University of the West of England
BRISTOL

CORPORATE AND ACADEMIC SERVICES

MODULE SPECIFICATION

Part 1: Basic Data						
Module Title	Genes & Biotechnology					
Module Code	USSKAM-30-2		Level	2	Version	1
Owning Faculty	Health and Applied Sciences		Field	BBAS		
Contributes towards	BSc (Hons) Biological Science					
UWE Credit Rating	30	ECTS Credit Rating	15	Module Type	Standard	
Pre-requisites	USSKA4-30-1 Cell Biochemistry and Genetics USSJRU-30-1 Human Biological Systems		Co- requisites			
Excluded Combinations	None		Module Entry requirements	N/A		
Valid From	September 2015		Valid to	September 2021		

CAP Approval Date	28/03/2014

Part 2: Learning and Teaching	
Learning Outcomes	On successful completion of this module students will be able to: • Review the current techniques used for the isolation, manipulation, cloning and characterisation of genes and their products within organisms • Describe the range of current gene-based techniques used in genetic studies • 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. • Describe current and potential applications of biotechnology and ethical issues raised • Explain the impact of biotechnology on human society
Syllabus Outline	**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.
Contact Hours	The contact hours (72) are distributed as follows: • 24 hours lectures • 12 hours tutorials • 36 hours practicals
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 etc. These sessions constitute an average time per level as indicated in the table below.

Key Information Sets Information	**Key Information Set - Module data** *Number of credits for this module* 30

Hours to be allocated	Scheduled learning and teaching study hours	Independent study hours	Placement study hours	Allocated Hours
300	72	228	0	300

	The table below indicates as a percentage the total assessment of the module which constitutes a - **Written Exam**: Unseen written exam **Coursework**: Written assignment, data analysis Please note that this is the total of various types of assessment and will not necessarily reflect the component and module weightings in the Assessment section of this module description: Total assessment of the module: Written exam assessment percentage: 50% Coursework assessment percentage: 50% 100%
Reading Strategy	All students will be encouraged to make full use of the print and electronic resources available to them through membership of the University. These include a range of electronic journals and a wide variety of resources available through web sites and information gateways. The University Library's web pages provide access to subject relevant resources and services, and to the library catalogue. Many resources can be accessed remotely. Students will be presented with opportunities within the curriculum to develop their information retrieval and evaluation skills in order to identify such resources effectively. Any **essential reading** will be indicated clearly, along with the method for accessing it, e.g. students may be expected to purchase a set text, be given or sold a print study pack or be referred to texts that are available electronically, etc. This guidance will be available either in the module handbook, via the module information on Blackboard or through any other vehicle deemed appropriate by the module/programme leaders. If **further reading** is expected, this will be indicated clearly. If specific texts are listed, a clear indication will be given regarding how to access them and, if appropriate, students will be given guidance on how to identify relevant sources for themselves, e.g. through use of bibliographical databases.
Indicative Reading List	*The following list is offered to provide validation panels/accrediting bodies with an indication of the type and level of information students may be expected to consult. As such, its currency may wane during the life span of the module specification. However, as indicated above, CURRENT advice on readings will be available via other more frequently updated mechanisms.* <u>Books</u>: The most recent edition of Russell, P.J *Genetics* Harlow: Pearson Education. Brown, T.A. *Gene Cloning and DNA Analysis*. Oxford: Blackwell. Brown, T.A *Genetics – A Molecular Approach*. London: Chapman and Hall. Primrose, S.B. & R.M. Twyman, *Principles of Gene Manipulation & Genomics*. Oxford: Blackwell. Robinson, T.R. *Genetics for Dummies*. New York: Wiley Turner et al. *Molecular Biology – Instant Notes*. New York: Wiley. Brown, T.A. *Genomes 3*. Abingdon: Garland Science. Ridley, M*. Genome: the autobiography of a species in 23 chapters*. New York: Harper Perennial. Ridley, M. *Nature via Nurture*. London: Fourth Estate. Wilmut, I. & R. Highfield, *After Dolly*. New York; London: W.W. Norton.

	Journals: Trends in Genetics Nature Genetics Nature Reviews PLoS PNAS

Part 3: Assessment	
Assessment Strategy	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. The controlled component is a written exam. The exam will be 3 hours duration 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.

Identify final assessment component and element		
% weighting between components A and B (Standard modules only)	**A:** **50%**	**B**: **50%**

First Sit	
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**
1. Examination (3 hours)	100%
Component B **Description of each element**	**Element weighting** **(as % of component)**
1. Case study	50%
2. Extended practical report	50%

Resit (further attendance at taught classes is not required)	
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**
1. Examination (3 hours)	100%
Component B	**Element weighting** **(as % of component)**

Description of each element	
1. Case study	50%
2. Data Interpretation	50%
If a student is permitted an **EXCEPTIONAL RETAKE** of the module the assessment will be that indicated by the Module Description at the time that retake commences.	