University of the West of England
BRISTOL

CORPORATE AND ACADEMIC SERVICES

MODULE SPECIFICATION

Part 1: Basic Data						
Module Title	Scientific Skills					
Module Code	USSJRW-30-1		Level	1	Version	1
Owning Faculty	Health & Applied Sciences		Field	BBAS		
Contributes towards	BSc Forensic Science					
UWE Credit Rating	30	ECTS Credit Rating	15	Module Type	Standard	
Pre-requisites	None		Co- requisites	None		
Excluded Combinations	None		Module Entry requirements	N/A		
Valid From	September 2014		Valid to	September 2020		

CAP Approval Date	28/03/2014

Part 2: Learning and Teaching	
Learning Outcomes	On successful completion of this module students will be able to: • address scientific problems using appropriate mathematical and statistical skills; assess their individual capabilities in analysis and presenting experimental data and recognise the degree of experimental uncertainty in experimental measures (A&B) • analyse forensic and other data by formulating hypotheses and making decisions based on appropriate (A&B) • statistical tests; for simple scenarios and evidence types evaluate the strength of evidence using probabilities and Bayesian statistics; (A) • perform some simple statistical modelling by applying basic statistical distributions to real life problems; (A) • use electronic resources that will also support their problem solving skills throughout their undergraduate course; (A&B) • describe the functions of the components of basic analytical instruments and operate analytical instruments at a basic level, (B) • recognise and describe a range of routine analytical techniques available for the chemical analysis of substances of relevance in forensic science (B) • prepare and analyse simple biological and chemical samples using the above techniques appropriately; (B) • record experimental data in an appropriate manner, use it for the calculation of concentrations and other parameters of simple biological or chemical test samples and in the calibration of instruments; (A&B) • understand the need for developing key graduate skills in addition to subject based proficiency

	• use resources that will support their research, problem solving and study skills throughout their undergraduate course
Syllabus Outline	Data Collection Practical methods in analytical science, including: • General aspects of analysis • Spectroscopy: instrumentation and applications of UV-vis absorption, infrared and NMR spectroscopy and atomic spectroscopy • Chromatography: thin layer chromatography, gas chromatography and high-performance liquid-chromatography • Electrophoresis and electrochemical methods of analysis Data Analysis • Scientific equations and formulae • Linear relationships and regression • Exponential and logarithmic functions. Equations of growth and decay • Use of EXCEL to display and analyse scientific information Data Assessment • Descriptive statistics. Confidence intervals. • Hypothoses testing t-test, F-test, Chi-squared test contingency tests • Probability and introduction to Bayesian statistics • Binomial, normal and Poisson distributions Communicating scientific information • Activities may include: organising a poster display, giving a spoken presentation, general aspects of scientific writing, writing essays, reporting practical and project work, writing literature surveys and reviews
Contact Hours	The contact hours (88) are distributed as follows: 12 hours of lectures, 54 hours of tutorials, 10 hours of laboratory practicals and 12 hours of computer practicals.
Teaching and Learning Methods	This is a module about developing skills and so a variety of teaching and learning approaches will be employed that include lectures, tutorials, laboratory work and computer practical tutorials, A significant proportion of this module covers the development of problem solving numeric and data analysis skills and communicating scientific information. Technology enhanced learning is therefore essential to support the teaching of these skills. The module will be delivered using a mixture of whole group and small tutorial group sessions. Support for student learning will be given through weekly tutorials which will be integrated with the online self-assessment tests and online video support to ensure focussed help can be given to those students who need help in the particular areas. This introduces students to the concept of using technology to enhance learning (TEL). Students will develop IT and data analysis skills through computer-based workshops. The IT component will be re-enforced by the need of students to complete the European Computer Driving Licence (ECDL) Level 1. The development of laboratory skills will be supported through a combination of lectures, tutorials, which will require preparation and follow-up work to be done by the student and laboratory practicals where students will get valuable hands on experience of laboratory techniques, data collection and analysis. Student learning will be supported through the University's E-Learning Environment, Blackboard. Students are expected to spend 88 hours on scheduled learning and 212 hours on independent learning.

<table>
<tr><td></td><td>Independent learning will take the following forms with an approximate indication of time required for each:

• Essential reading to support acquisition of knowledge and completion of problem solving and laboratory skills exercises relating to lectures and practical classes – 132 hours
• Preparation and submission of assignment based on practical work– 4 hours
• Preparation and submission of maths coursework – 20 hours
• Revision and preparation for exam, including support tutorials – 72 hours

Scheduled learning includes lectures, tutorials, practical computer classes and laboratory workshops.

Independent learning includes hours engaged with essential reading, assignment preparation and completion etc.</td></tr>
<tr><td>Key Information Sets Information</td><td>Key Information Sets (KIS) are produced at programme level for all programmes that this module contributes to, which is a requirement set by HESA/HEFCE. KIS are comparable sets of standardised information about undergraduate courses allowing prospective students to compare and contrast between programmes they are

<u>Key Information Set - Module data</u>

Number of credits for this module 30

<table>
<tr><th>Hours to be allocated</th><th>Scheduled learning and teaching study hours</th><th>Independent study hours</th><th>Placement study hours</th><th>Allocated Hours</th></tr>
<tr><td>300</td><td>88</td><td>212</td><td>0</td><td>300</td></tr>
</table>

The table below indicates as a percentage the total assessment of the module which constitutes a -

Written Exam: One unseen written exam, one open book written exam.
Coursework: Two written assignments

Please note that this is the total of various types of assessment and will not necessarily reflect the component and module weightings in the Assessment section of this module description:

<table>
<tr><td>Total assessment of the module:</td><td></td></tr>
<tr><td>Written exam assessment percentage</td><td>40%</td></tr>
<tr><td>Coursework assessment percentage</td><td>60%</td></tr>
<tr><td>Practical exam assessment percentage</td><td>0%</td></tr>
<tr><td></td><td>100%</td></tr>
</table>
</td></tr>
<tr><td>Reading Strategy</td><td>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</td></tr>
</table>

	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. A detailed reading list will be made available through relevant channels, e.g. module handbooks, Blackboard, etc.
Indicative Reading List	The most recent editions of: Currell, G. and Downman, A.A., *Mathematics and Statistics for Science*. Oxford: Wiley-Blackwell. Students will use a dedicated website associated with this text, which gives access to additional learning resources including video feedback. Crow, J., Bradshaw, T. & Monk, P., *Chemistry for the Biosciences*, Oxford: Oxford University Press. Higson, S.P.J., *Analytical Chemistry*. Oxford: Oxford University Press. Potter, G.W.H. *Analysis of Biological Molecules*. London: Chapman & Hall Reed, R. et al.*Practical Skills in Biomolecular Sciences* Harlow: Prentice Hall. Skoog, D.A., Holler, F.J & Nieman, T.A., *Principles of Instrumental Analysis*, Belmont, CA: Thomson Brooks/Cole

Part 3: Assessment	
Assessment Strategy	The Assessment Strategy has been designed to support and enhance the development of both subject-based and generic key skills, whilst ensuring that the modules Learning Outcomes are attained. The coursework comprises two elements. The first is a problem solving exercise which will provide an opportunity for students to demonstrate their ability to apply basic problem solving skills to unseen problems and evidence their skills in approaching it appropriately. The second element is a portfolio. Students will be given instruction on the content of this portfolio which will contain examples of both study skills and laboratory skills such as: laboratory workbook; ECDL level 1 certificate; evidence of referencing; examples of poster presentation; a skills evaluation; reflection and action plan. The controlled component is made up of two one and a half hour exams, one of which is an open book exam. The exam will allow students to undertake a suitable range of activities such as data analysis, ability to undertake calculations; process and manipulate data; draw and display data in graphs and other forms. This will test a range of the learning outcomes. Formative feedback is available to students throughout the module through

	group discussions particularly in tutor group sessions. Students are provided with formative feed-forward for their exam through a revision and exam preparation session prior to the exam and through support materials supplied through Blackboard.

Identify final assessment component and element		
% weighting between components A and B (Standard modules only)	**A:** **40**	**B**: **60**

First Sit	
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**
1. Examination (1.5 hour) - examining the material covered in the maths and stats component (Assessment Period 1)	50
2. Examination (1.5 hour) - examining the material covered in the analytical science lectures, practicals and tutorials (Assessment Period 2)	50
Component B **Description of each element**	**Element weighting** **(as % of component)**
1. Statistical analysis using Semester 2 skills on real data	60
2. Portfolio of laboratory work sheets and study skills.	40

Resit (further attendance at taught classes is not required)	
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**
1. Examination (3 hours) - examining the material covered in the maths and stats tutorials and computer workshops, analytical science lectures, practicals and tutorials	100
Component B **Description of each element**	**Element weighting** **(as % of component)**
1. Integrated assignment (including Portfolio)	100

If a student is permitted an **EXCEPTIONAL RETAKE** of the module the assessment will be that indicated by the Module Description at the time that retake commences.