



## **Module Specification**

### **Practical Applications of Molecular Biology and Biotechnology**

Version: 2023-24, v2.0, 19 Jun 2023

#### **Contents**

<b>Module Specification .....</b>	<b>1</b>
<b>Part 1: Information .....</b>	<b>2</b>
<b>Part 2: Description .....</b>	<b>2</b>
<b>Part 3: Teaching and learning methods .....</b>	<b>3</b>
<b>Part 4: Assessment.....</b>	<b>5</b>
<b>Part 5: Contributes towards .....</b>	<b>7</b>

## Part 1: Information

**Module title:** Practical Applications of Molecular Biology and Biotechnology

**Module code:** USSKNM-30-2

**Level:** Level 5

**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:** None

**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:** See learning outcomes.

**Outline syllabus:** This module will cover the following topics within molecular biology field:

Principles of gene cloning: purification of DNA and manipulation of DNA fragments and vectors for gene cloning, application of enzymes in molecular biology.

Cloning: transformations (the uptake of DNA by bacterial cells), identification and analysis of recombinants; evaluation of transformation efficiency.

Amplification of DNA: the polymerase chain reaction (PCR), optimisation of PCR protocols, analysis of PCR products, real time PCR.

Protein analysis: an overview of protein structure and function. Protein folding and denaturation. The importance of protein folding in health and disease. Protein purification and analysis of proteins by gel electrophoresis.

Analysis of gene expression: the structure of genes, RNA, transcription and protein synthesis, control of gene expression

Applications of gene cloning and DNA analysis in biotechnology

Production of a protein from cloned genes - Special vectors for expression of foreign genes in E. coli, problems with the production of recombinant protein in E. coli, production of recombinant protein by eukaryotic cells.

Gene cloning and DNA analysis in medicine – Production of recombinant pharmaceuticals, identification of genes responsible for human disease, gene therapy.

Gene cloning and DNA analysis in agriculture – Gene addition approach to plant genetic engineering, gene subtraction, problems with genetically modified plants.

Gene cloning and DNA analysis in forensic science– DNA analysis in the identification of crime suspects.

### **Part 3: Teaching and learning methods**

**Teaching and learning methods:** This module aims to deliver specialist knowledge through taught lectures, seminars and practical sessions to promote application of knowledge acquired and analytical and problem-solving skills.

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

**MO1** Review current techniques used for the isolation, manipulation and analysis of genes and their products within organisms

**MO2** Evaluate the research process through appreciation of practical experience of molecular biology and be able to interpret primary or secondary experimental data

**MO3** Discuss key structural features of proteins and the forces directing protein folding highlighting the protein-function relationship

**MO4** Show an understanding of gene structure and explain the process of gene expression and regulation

**MO5** Evaluate current and potential applications of biotechnology, the ethical issues raised and the impact on human society

**MO6** Use appropriate information technology resources and sources of information to seek, retrieve and interpret subject specific material alongside the acquisition of other key generic graduate skills, such as academic writing, interpreting information, evaluating research data and critical thinking

**Hours to be allocated:** 300

**Contact hours:**

Independent study/self-guided study = 210 hours

Face-to-face learning = 90 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/ussknm-30-2.html) via the following link <https://uwe.rl.talis.com/modules/ussknm-30-2.html>

## Part 4: Assessment

**Assessment strategy:** Assessment 1 is a 1500 literature review. Assessment 1 will include independent research of published literature focused around biotechnological processes and ethical issues of DNA manipulation and cloning.

Assessment 2 is a portfolio of laboratory reports based on primary or secondary data. Assessment 2 will provide a valuable practical learning experience and will further develop laboratory skills and understanding of molecular biology applications.

Assessment 3 is an online exam designed to take 2 hours, to be completed within a 24 hour window. This assessment will provide students with an opportunity to demonstrate depth and breadth of their knowledge on a broad range of topics through a series of questions and discussions. This assessment will test a range of the learning outcomes.

Opportunities for formative feedback are built into teaching and practical sessions, through discussion and evaluation of current research and practical sessions. Students are provided with formative feed-forward for their exam through a revision and exam preparation session prior to the exam.

### Assessment tasks:

#### Written Assignment (First Sit)

Description: Literature review (1500 words)

Weighting: 24 %

Final assessment: No

Group work: No

Learning outcomes tested: MO5, MO6

#### Portfolio (First Sit)

Description: Practical portfolio

Weighting: 36 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO6

**Examination (Online) (First Sit)**

Description: Online examination (24 hours)

Weighting: 40 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO3, MO4

**Written Assignment (Resit)**

Description: Literature review (1500 words)

Weighting: 24 %

Final assessment: No

Group work: No

Learning outcomes tested: MO5, MO6

**Portfolio (Resit)**

Description: Practical portfolio

Weighting: 36 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO6

**Examination (Online) (Resit)**

Description: Online examination (24 hours)

Weighting: 40 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO3, MO4

## **Part 5: Contributes towards**

This module contributes towards the following programmes of study:

Biological Laboratory Sciences [UCW] FdSc 2022-23