University of the West of England
BRISTOL

ACADEMIC SERVICES

MODULE SPECIFICATION

Part 1: Basic Data						
Module Title	Biomedical Skills					
Module Code	USSKA5-30-1		Level	1	Version	1.1
Owning Faculty	Health & Life Sciences		Field	Applied Science		
Department	Biological, Biomedical and Analytical Sciences					
Contributes towards	BSc Biomedical Science BSc Healthcare Science (Life Science) BSc Healthcare Science (Physiological Sciences) Cert HE Premedical Sciences					
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			

CAP Approval Date	28/3/2014

Part 2: Learning and Teaching	
Learning Outcomes	On successful completion of this module students will be able to (assessment intended for each learning outcome designated by [*] corresponding to assessment section): • perform basic scientific calculations relevant to healthcare and the biomedical sciences [A1, A2, B1] • use statistical methods to describe datasets using a variety of techniques [A2] • estimate the uncertainties in the results of scientific measurements [A2, B1] • present, analyse and interpret laboratory and field data using appropriate mathematical, statistical and communication skills [A2, B2] • apply a basic knowledge of nuclear and atomic physics to describe the basis of instruments, equipment and procedures in nuclear medicine [A1, B1] • describe the functions of the components of basic analytical instruments and operate analytical instruments at a basic level [B2] • recognise and describe a range of routine analytical techniques available for the chemical analysis of biological molecules [A1, A2, B2] • understand the kinetics of bacterial growth and death [A1] • record experimental data in an appropriate manner, use it for the calculation of concentrations and other parameters of simple test samples and in the calibration of instruments [B2] • understand the need for developing key graduate skills in addition to subject based proficiency [B2]

	• use resources that will support their research, problem solving and study skills throughout their undergraduate course [B2]
Syllabus Outline	This is a skills based module and aims to support and enhance the development of both subject-based and generic key skills. Specifically this module will introduce the following: **Part I – Problem solving skills** Basic medical imaging science • The structure of the atom, mass number, atomic number, isotopes • The structure of the nucleus, modes of radioactive decay, the ranges and ionisation properties of radioactivity, half-life, inverse square law, units of activity, the biological effects of radiation, dose and dose equivalent • Production of X-rays, CT, ultrasonic imaging, image formation, filtering and image enhancement techniques Performing calculations • Rearranging formulae, scientific notation, significant figures, powers and indices • Logs and exponentials, basic trigonometry Estimating uncertainties • Precision and accuracy, histograms, bar charts, box and whisker plot, mean, mode, standard deviation, variance, IQRs, samples and populations • The normal distribution, 95% confidence limits, combining uncertainties Mathematical theory behind bacterial growth and death patterns **Part II – Laboratory skills** Basic laboratory skills • Measurement and dispensing of liquids (pipettes and burettes) • Preparing and diluting solutions (calibration standards and buffers) • Weighing and use of analytical balances Further topics may include: Analytical Science • General aspects of analysis: characteristics of analysis, qualitative, quantitative, bulk, trace, destructive, non-destructive • Analytical accuracy and precision; standards, calibration of instruments • Sensitivity, detection limits, quantitation limits • Choice of methods Cultivation and control of microorganisms • Aeptic technique, microbiological culture media, selective and differential media, microbial growth • Hazard groupings of microorganisms; containment categories for laboratories. Spectroscopy • The electromagnetic spectrum, interaction of matter and electromagnetic energy, production of emission and absorption spectra, qualitative and quantitative uses of spectra • Instrumentation and applications of UV-vis absorption, molecular fluorescence • Instrumentation and applications of atomic spectroscopy Chromatography • Origin of chromatographic separations • Qualitative and quantitative parameters • Manual procedures

	• Instrumental methods, gas- and high-performance liquid-chromatography • Applications for biological samples Electrophoresis • Factors affecting electrophoretic separations • Physical design of apparatus, horizontal and vertical arrangements • General interpretation of results • Adaptations for specific purposes, SDS-PAGE, IEF, NA analysis Electrochemical methods of analysis • pH and other potentiometric measurements **Part III – Study skills** 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 Using computers • Basic spreadsheet skills - copying, formatting, addressing • Graphical techniques - different graph types, formatting, regression lines • Calculational techniques - formulae, functions, formatting numbers
Contact Hours	The contact hours (72) are distributed as follows: 24 hours of lectures, 24 hours of tutorials, 12 hours of laboratory practicals and 12 hours of computer based tutorials.
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, **Part I (Problem solving skills)** covers the development of problem solving numeric and data analysis skills. The module will be delivered using a mixture of whole group (lectorials) and small tutorial group sessions. Support for student learning in Part I will be given through weekly lectorials/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). Resources for Part I also include direct tutorial material, and references to published material, software, internet and intranet resources. The development of numeric and data analysis skills will be further supported through timetabled PAL (Peer Assisted Learning) sessions, in which second year students (who are on the same degree course as those first year students taking this module) provide guidance. **Part II (Laboratory skills)** will be taught through a combination of lectures, which will include short audio/visual presentations, 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 analytical methods. **Part III (Study skills)** will be taught through a combination of lectures/tutorials, to develop the students' skills in communicating scientific information, and computer-based workshops to develop IT and data analysis. These areas of development will be further supported by UWE's dedicated online study skills resources http://www1.uwe.ac.uk/students/studysupport/studyskills.aspx. Student learning will be further supported through the University's E-Learning Environment, Blackboard. Students are expected to spend 72 hours on scheduled learning and 228 hours on independent learning. 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 skills exercises relating to lectures and practical classes – 132 hours
- Preparation and submission of coursework 1 – 12 hours
- Preparation and submission of coursework 2 – 12 hours
- Revision and preparation for exams, 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.

Key Information Sets Information

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

Key Information Set - Module data

Number of credits for this module				30
Hours to be allocated	Scheduled learning and teaching study hours	Independent study hours	Placement study hours	Allocated Hours
300	72	228	0	300

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

Written Exam: Two unseen written exams
Coursework: One integrated assignment and one portfolio of laboratory work sheets

Total assessment of the module:	
Written exam assessment percentage	40%
Coursework assessment percentage	60%
	100%

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. A detailed reading list will be made available through relevant channels, e.g. module handbooks, Blackboard, etc.
Indicative Reading List	For Part I It is recommended that the following book be purchased by all students as it covers all aspects of the mathematical and statistical topics students are likely to encounter on the module. The maths and statistics sections of the syllabus will adhere closely to the content of this book. Currell G and Downman AA (2009) *Mathematics and Statistics for Science*. Wiley-Blackwell. It is not recommended that students purchase physics texts specifically for Part I as extensive notes will be provided via blackboard on the physics topics. Links to useful and credible websites will also be provided. The students are however advised to consult the basic physics texts in Frenchay and Glenside libraries, of which the following is a representative sample: Aird E (1988) *Basic physics for medical imaging*. Heinemann. Schuler JM (2006) *Understanding radiation science : basic nuclear and health physics*. Universal. Parker RP (1984) *Basic science of nuclear medicine*. Churchill Livingstone. Chandra R (1992) *Introductory physics of nuclear medicine*. Williams & Wilkins. Cember H (2009) *Introduction to Health Physics*. McGraw-Hill Medical. Farr RF (2008) *Physics for Medical Imaging*. Saunders. For Parts II & III It is recommended that the following book be purchased: Reed R *et al.* (2012) *Practical Skills in Biomolecular Sciences*. Pearson. The students are however advised to consult the basic chemistry texts (for Part II) in Frenchay and Glenside libraries, of which the following is a representative sample: Harris DC (2010) *Quantitative Chemical Analysis*. W. H. Freeman. Crow J, Bradshaw T and Monk P (2006) *Chemistry for the Bioscience.* OUP. Higson SPJ (2003) *Analytical Chemistry*. OUP
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 the Integrated assignment which will provide an opportunity for students to demonstrate their ability to apply the principles of the course 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 two written examinations. These will assess Parts I and II, respectively, and are an effective vehicle for assessing a student's knowledge and understanding of many aspects of this material. 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	**Component A, Element 2**	
% weighting between components A and B (Standard modules only)	**A:**	**B**:
	40%	**60%**

First Sit	
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**
1. Examination (1.5 hours)	50%
2. Examination (1.5 hours)	50%
Component B **Description of each element**	**Element weighting** **(as % of component)**
1. Integrated assignment	50%
2. Portfolio	50%

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)	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.	