Module Title:	Bioforensics
Language of Instruction:	English

Credits:	5

NFQ Level:	8

Module Delivered In	No Programmes

Teaching & Learning Strategies:	This module will be delivered via two one-hour lectures per week. Students may be required to access the material via Blackboard in advance of class to encourage active learning. To consolidate lectures, students will normally be required to carry out assignments, give presentations and continuous assessment examinations. Group and peer learning will be facilitated during the preparation of assignments, presentations and practicals. Any course-related issue or questions that may arise will be discussed at lectures. Course lecture summaries, course calendar, announcements and other course-related material will be available on Blackboard, a virtual learning environment. Students can contact lecturer outside of class hours to discuss formative feedback given on written reports and group project work. Online demonstrations will illustrate the key concepts of the course and will be available throughout the year. Digital resources such as YouTube, Reusable learning objects and the National Digital Learning Repository will be used as practicable.

Module Aim:	To introduce students to the various concepts in biomolecular forensics and the analysis of such forensic samples. Introduce students to concepts such as Population genetics, Parentage testing, DNA profiles and databases, Trial evidence, Bioethics and Case studies. Provide information for students so that they can be familiar with the software packages used for DNA, RNA and protein sequence analysis.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Know the different molecular forensic techniques used in the analysis of biological material.
LO2	Evaluate DNA profile data and have the relevant knowledge and skills analyse DNA.
LO3	Describe the relevant internet based databases for storage, query and retrieval of biomolecular sequences.
LO4	Cognisant of the issues involving bioethics.
LO5	Proficient in communicating with peers and academic staff using verbal and written methods of communication as well as presentations.

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.*	
Successful completion of Year 3 or equivalent.	

Module Content & Assessment

Indicative Content

Introduction to Biomolecular forensics.
DNA as evidence, Sources of DNA for testing, DNA isolation, purification and evaluation; intact high molecular weight versus degraded DNA. PCR technology, Variable DNA and the key to DNA typing; multi-locus analysis versus polymorphic single locus genes.

Techniques and concepts.
Use of hypervariable or variable tandem repeat loci (VNTR's) to identify individuals. Restriction fragment length polymorphisms. Protocols for restriction digestion, southern transfers, probdesign and hybridization. Automated systems for multi-locus analysis. Interpretation of data; band comparison and match criteria.

DNA databases and inherited disorders.
DNA profile databases, Population genetics, Frequencies of DNA patterns. Applications of the above. DNA diagnosis of inherited disorders; case studies with cystic fibrosis, hemophilia, huntingtons etc.

DNA in parentage testing.
DNA sample collection. Buccal swabs and home DNA paternity tests. Applications for newborn paternity testing, kinship and sibship analysis and criminal paternity. The paternity index, probability of paternity.

Blood and Bloodstains.
Identification, Blood grouping. Bloodstain pattern identification. Photographic documentation of bloodstain patterns and applications of luminal and other methods of visualisation.

Bioinformatics.
Evolutionary Concepts, Information.Resources, DNA sequence analysis, Alignment techniques, Protein sequence analysis, Phylogenetic analysis, genomics.

Bioethics.
Issues in Bio-ethics: Animal biotechnology, human genetic testing and reproductive technologies, genetic engineering, GMOs, stem cell research. Genetic screening; genetic privacy and societal issues. Ethics as they apply to the scientist. Regulations surrounding these issues both nationally and internationally.

Additional Special Topics of Interest.
These topics may vary from year to year depending on current developments. Case studies. Courtroom skills: Expert witness in an adversarial setting.Scientific evidence and admissibility standards; Case studies eg People versus Orenthal James Simpson.

Assessment Breakdown	%
Continuous Assessment	10.00%
Project	30.00%
End of Module Formal Examination	60.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	Formative assessment may include MCQ and assignments and timely feedback being given.	1,2,3,4	10.00	n/a

Project

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	Individual Projects on area specific to the module will be undertaken by each student during the year.	1,2,3,4,5	30.00	n/a

No Practical

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Assessment will be linked with the stated learning outcomes mentioned earlier in the document. This will be a two hour terminal exam at the end of the academic year.	1,2,3,4	60.00	End-of-Semester

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

Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	30 Weeks per Stage	2.00
	Total Hours	60.00