



## **Module Specification**

### **Genomic Technologies**

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## Part 1: Information

**Module title:** Genomic Technologies

**Module code:** USSKBF-30-3

**Level:** Level 6

**For implementation from:** 2021-22

**UWE credit rating:** 30

**ECTS credit rating:** 15

**Faculty:** Faculty of Health & Applied Sciences

**Department:** HAS Dept of Applied Sciences

**Partner institutions:** None

**Delivery locations:** Frenchay Campus

**Field:** Applied Sciences

**Module type:** Standard

**Pre-requisites:** Genes and Biotechnology 2020-21, Molecular Biology 2021-22, Molecular Genetics 2021-22

**Excluded combinations:** None

**Co-requisites:** None

**Continuing professional development:** No

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

## Part 2: Description

**Overview:** Not applicable

**Features:** Not applicable

**Educational aims:** This module aims to cover bioinformatics approached to genes, proteins, sequencing and molecular genomic techniques.

**Outline syllabus:** Genome technologies:

DNA sequencing:

Structure of a genome, Sanger sequencing, next generation sequencing, future sequencing technologies.

Bioinformatics Analysis Techniques - DNA:

Gene annotation, DNA and protein databases. Pairwise alignment techniques; Basic Local Alignment Search Tool (BLAST), identity and similarity. Multiple sequence alignment; Position Specific Iterative (PSI)-BLAST, Clustal.

Bioinformatics Analysis Techniques – Protein:

Secondary databases and protein structure prediction; motifs, pattern and profile database, PROSITE, structure databases, Domains, ExPASy Proteomics tools. Structural Proteomics, methods of determination, how to display and store.

Model Genomes: Structure and organisation, techniques used to study model genome, discoveries made.

Analysis of Gene Expression and Function:

Expression analysis, microarrays, RNAseq, functional assays, 'knock-out' and 'knock-down' technologies, proteomics.

Applications of genome technologies:

Current topics for example:

Drug development and targets – Analysis of drug resistance.

Identification of tumour-rejection antigens.

Genome Analysis in Forensic Science.

Reconstructing Phylogenies.

Antibiotic drug discovery and reverse vaccinology

### Part 3: Teaching and learning methods

**Teaching and learning methods:** Scheduled contact time is structured around a series of lectures that introduce the key concepts of the topic under discussion. Bioinformatics lectures will be supported by a series of computer based tutorials to allow the students to put the theory in to practice and prepare for their assignment. Coursework support will be embedded in the lectures but also focused on in an additional tutorial session.

#### Module Learning outcomes:

**MO1** Describe and critically discuss past, current and future developments in DNA sequencing technologies.

**MO2** Review and critically evaluate the scope of bioinformatics including alignment techniques and databases.

**MO3** Discuss the concept of and critically assess the techniques used to analyse model genomes and the discoveries that have been made using them.

**MO4** Discuss and critically assess the methods of global expression analysis including the transcriptome and the proteome and the applications of these technologies.

**MO5** Review, discuss and evaluate a range of current uses for genomic technologies.

**MO6** Select and use appropriate bioinformatics tools, showing evidence of understanding and interpretation of results.

**Hours to be allocated:** 300

#### Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 300

**Reading list:** The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://uwe.rl.talis.com/modules/usskb-30-3.html) via the following link <https://uwe.rl.talis.com/modules/usskb-30-3.html>

## Part 4: Assessment

**Assessment strategy:** Component A is a written case study. This assessment is designed to test their ability to research, prioritise information and produced a structured, evidence based answer. This assessment can be tailored to students on different programmes as there is a choice of questions allowing students to focus their answers to their relevant degree programme (i.e. biological, biomedical or forensic science). This assessment tests the breadth and depth of students' knowledge, as well as their ability to analyse, synthesize and summarise information critically, including published research.

Formative support underpinning component A includes a dedicated coursework support tutorial in which guidance is provided on literature searching and structuring of answers.

Component B is a problem based data interpretation that allows the students to select and use appropriate bioinformatics techniques and interpret the outputs of their analysis. This assessment tests student's ability to apply bioinformatics approached to sequence data and interpretation of results. Bioinformatics is defined as a vulnerable skill by multiple research councils and is increasingly required by employers in the sector.

Formative support underpinning component B includes bespoke tutorial sessions, in which practice examples are discussed and worked through.

### Assessment components:

#### Case Study - Component A (First Sit)

Description: Critical Essay

Weighting: 60 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

**Practical Skills Assessment - Component B (First Sit)**

Description: Data interpretation Exercise

Weighting: 40 %

Final assessment: No

Group work: No

Learning outcomes tested: MO2, MO6

**Case Study - Component A (Resit)**

Description: Critical Essay

Weighting: 60 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

**Practical Skills Assessment - Component B (Resit)**

Description: Data interpretation Exercise

Weighting: 40 %

Final assessment: No

Group work: No

Learning outcomes tested: MO2, MO6

**Part 5: Contributes towards**

This module contributes towards the following programmes of study:

Healthcare Science (Genetic Science) {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19

Forensic Science [Sep][FT][Frenchay][3yrs] BSc (Hons) 2019-20

Biological Sciences [Sep][SW][Frenchay][4yrs] BSc (Hons) 2018-19

Biological Sciences [Sep][SW][Frenchay][5yrs] MSci 2018-19

Biomedical Science [Sep][SW][Frenchay][4yrs] BSc (Hons) 2018-19

Biological Sciences {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2018-19

Biomedical Science {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19

Biomedical Science [Sep][SW][Frenchay][5yrs] MSci 2018-19

Biological Sciences {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19

Biomedical Science {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2018-19

Forensic Science {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19

Forensic Science [Sep][SW][Frenchay][4yrs] BSc (Hons) 2018-19

Forensic Science [Sep][SW][Frenchay][5yrs] MSci 2018-19

Forensic Science {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2018-19