MODULE SPECIFICATION

Part 1: Information			
Module Title	Practical Applications of Molecular Biology and Biotechnology		
Module Code	USSKNM-30-2	Level	Level 5
For implementation from	2020-21		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Faculty of Health & Applied Sciences	Field	Applied Sciences
Department	HAS Dept of Applied Sciences		
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

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 or 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 express

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.

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.

Part 3: Assessment

The assessment strategy has been designed to support and enhance the development of subject-based knowledge and practical skills, whilst ensuring that the learning outcomes are achieved.

Component A 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.

The coursework consists of two parts: a 1500 literature review (B1) and a portfolio of laboratory reports based on primary or secondary data (B2). Component B2 will provide a valuable practical learning experience and will further develop laboratory skills and understanding of molecular biology applications. Component B1 will include independent research of published literature focused around biotechnological processes and ethical issues of DNA manipulation and cloning.

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.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Written Assignment - Component B	✓	24 %	Literature review (1500 words)
Portfolio - Component B		36 %	Practical portfolio based on primary or secondary data
Examination (Online) - Component A		40 %	Online examination (24 hours)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Written Assignment - Component B	✓	24 %	Literature review (1500 words)
Portfolio - Component B		36 %	Practical portfolio based on secondary data
Examination (Online) - Component A		40 %	Online examination (24 hours)

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	Reference
Review current techniques used for the isolation, manipulation and analysis of genes and their products within organisms	MO1
Evaluate the research process through appreciation of practical experience of molecular biology and be able to interpret primary or secondary experimental data	MO2
Discuss key structural features of proteins and the forces directing protein folding highlighting the protein-function relationship	MO3
Show an understanding of gene structure and explain the process of gene expression and regulation	MO4
Evaluate current and potential applications of biotechnology, the ethical issues raised and the impact on human society	MO5
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	MO6

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	210
Total Independent Study Hours:	210
Scheduled Learning and Teaching Hours:	
Face-to-face learning	90
Total Scheduled Learning and Teaching Hours:	90
Hours to be allocated	300
Allocated Hours	300

Reading List

The reading list for this module can be accessed via the following link:

https://uwe.rl.talis.com/index.html

Part 5: Contributes Towards

This module contributes towards the following programmes of study:

Biological Laboratory Sciences [Sep][FT][UCW][2yrs] FdSc 2019-20