# Module Specification

Forensic Biology

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## Part 1: Information

**Module title:** Forensic Biology

**Module code:** USSKB8-15-2

**Level:** Level 5

**For implementation from:** 2024-25

**UWE credit rating:** 15

**ECTS credit rating:** 7.5

**College:** College of Health, Science & Society

**School:** CHSS School of Applied Sciences

**Partner institutions:** None

**Field:** Applied Sciences

**Module type:** Module

**Pre-requisites:** Human Biological Systems 2023-24

**Excluded combinations:** Instrumental Analytical Science 2024-25, Medicinal Chemistry 2024-25

**Co-requisites:** None

**Continuing professional development:** No

**Professional, statutory or regulatory body requirements:** None

## Part 2: Description

**Overview:** 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. The ability to differentiate biological stains is essential in the prioritisation and probative evaluation of evidence gathered at crime scenes, or recovered in the laboratory.

**Features:** Not applicable

**Educational aims:** This module aims to provide students with the practical skills and theoretical knowledge required to identify and analyse biological materials, such as may be encountered in forensic casework.
Students will gain practical experience of immunological based assays and DNA quantification and in the theoretical evaluation of a broad range of immunological, RNA, and DNA based assays.

**Outline syllabus:** 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:

Genetic linkage. Genetic assignment to a relative, a population or geographic region for human and nonhuman 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.

Population genetics. An introduction to allele and genotype frequency, including an investigation of Hardy-Weinberg principles and testing HW proportions for population databases.

## Part 3: Teaching and learning methods

**Teaching and learning methods:** Lecture and tutorial sessions will provide opportunities for data handling and interpretation, problem solving and discussions with academic staff. Workshops will be used to support students in the development of data analysis, presentation and critical writing skills, which underpin the assessment. Laboratory sessions will provide practical skills in the analysis of sample material, the data for which will be interpreted in the support lecture/ tutorial sessions.

**Module Learning outcomes:** On successful completion of this module students will achieve the following learning outcomes.

**MO1** Describe and critically assess the use of immunological assays to indicate the presence of body fluids and relate these to sensitivity and specificity.

**MO2** 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.

**MO3** Discuss the common underlying principles of DNA typing of human and nonhuman DNA and population genetics.

**Hours to be allocated:** 150

**Contact hours:**

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

**Reading list:** The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/usskb8-15-2.html

## Part 4: Assessment

**Assessment strategy:** The assessment for this module is a case study (3000 words).
The case study report has been selected as it allows the student to apply practical and theoretical knowledge gained throughout the course to provide a justified analytical strategy for the analysis of biological fluids. This assessment strategy also encourages student engagement, as students use their own laboratory results, this also mitigates against collusion.

Students will be supported to succeed in this assessment through dedicated assessment support sessions. Students will be provided with guidance on data analysis and presentation and critical writing. Example case studies will also be discussed in workshops.

**Assessment tasks:**

**Case Study** (First Sit)
Description: Case Study (3000 words)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

**Case Study** (Resit)
Description: Case Study (3000 words)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

## Part 5: Contributes towards

This module contributes towards the following programmes of study: