



MODULE SPECIFICATION

| Part 1: Information | | | |
|---------------------------|--|--------------------|------------------|
| Module Title | Forensic Biology | | |
| Module Code | USSKB8-15-2 | Level | 2 |
| For implementation from | September 2017 | | |
| UWE Credit Rating | 15 | ECTS Credit Rating | 7.5 |
| Faculty | Health and Applied Sciences | Field | Applied Sciences |
| Department | Department of Applied Sciences | | |
| Contributes towards | MSci Forensic Science MSci Forensic Science (with Foundation Year) BSc Forensic Science BSc Forensic Science (with Foundation Year) | | |
| Module type: | Standard | | |
| Pre-requisites | USSJRU-30-1 Human Biological Systems | | |
| Excluded Combinations | USSKB5-15-2 Medicinal Chemistry USSKB9-15-2 Instrumental Analytical Science | | |
| Co- requisites | N/A | | |
| Module Entry requirements | N/A | | |

| Part 2: Description |
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| <p>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.</p> <p>Identification of biological material</p> <ul style="list-style-type: none"> • 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 polymorphisms 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 lineage 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 medico-legal 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).

Teaching and Learning Methods

A variety of learning approaches will be used. Taught sessions at UWE will utilise TEL where possible, to support 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.

Part 3: Assessment

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 3 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 through 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 a 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.

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.

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| Identify final timetabled piece of assessment (component and element) | A1 | |
| % weighting between components A and B (Standard modules only) | A: | B: |
| | 50% | 50% |
| First Sit | | |
| Component A (controlled conditions) Description of each element | Element weighting (as % of component) | |
| 1. Unseen written exam (3 hours) | 100% | |
| Component B Description of each element | Element weighting (as % of component) | |
| 1. Portfolio | 100% | |
| Resit (further attendance at taught classes is not required) | | |
| Component A (controlled conditions) Description of each element | Element weighting (as % of component) | |
| 1. Unseen written exam (3 hours) | 100% | |
| Component B Description of each element | Element weighting (as % of component) | |
| 1. Portfolio | 100% | |
| Part 4: Teaching and Learning Methods | | |
| Learning Outcomes | <p>On successful completion of this module students will be able to:</p> <ul style="list-style-type: none"> • 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 B); • Discuss the common underlying principles of DNA typing of human and nonhuman 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, B). | |

| Key Information Sets Information (KIS) | <p>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</p> | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|-----------------------|------------------------------------|-----|----------------------------------|--|--|--|--|--|--|--|--|--|----|-----------------------|---|-------------------------|-----------------------|-----------------|-----|----|-----|---|-----|
| Contact Hours | <table border="1"> <thead> <tr> <th colspan="5"><u>Key Information Set - Module data</u></th> </tr> <tr> <td colspan="5"><i>Number of credits for this module</i></td> </tr> </thead> <tbody> <tr> <td colspan="4"></td> <td style="text-align: center;">15</td> </tr> <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 style="text-align: center;">150</td> <td style="text-align: center;">36</td> <td style="text-align: center;">114</td> <td style="text-align: center;">0</td> <td style="text-align: center;">150</td> </tr> </tbody> </table> | <u>Key Information Set - Module data</u> | | | | | <i>Number of credits for this module</i> | | | | | | | | | 15 | Hours to be allocated | Scheduled learning and teaching study hours | Independent study hours | Placement study hours | Allocated Hours | 150 | 36 | 114 | 0 | 150 |
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| 150 | 36 | 114 | 0 | 150 | | | | | | | | | | | | | | | | | | | | | | |
| Total Assessment | <p>The table below indicates as a percentage the total assessment of the module which constitutes a;</p> <p>Written Exam: Unseen written exam Coursework: Portfolio</p> <table border="1"> <thead> <tr> <th colspan="2">Total assessment of the module:</th> </tr> </thead> <tbody> <tr> <td>Written exam assessment percentage</td> <td style="text-align: center;">50%</td> </tr> <tr> <td>Coursework assessment percentage</td> <td style="text-align: center;">50%</td> </tr> </tbody> </table> | Total assessment of the module: | | Written exam assessment percentage | 50% | Coursework assessment percentage | 50% | | | | | | | | | | | | | | | | | | | |
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| Written exam assessment percentage | 50% | | | | | | | | | | | | | | | | | | | | | | | | | |
| Coursework assessment percentage | 50% | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reading List | <p>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.</p> <p>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.</p> <p>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.</p> <p>A detailed reading list will be made available through relevant channels, e.g. module handbooks, Blackboard, etc.</p> <p>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.</p> | | | | | | | | | | | | | | | | | | | | | | | | | |

Books

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.

Journals

Journal of Forensic Sciences
Forensic Science International
Journal of Forensic Research
The British Academy of Forensic Science
Science and Justice

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| First CAP Approval Date | 28/03/2014 | | | |
| Revision CAP Approval Date | 1 st February 2017 | Version | 2 | RIA 12196 |