University of the West of England
BRISTOL

CORPORATE AND ACADEMIC SERVICES

MODULE SPECIFICATION

Part 1: Basic Data						
Module Title	Forensic Biology					
Module Code	USSKB8-15-2		Level	2	Version	1
Owning Faculty	Health & Applied Sciences		Field	BBAS		
Contributes towards	BSc Forensic Science, BSc Forensic Science (Biology)					
UWE Credit Rating	15	ECTS Credit Rating	7.5	Module Type	Standard	
Pre-requisites	Human Biological Systems		Co- requisites	None		
Excluded Combinations	USSKB5-15-2 Medicinal Chemistry and USSKB9-15-2 Instrumental Analytical Science		Module Entry requirements	N/A		
Valid From	September 2015		Valid to			

CAP Approval Date	

Part 2: Learning and Teaching	
Learning Outcomes	On successful completion of this module students will be able to: • Describe and critically assess the use of immunological assays to indicate the presence of body fluids and relate these to sensitivity and specificity (assessed in Component A); • Research and evaluate in detail the use of messenger RNA transcripts that are specific to each type of body fluid and evaluate the use of transcripts with constant degradation rates for determination of the age of biological material (assessed in Component B2); • Discuss the common underlying principles of DNA typing of human and non-human DNA and relate this to species testing, genetic linkage and primer design (assessed in Component A); • Discuss and evaluate the use of real-time quantitative PCR for quantifying human nuclear DNA, X and Y chromosome targets, mitochondrial DNA and non-human species (assessed in Component A); • Discuss the common underlying principles of population genetics and relate this to the use of frequency databases used in forensic DNA analysis (assessed in Component A);

	• Discuss the fundamentals of anthropology, osteology, odontology and facial reconstruction and the application of these disciplines within a legal context. (assessed in component A) • Undertake practical work to record scientific data in the field or laboratory, and present, analyse and interpret these data (assessed in Component A, B1).
Syllabus Outline	This module examines how forensic scientists identify biological materials and analyse such materials to obtain genetic information relating to the donor for both human and non-human species. **Identification of biological material** **Immunological assays**; an introduction to antibodies and antigens, including antigen-antibody binding reactions; primary and secondary reactions, precipitation and agglutination. Production of monoclonal and polyclonal antibodies. **Forensic application of primary binding assays**. Enzyme-linked immunosorbent assay for the detection of seminal stains and saliva; immunochromatographic assays for the identification of blood, saliva and semen. **Forensic application of secondary binding assays.** Precipitation-based assays such as immunodiffusion, Ouchterlony and electrophoretic methods used for species identification and to distinguish vaginal and seminal secretions. **Forensic application of RNA based assays**. Detection of specific types of mRNA expressed exclusively in certain cells to identify body fluids. Real-time PCR to detect gene expression levels of mRNAs. **Genetic information relating to both human and non-human species** **Role of non-human DNA in forensic science**. Genetic loci used in species testing. DNA polymorphisims leading to speciation. Techniques available for species testing and how they are performed. **Genetic linkage**. Genetic assignment to a relative, a population or geographic region for human and non-human species. Use of STRs and their characterisation. **Real-time PCR.** Basic principles for the use of real-time PCR including real-time fluorescence-based quantitative polymerase chain reaction, PCR microchip applications in forensic analysis, and PCR methods based on mitochondrial gene. **X and Y chromosomes in forensic science**. Application of X chromosome markers in forensic science, including kinship testing. Identification of male linage and geographical origin. **Population genetics.** An introduction to allele and genotype frequency, including an investigation of Hardy-Weinberg principles and testing HW proportions for population databases. **Identification of human remains** **Forensic anthropology**. An introduction to anatomical and osteological principles to enable the analysis of human remains for the medicolegal purposes of establishing identity. Recognize individual skeletal elements and begin to formulate an educated opinion on their origin (human or nonhuman) and their stage of development (i.e. age at death).
Contact Hours	The contact hours (36) are distributed as follows: 20 hours interactive lectures 6 hours practicals

<table>
<tr><td></td><td>10 hours workshops/seminars</td></tr>
<tr><td>Teaching and Learning Methods</td><td>A variety of learning approaches will be used. Taught sessions at UWE will utilise TEL where possible, to support a pedagogy of Inductive Learning where the students will engage in facilitated activities such as lectorials, debates, case studies, problem based learning etc. Practical laboratory sessions will provide experience of techniques used in forensic serology. Wherever possible, audio recordings of lectorials will be made available on Blackboard to enhance learning and as revision material.

Practical and tutorial sessions will provide opportunities for data handling and interpretation, problem solving and discussions with academic staff. Lectorials will provide contexts and overviews of topics to guide student-centred learning. Student learning will be supported with interactive revision material and practical workbooks and the University's E-Learning Environment, Blackboard.

Scheduled learning includes lectorials and laboratory practical classes.

Independent learning includes hours engaged with essential reading, assignment preparation and completion, etc. These sessions constitute an average time per level as indicated in the table below.</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 15

<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>150</td><td>36</td><td>114</td><td>0</td><td>150</td></tr>
</table>

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

Written Exam: Unseen written exam,
Coursework: Practical report and taxonomic collection

<table>
<tr><td>Total assessment of the module:</td><td></td></tr>
<tr><td>Written exam assessment percentage</td><td>50%</td></tr>
<tr><td>Coursework assessment percentage</td><td>50%</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td>100%</td></tr>
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</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 to develop their information retrieval and evaluation skills in order to identify such</td></tr>
</table>

	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 following list is offered to provide validation panels/accrediting bodies with an indication of the type and level of information students may be expected to consult. As such, its currency may wane during the life span of the module specification. However, as indicated above, CURRENT advice on readings will be available via other more frequently updated mechanisms.* <u>Books</u> The most recent edition of Cooper, J.E and Cooper, M.E. *Wildlife Forensic Investigation – principles and practice*. Auerbach Publications. Coyle, H.M. *Nonhuman DNA Typing – theory and casework applications*. Boca Raton, Florida: CRC Press. Gunn, A. *Essential Forensic Biology*. Oxford: Wiley-Blackwell. Jaiprakash, S.G. and Ray, H.S. *Forensic DNA Analysis - Current practices and emerging technologies*. Boca Raton, Florida: CRC Press. Li, R. *Forensic Biology*. Boca Raton, Florida: CRC Press. Linacre, A.M. and Tobe, S.S. *Wildlife DNA analysis*. Oxford: Wiley-Blackwell Rapely, R. and Whitehouse, D. *Molecular Forensics*. Chichester: John Wiley & Sons. <u>Journals</u> Journal of Forensic Sciences Forensic Science International Journal of Forensic Research The British Academy of Forensic Science Science and Justice

Part 3: Assessment	
Assessment Strategy	The Assessment Strategy has been designed to support and enhance the development of both subject-based and employability skills, whilst ensuring that the modules Learning Outcomes are attained, as described below. The controlled component is a written exam. The exam will be 2 hours duration which is consistent with the Department's assessment strategy for Level 2 modules. This assessment will provide students with an opportunity to demonstrate both their knowledge on a broad range of topics through a series of short answer questions, and more in-depth knowledge though a

	selection of medium length questions. This assessment will test a range of the learning outcomes and will provide a valuable learning experience through recalling and demonstrating knowledge which will be of benefit when progressing to final year modules. The coursework comprises 2 elements. The first is a Practical Portfolio which is based on the laboratory practical series. This portfolio requires the detailed recording of data followed by analysis, interpretation and discussion of these data. The recording and analysis of laboratory data a vital skill for forensic biology students; consequently this assessment can be described as an assessment to enhance employability and learning. The second element, a written assignment, provides the opportunity for the student to complete an in-depth analysis of the use of messenger RNA transcripts that are specific to each type of body fluid and evaluate the use of transcripts with constant degradation rates for determination of the age of biological material. Opportunities for formative assessment and feedback are built into the workshop and seminar series, through discussion of current research, the evaluation of research methods, and review of past exam papers. All work is marked in line with the Department's Generic Assessment Criteria and conforms to university policies for the setting, collection, marking and return of student work. Assessments are described in the Module handbook that is supplied at the start of module Formative feedback is available to students throughout the module through group discussions, practical classes and in tutorials. Students are provided with formative feed-forward for their exam through a revision and exam preparation session prior to the exam and through the extensive support materials supplied through Blackboard.

Identify final assessment component and element		
% weighting between components A and B (Standard modules only)	**A:** **50%**	**B**: **50%**

First Sit	
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**
1. Written Exam (3 hours)	100%
2.	
Component B **Description of each element**	**Element weighting** **(as % of component)**
1. Practical Portfolio	20%
2. Written Assignment	80%

Resit (further attendance at taught classes is not required)	
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**

1. Written exam (3 hours)	100%
2	
Component B **Description of each element**	**Element weighting** **(as % of component)**
1. Practical Report	20%
2. Written Assignment	80%
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.	