MODULE SPECIFICATION

Part 1: Information			
Module Title	Genes and Biotechnology		
Module Code	USSKAM-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	Cells, Biochemistry and Genetics 2020-21		
Excluded Combinations	None		
Co-requisites	None		
Module Entry Requirements	None		
PSRB Requirements	None		

Part 2: Description

Overview: Pre-requisites: Students must have taken USSKA4-30-1: Cell Biochemistry and Genetics, USSJRU-30-1: Human Biological Systems

Educational Aims: See Learning Outcomes.

Outline Syllabus: The syllabus includes:

Principles of gene cloning and DNA Analysis:

Why gene cloning and DNA analysis are important.

Vectors for gene cloning - Plasmids and bacteriophages.

Purification of DNA from living cells - Cell, plasmids and bacteriophage DNA, ancient DNA.

Manipulation of purified DNA – DNA manipulative enzymes, restriction endonucleases, ligase.

Introduction of DNA into living cells - Transformation (the uptake of DNA by bacterial cells),

identification of recombinants, and introduction of DNA into non-bacterial cells.

Cloning vectors – Bacterial vectors based on E. coli, vectors based on bacteriophage, vectors for other bacteria; vectors for eukaryotes (yeast, higher plants and animals).

How to obtain a clone of a specific gene – Direct selection, identification of a clone from a gene library, methods for clone identification.

The polymerase chain reaction (PCR) – PCR details, studying PCR products, real time PCR.

Sequencing genes and genomes – Methodology for sequencing genes, how to sequence a genome.

Applications of gene cloning and DNA analysis in Biotechnology:

Production of 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 and archaeology – DNA analysis in the identification of crime suspects, kinship studies by DNA profiling, Archaeogenetics.

Teaching and Learning Methods: Scheduled learning:

The module will be delivered as mix of lectures and integrated tutorial sessions together with a student centred case study and extended practical project.

Revision will be embedded in the lectures but also focused on in an additional tutorial session.

Independent learning includes hours engaged with essential reading, case study preparation, assignment preparation and completion. These sessions constitute an average time per level.

The contact hours (66) are typically distributed as follows:

22 hours lectures
11 hours tutorials
33 hours practicals

Part 3: Assessment

The Assessment for this module is designed to test the breadth and depth of students' knowledge, as well as their ability to analyse, synthesize and summarise information critically, including published research.

Component A is an online exam, with a 24 hour submission window, and a suggested completion time of 3 hours, which is consistent with the Department's assessment strategy for Level 2 modules.

The case study provides the opportunity for the student to complete an in-depth analysis of selected topic from the module syllabus by critically reviewing published research. The second assignment will be an extended practical report which will provide the opportunity for the student to apply key methodologies in gene cloning and DNA analysis and analyse results from these.

Opportunities for formative assessment and feedback are built into the assignments and review of past exam papers.

All work is marked in line with the Department's Generic Assessment Criteria and conforms to the university policies for the setting, collection, marking and return of student work. Assessments are described in the module handbook that is supplied at the start of module.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		25 %	Extended practical report
Examination - Component A	✓	50 %	Online exam (24 hours)
Case Study - Component B		25 %	Case study
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Set Exercise - Component B		25 %	Data interpretation
Examination - Component A	✓	50 %	Online exam (24 hours)
Case Study - Component B		25 %	Case study

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 the current techniques used for the isolation, manipulation, cloning and characterisation of genes and their products within organisms	MO1
Describe the range of current gene-based techniques used in genetic studies	MO2
Have acquired an appreciation of the research process through gaining practical experience of molecular genetics and DNA analysis and be able to interpret data obtained from such analysis	MO3
Describe current and potential applications of biotechnology and ethical issues raised	MO4
Explain the impact of biotechnology on human society	MO5

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	234
Total Independent Study Hours:	234
Scheduled Learning and Teaching Hours:	
Face-to-face learning	66
Total Scheduled Learning and Teaching Hours:	66

	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/modules/usskam-30-2.html	

Part 5: Contributes Towards
This module contributes towards the following programmes of study: Biological Sciences {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19 Biological Sciences {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2018-19 Biological Sciences {Foundation} [Sep][SW][Frenchay][6yrs] MSci 2018-19 Biological Sciences {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2018-19