

# **Module Specification**

# **Genomic Technologies**

Version: 2023-24, v3.0, 05 Apr 2023

Contents	
Module Specification	1
Part 1: Information	2
Part 2: Description	2
Part 3: Teaching and learning methods	4
Part 4: Assessment	5
Part 5: Contributes towards	6

## Part 1: Information

Module title: Genomic Technologies

Module code: USSKBF-30-3

Level: Level 6

For implementation from: 2023-24

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Health & Applied Sciences

Department: HAS Dept of Applied Sciences

Partner institutions: None

Field: Applied Sciences

Module type: Module

**Pre-requisites:** Molecular Biology 2023-24, Molecular Biotechnology 2022-23, Molecular Genetics 2023-24

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

## **Part 2: Description**

**Overview:** Pre-requisites: students must have taken one out of USSKAL-30-2 Molecular Biology, or USSKAM-30-2 Genes and Biotechnology, or USSKB7-15-2 Molecular Genetics

Features: Not applicable

Page 2 of 8 11 July 2023 **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.

Bioinfomatics 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 predication; 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.

> Page 3 of 8 11 July 2023

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 serious 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:** On successful completion of this module students will achieve the following 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

#### Page 4 of 8 11 July 2023

Face-to-face learning = 72 hours

Total = 300

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

## Part 4: Assessment

**Assessment strategy:** Assessment Task 1 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 Assessment Task 1 includes a dedicated coursework support tutorial in which guidance is provided on literature searching and structuring of answers.

Assessment Task 2 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 Assessment Task 2 includes bespoke tutorial sessions, in which practice examples are discussed and worked through.

#### Assessment tasks:

#### Page 5 of 8 11 July 2023

#### Case Study (First Sit)

Description: Critical Essay Weighting: 60 % Final assessment: Yes Group work: No Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

## Practical Skills Assessment (First Sit)

Description: Data interpretation Exercise Weighting: 40 % Final assessment: No Group work: No Learning outcomes tested: MO2, MO6

## Case Study (Resit)

Description: Critical Essay Weighting: 60 % Final assessment: Yes Group work: No Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

## Practical Skills Assessment (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:

Applied Biomedical Science {Top-Up} [INTUNI] BSc (Hons) 2023-24

Page 6 of 8 11 July 2023 Biomedical Science [Sep][FT][Frenchay][3yrs] BSc (Hons) 2021-22 Biomedical Science [Sep][FT][Frenchay][4yrs] MSci 2021-22 Applied Biomedical Science [Sep][FT][Frenchay][3yrs] BSc (Hons) 2021-22 Forensic Science [Sep][FT][Frenchay][3yrs] BSc (Hons) 2021-22 Forensic Science [Sep][FT][Frenchay][4yrs] MSci 2021-22 Biological Sciences [Sep][FT][Frenchay][3yrs] BSc (Hons) 2021-22 Biological Sciences [Sep][FT][Frenchay][4yrs] MSci 2021-22 Forensic Science [Sep][SW][Frenchay][4yrs] BSc (Hons) 2020-21 Biological Sciences [Sep][SW][Frenchay][4yrs] BSc (Hons) 2020-21 Biological Sciences [Sep][SW][Frenchay][5yrs] MSci 2020-21 Biomedical Science [Sep][SW][Frenchay][5yrs] MSci 2020-21 Biomedical Science {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2020-21 Biomedical Science [Sep][SW][Frenchay][4yrs] BSc (Hons) 2020-21 Biomedical Science {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2020-21 Forensic Science [Sep][SW][Frenchay][5yrs] MSci 2020-21 Forensic Science {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2020-21 Biological Sciences {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2020-21 Forensic Science {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2020-21 Biological Sciences {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2020-21 Forensic Science {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2019-20 Biological Sciences {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2019-20 Biological Sciences {Foundation} [Sep][SW][Frenchay][6yrs] MSci 2019-20 Biomedical Science [Sep][PT][Frenchay][6yrs] BSc (Hons) 2019-20 Biomedical Science [Sep][PT][Frenchay][8yrs] MSci 2019-20 Biomedical Science {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2019-20 Biomedical Science {Foundation} [Sep][SW][Frenchay][6yrs] MSci 2019-20

#### Page 7 of 8 11 July 2023

Forensic Science {Foundation} [Sep][SW][Frenchay][6yrs] MSci 2019-20