ZBIO C3100: Molecular Biology and Immunology 1

Module Title:	Molecular Biology and Immunology 1
Language of Instruction:	English

Credits:	5

NFQ Level:	7

Module Delivered In	4 programme(s)

Teaching & Learning Strategies:	The module will be taught as two theory classes of one hour duration per week and one three hour practical per week for 8 weeks. Class notes and self assessment tools will be provided via the Institute student common drive. Students will normally be required to carryout assignments and give presentations in order to consolidate material in lectures and practicals. Group and peer learning will be facilitated during theory and practical classes and during the preparation of assignments. Classes will be aided with the use of online resources and the Blackboard will be used where necessary.

Module Aim:	The aim of the module is to introduce students to the fundamentals of molecular biology, bioinformatics, medical microbiology and immunology.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Explain and illustrate the molecular processes of DNA replication and information flow and relate these to biotechnological processes.
LO2	Discuss the role of biotechnology in medicine, industry and the environment including limitations, hazards and risks.
LO3	Outline and carry out the main molecular methods used in DNA technology. Apply practical skills in the molecular biology and medical microbiology laboratory with respect to CGLP, health and safety, problem solving, team work, efficient record keeping and timely submission of reports

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
No requirements listed

ZBIO C3100: Molecular Biology and Immunology 1

Module Content & Assessment

Indicative Content
1. Molecular Biology: Regulation of enzyme activity: product inhibition, feedback inhibition, covalent modification. Regulation of enzyme synthesis: DNA Binding Proteins. Regulation of Transcription: induction and repression, negative and positive control, attenuation. Global control: catabolite repression. Signal Transduction and Two-Component Regulatory Systems. Horizontal gene transfer and its clinical and environmental implications. DNA replication. The genetic code RNA transcription, editing and translation. Basic introduction to bioinformatics. Introduction to basic recombinant DNA technology methods: restriction enzyme technology, cloning, expression systems, PCR, DNA sequencing. Overview of GMOs: categorization, risks and containment. Examples and case studies of applications of molecular biology in biotechnology: enzymes, biopharmaceuticals, vaccines, environmental biotechnology.
Practical Practical classes will develop skills including: The manipulation and handling of recombinant organisms and molecules with emphasis to CGLP and health and safety, monitoring, recording and analysing experimental data in molecular biology, operating the range of instrumentation specified safely and effectively in the laboratory, effective group work and good written and oral communication skills, safety in the molecular biology lab, specific hazards and risks, waste disposal of EtBr, UV visualisation, DNA isolation, DNA quantification and visualisation, gel electrophoresis, restriction enzyme digestion of DNA and cloning, transformation of cells with recombinant DNA molecules, DNA amplification using the polymerase chain reaction, demonstration of the effects of heat and pH on DNA, detection of endotoxins, the LAL test, production of pyrogen-free water, basic serological techniques, agglutination reactions, ELISA testing. The application of bioinformatics to discover variability in sequences and trace the effects of molecular evolution in related genes and proteins.

Assessment Breakdown	%
Continuous Assessment	40.00%
Practical	60.00%

Special Regulation
Students must achieve a minimum grade (35%) in both the practical and CA.

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Other	n/a	1,2	40.00	n/a

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Performance in Lab class/practicals and practical reports or assignments	3	60.00	n/a

No End of Module Formal Examination

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

ZBIO C3100: Molecular Biology and Immunology 1

Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	12 Weeks per Stage	2.00
Laboratory	12 Weeks per Stage	2.00
Estimated Learner Hours	12 Weeks per Stage	6.42
	Total Hours	125.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EEBEE_B	Bachelor of Engineering (Honours) in Biomedical Electronics	5	Mandatory
CW_EEBEE_D	Bachelor of Engineering in Biomedical Electronics	5	Mandatory
CW_SABTP_B	Bachelor of Science (Honours) in Biosciences with Biopharmaceuticals	5	Mandatory
CW_SABFQ_D	Bachelor of Science in Biosciences	5	Mandatory