ensure students' competence in operating a range of modern analytical instruments and associated computer software.

Reading Strategy:

All students will be encouraged to make full use of the print and electronic resources available to them through membership of the University. These include a range of electronic journals and a wide variety of resources available through web sites and information gateways. The University Library's web pages provide access to subject relevant resources and services, and to the library catalogue. Many resources can be accessed remotely. Students will be presented with opportunities within the curriculum to develop their information retrieval and evaluation skills in order to identify such resources effectively.

Any **essential reading** will be indicated clearly, along with the method for accessing it, e.g. students may be expected to purchase a set text, be given or sold a print study pack or be referred to texts that are available electronically, etc. This guidance will be available either in the module handbook, via the module information on Blackboard or through any other vehicle deemed appropriate by the module/programme leaders.

If **further reading** is expected, this will be indicated clearly. If specific texts are listed, a clear indication will be given regarding how to access them and, if appropriate, students will be given guidance on how to identify relevant sources for themselves, e.g. through use of bibliographical databases.

Indicative Reading List:

Aspects of the syllabus are covered in the most recent editions of books such as:

- Harris D, Quantitative Chemical Analysis, Freeman
- Skoog D, Holler F, Nieman T, Principles of Instrumental Analysis, Saunders
- Clarke's Analytical Forensic Toxicology, ed Jickells, S and Neqrusz, A, Pharmaceutical Press.
- Moffat, A C, Osselton, M.D and Widdop, B. Clarke's Analysis of Drugs and Poisons, Pharmaceutical Press.
- Bell, S. Forensic Chemistry, Pearson.
- Snyder, L R, Kirkland, J J and Dolan, J W. Introduction to modern liquid chromatography, Wiley
- Poole, C F. The Essence of Chromatography, Elsevier.
- Flanagan, R. Et Al. Fundamentals of Analytical Toxicology.

and in journals:

Analytical Abstracts
Analytical Chemistry
Journal of Chromatography A and B
Forensic Science International
Science and Justice
Journal of Analytical Toxicology and Bioanalysis

Assessment:

Weighting between components A and B (standard modules only) A: 50% B: 50%

FIRST ATTEMPT

First Assessment Opportunity

Component A (*controlled*)
Description of each element

Element Wt (Ratio)
(*within Component*)

EX1 Exam (3 hours) assessment period 2

Final Assessment

1

Component B

Description of each element

CW1 Extended critical analysis

Element Wt (Ratio)

(within Component)

1

Second Assessment Opportunity (Resit) further attendance at taught classes is not required

Component A *(controlled)*

Description of each element

EX2 Exam (3 hours) assessment period 3

Element Wt (Ratio)

(within Component)

Final Assessment

1

Component B

Description of each element

CW2 Extended critical analysis

Element Wt (Ratio)

(within Component)

1

EXCEPTIONAL SECOND ATTEMPT Attendance at taught classes is required.

Specification confirmed by**Date**
(Associate Dean/Programme Director)