AN230: Human Body Structure (Semester:1 Optional)

Module Details

Title Short:	Human Body Structure APPROVED
Language of Instruction:	English

Module Code:	AN230

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	17 programme(s)

Module Owner:	DARA CANNON

Module Discipline:	AN - Anatomy

Module Description:	Human Body Structure is delivered by the anatomy department to students at the first, second and masters level in university for whom anatomy is not a core degree element who require a sound basic knowledge of the structure of the human body. The content will cover topics including the following: * Organisation of human body, anatomical terminology, the principles of support and movement, the control systems of the human body, maintenance and continuity of the body and finally, biomechanics and functional anatomy of the limbs.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Established a sound basic knowledge of the organization and structure of the human body including the location and anatomical relations of the major organ systems
LO2	Developed a basic understanding of the principles of support and movement, the control systems of the body, maintenance and continuity of the human body.
LO3	Understand and describe the biomechanics and functional anatomy of the human limbs and musculoskeletal system
LO4	Explain how specific aspects of human anatomy relate to your field of study
LO5	Begun to develop your ability to look up and synthesize anatomical subject matter in a self-directed manner

AN506: Anatomy 2 - Gross Anatomy (Semester:1 Optional)

Module Details

Title Short:	Anatomy 2 - Gross Anatomy APPROVED
Module Code:	AN506
ECTS Credits:	5
NFQ Level:	8
EQF Level:	6
EHEA Level:	First Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	8 programme(s)
Module Owner:	FABIO QUONDAMATTEO
Module Discipline:	AN - Anatomy
Module Level:	Continuous Calculator (M.Sc.) (PG Dip)
Module Description:	This module is an introduction to the macroscopic structure of the human body. This course begins by introducing the formal terminology and language used by anatomists to describe the relationships between and among organs and tissues. Then each of the major body systems is considered in turn, including the cardiovascular, respiratory, gastrointestinal, genitourinary systems etc. In each case the key anatomical and functional features are emphasized.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe tissues and organs, their locations and relationships to one another using formal anatomical terminology.
LO2	Describe each of the major organ systems in some detail, including aspects of the function of each of the organ systems.
LO3	Appreciate how individual organ systems relate to one another, both in terms of their physical relationships and their functional interactions.
LO4	Apply this anatomical knowledge to the consideration of human health and diseases and conditions having an adverse effect on human health.

AN507: Stereology
(Semester:2 Optional)

Module Details

Title Short:	Stereology APPROVED				
Module Code:	AN507				
ECTS Credits:	5				
NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)				
Teaching Period:	Semester 2				
Module Delivered in	8 programme(s)				
Module Owner:	PETER DOCKERY				
Module Discipline:	AN - Anatomy				
Module Level:	Continuous Calculator (M.Sc.) (PG Dip)				
Module Description:	The word “Stereology” was invented to describe the set of methods that allow a 3 dimensional interpretation of structures based on observations made on 2 dimensional sections. It allows the researcher obtain information from two- dimensional images that is not available through any other means. A modern interpretation of stereology is that it is a spatial version of sampling theory. The Stereological approach is providing a spatial framework upon which to lay the new physiological and molecular				

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Improve your skill in : a.experimental design and b. critical analysis of quantitative morphometry.
LO2	Explain and apply sampling theory.
LO3	Describe the application of modern design-based (unbiased) stereological techniques to biological tissue. Note: These applications focus on the quantification of morphological parameters such as object number, feature length, surface area, volume and spatial distribution of features of biological interest on tissue

AN5101: Histology 1: Fundamental Tissues (Semester 2)

Module Details

Title Short:	Histology 1: Fundamental Tissues (Semester 2) APPROVED
Language of Instruction:	English
Module Code:	AN5101
ECTS Credits:	5
NFQ Level:	8
EQF Level:	6
EHEA Level:	First Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	2 programme(s)
Module Owner:	BRENDAN WILKINS
Module Discipline:	AN - Anatomy
Module Level:	Honours
Module Description:	This module is an overview of the histological structure of the fundamental tissues. The structure, function, and relations of epithelium, connective tissue, cartilage, bone, muscle, nerve and microvasculature are all covered. The module examines how cells are assembled into tissues and how these tissues accomplish coordinated functions. Didactic content is supplemented by directed self-learning practicals accomplished online.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Explain how cells can assemble into the fundamental tissues and explain the role and function of each of the fundamental tissues.
LO2	Describe the microscopic structure of epithelia, connective tissues, cartilage, bone, muscle, nerve, vascular and lymphatic tissues and explain how the structure contributes to the function of the tissue.
LO3	Recognize the microscopic appearance of epithelia, connective tissues, cartilage, bone, muscle, nerve, vascular and lymphatic tissues and differentiate between them.
LO4	Investigate and document the microscopic structure of the epithelia, connective tissues, cartilage, bone, muscle, nerve, vascular and lymphatic tissues using virtual microscopy

BES506: Innovation & Technology Transfer (Semester:1 Optional)

Module Details

Title Short:	Innovation & Technology Transfer APPROVED
Module Code:	BES506
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 1
Module Delivered in	7 programme(s)
Module Owner:	KATHRYN CORMICAN
Module Discipline:	NAT_SCI - School of Natural Sciences
Module Description:	Aspects of innovation (history, theory, strategy etc) and technology (strategies, acquisition, assessment) are covered by this course. Intellectual property and asset management, including issues surrounding contracts, licensing, transfer, negotiations and commercialisation are also be explored. Included are case reports tailored to the biomedical/biopharma/medical device sector.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Explain the role of technology as a resource and how to use technology strategically in a business.
LO2	Identify and exploit intellectual assets
LO3	Acquire technology internally and externally.
LO4	Assess technology sources and strengths using modern information systems.
LO5	Make decisions on how technology is protected and licensed.
LO6	Handle legal contractual and commercial issues related to technological innovation.

BES509: Practicals (Semester:2 Optional)

Module Details

Title Short:	Practicals APPROVED
Module Code:	BES509
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 2
Module Delivered in	7 programme(s)
Module Owner:	MARY NÍ FHLATHARTAIGH
Module Discipline:	NAT_SCI - School of Natural Sciences
Module Description:	Over a period of two weeks, 4 laboratory practicals are completed. Topics include cell culture, molecular biology, scanning electron microscopy, histology.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Explain how to use good aseptic technique when culturing cells.
LO2	Quantify cell number and use this information to subculture cells.
LO3	Recommend and know how to apply assays that measure cell viability
LO4	Isolate RNA from cells synthesise cDNA
LO5	Use real-time PCR to quantify levels of mRNA in cell or tissue samples
LO6	Use Excel to quantify relative changes in RNA expression
LO7	Recommend an SEM protocol for assessing the surface characteristics of polishesd/treated medical devices
LO8	Use standard histochemical stains and immunohistochemical techniques to identify cell types in mammalian tissue

BES512: Research Project (Semester:1 Optional)

Module Details

Title Short:	Research Project APPROVED
Module Code:	BES512
ECTS Credits:	30
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	12 months long
Module Delivered in	5 programme(s)
Module Owner:	UNA FITZGERALD
Module Discipline:	NAT_SCI - School of Natural Sciences
Module Description:	The aim of this module is to provide students with hands-on experience of the rigours of scientific research, from experimental design, to execution of research. Students are educated as to best practice for reporting their results. Where possible, project work is carried out in the student's place of work. Alternatively, a suitable project is provided on-campus.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Carry out a literature search on topic of research project.
LO2	Design and follow an experimental plan projected to meet research objectives.
LO3	Monitor progress of research and adjust experimental plan accordingly.
LO4	Write good-quality masters thesis that summarises, in scientific language, the background to the research, methods used and results.
LO5	Produce a postgraduate-level discussion of the research carried out, as part of the thesis write-up.
LO6	Communicate the rigorous approach to research that is required for successful completion of a research project.

BES513: Materials, Science & Biomaterials (Semester:1 Core)

Module Details

Title Short:	Materials, Science & Biomaterials APPROVED
Language of Instruction:	English

Module Code:	BES513

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	2 programme(s)

Module Owner:	YURY ROCHEV

Module Discipline:	CH - Chemistry

Module Description:	The understanding of biomaterials encompasses fundamental knowledge of medicine, biology, chemistry, and material science. The biomaterials field rests on a foundation of engineering principles. There is also a compelling human side to the therapeutic and diagnostic application of biomaterials. This course addresses the fundamental properties and applications of biomaterials (synthetic and natural) that are used in contact with biological systems.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Summarise the issues surrounding biocompatibility and ethics in the use of biomaterials.
LO2	Communicate the molecular and physiological features of biomaterials, including biomechanical properties, particularly in relation to orthopaedic applications.
LO3	Describe the fundamentals of biopolymers – their structure, synthesis and characterisation.
LO4	List biomaterial applications in orthopaedics and cardiovascular medicine.

BES514: Molecular & Cellular Biology (Semester:1 Optional)

Module Details

Title Short:	Molecular & Cellular Biology APPROVED
Module Code:	BES514
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 1
Module Delivered in	7 programme(s)
Module Owner:	UNA FITZGERALD
Module Discipline:	NCBES - National Centre for Biomedical Engineering Science
Module Description:	The fundamentals of cell and molecular biology are provided during this course. Topics include cell composition, structure of DNA and RNA, RNA transcription, protein synthesis, cell signalling, cell death, PubMed, DNA recombination, PCR, green fluorescent protein, transformation, transfection.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Illustrate the structure of DNA, explaining how DNA is replicated during the polymerase chain reaction technique.
LO2	Explain what is meant by the 'genetic code' and how it relates to protein synthesis.
LO3	Carry out a Pubmed search in order to identify molecules implicated in a human disease.
LO4	Use the National Cancer and Biological Institute (NCBI) nucleotide database to discover the DNA sequence encoding a specific protein and determine the length of the coding sequence and the number of amino acids contained in the protein encoded.
LO5	Describe how mammalian cell culture, PCR, DNA recombination, DNA plasmids, bacterial transformation and cellular transfection can be used to understand protein function, localisation and possible relevance to disease.
LO6	Name the major structural components a mammalian cell and its constituent organelles.
LO7	List cytoskeletal, extracellular matrix, membrane and signalling proteins involved in mammalian cell interactions with each other and with the extracellular environment.
LO8	Explain how mitochondria meet the energy requirements of the cell.
LO9	Recognise cellular organelles involved in trafficking newly-synthesised proteins through and out of the cell
LO10	Summarise the main steps and in the cell cycle and proteins involved in regulation of each stage.

BES519: Scientific Writing (Semester:1 Optional)

Module Details

Title Short:	Scientific Writing APPROVED
Module Code:	BES519
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	17 programme(s)
Module Owner:	UNA FITZGERALD
Module Discipline:	NCBES - National Centre for Biomedical Engineering Science
Module Description:	Based largely on a peer-review exercise, this module aims to provide students with an in-depth understanding of the process of scientific publication. Topics include journal author guidelines, review article types, how to write a good review article, how to produce a critique of a review article, how to write to a journal editor and to respond to reviewer comments. Other apsects discussed include open access publishing, paper authorship, the ethics of publication, predatory journals

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Recognise and explain scientific writing
LO2	Describe the structure of different kinds of scientific papers
LO3	Summarise the different steps in the publication process
LO4	Explain the aims, principles and limiations of the peer review process
LO5	Produce a well-written critique of a mini-review paper
LO6	Respond to peer reviews and write a letter to a journal editor
LO7	Produce a well-written mini-review on a specialist topic
LO8	Define what is meant by 'journal impact factor' (IF)
LO9	Use Journal IFs and other journal information, to select appropriate journals for paper submission

BES554: Molecular Medicine (Semester:2 Optional)

Module Details

Title Short:	Molecular Medicine APPROVED
Language of Instruction:	English

Module Code:	BES554

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	5 programme(s)

Module Owner:	MARY NÍ FHLATHARTAIGH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	The molecular mechanisms underlying diseases including cancer, immuno-deficient and neurodegenerative disorders is described. The basis for gene and stem cell approaches to system regeneration is then summarised. A poster preparation and presentation activity enables the investigation by students of aspects molecular medicine not directly covered in lectures., including the mechanisms underlying current treatments, the development of novel therapeutics, including gene or stem cell therapies.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Depict challenges of drug discovery and how molecular mechanisms of action of current drugs vary.
LO2	Summarise the molecular mechanisms implicated in the development of diseases such as cancer, multiple sclerosis, Alzheimers disease, diabetes.
LO3	Explain the basis for current cancer treatments and medications used to treat the major neurodegenerative disorders.
LO4	Communicate the principles underlying the development of gene therapies and summarise the relative advanatges and disadvantages of different gene delivery stratagies.
LO5	Compare the properties of stem cells isolated from different sources and give details of the clinical use of a stem cell based therapy
LO6	In cooperation with a fellow-student, produce a poster depicting signalling pathways associated with an acute or chronic disorders, as well as current and experimental treatments.

BES5102: Cell & Molecular Biology: Advanced Technologies (Semester:1 Optional)

Module Details

Title Short:	Cell & Molecular Biology: Advanced Technologies APPROVED
Language of Instruction:	English

Module Code:	BES5102

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)

Teaching Period:	Semester 1

Module Delivered in	5 programme(s)

Module Owner:	MARY NÍ FHLATHARTAIGH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module it is designed to bring students to a common point where all will share the appropriate biological knowledge and understanding of the fundamentals in cellular and molecular biology. The module explores the following: cell composition; sub-cellular organelles; structure of DNA and RNA; transcription, protein synthesis; cell signalling, cell cycle; PubMed, DNA recombination, PCR; transformation, transfection; advanced molecular and cellular biology techniques.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Illustrate the structure of DNA, explaining how DNA is replicated during the polymerase chain reaction technique.
LO2	Explain what is meant by the 'genetic code' and how it relates to protein synthesis.
LO3	Carry out a Pubmed search in order to identify molecules implicated in a human disease chosen by you.
LO4	Use the National cancer and Biological Institute (NCBI) nucleotide database to discover the DNA sequence encoding a protein of your choice and determine the length of the coding sequence and the number of amino acids contained in the protein encoded.
LO5	Describe how mammalian cell culture, PCR, DNA recombination, DNA plasmids, bacterial transformation and cellular transfection can be used to understand protein function, localisation and possible relevance to disease.
LO6	Name the major structural components a mammalian cell and its constituent organelles.
LO7	List cytoskeletal, extracellular matrix, membrane and signalling proteins involved in mammalian cell interactions with each other and with the extracellular environment.
LO8	Explain how the mitochondria meet the energy requirements of the cell.
LO9	Recognise cellular organelles involved in trafficking newly-synthesised proteins through and out of the cell.
LO10	Summarise the main steps and in the cell cycle and proteins involved in regulation of each stage.
LO11	Study and present on advanced technologies in cell and molecular biology

BES5103: Applied Biomedical Sciences (Semester:1 Core)

Module Details

Title Short:	Applied Biomedical Sciences APPROVED
Language of Instruction:	English

Module Code:	BES5103

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	1 programme(s)

Module Owner:	MARY NÍ FHLATHARTAIGH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	Over the course of semesters 1 and 2, 5-6 laboratory practicals (depending on size of effort required) are completed. Topics may include cell culture, cell and molecular biology, scanning electron microscopy, biomechanics, mass spectrometry. Industry experts and visits outline recent advancements in biomedical applications and applications.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate ability to culture mammalian cells in vitro using aseptic technique, including quantifying cell number, assessing cell viability, passaging of cells, and analysis of protein expression in cells by Western blotting.
LO2	Apply molecular biology techniques, including purification of RNA from in vitro cultured cells, cDNA synthesis from purified RNA, real-time PCR amplification of target cDNAs, and quantification of RNA expression.
LO3	Explain the applications of SEM, Mass Spectrometry and biomedical engineering technologies in biomedical science.
LO4	Recommend equipment and protocol for testing mechanical properties of medical devices and tissue
LO5	Communicate verbally and in writing on biomedical science subjects

BES5104: Regulatory Compliance in Healthcare Manufacturing (Semester:2 Core)

Module Details

Title Short:	Regulatory Compliance in Healthcare Manufacturing APPROVED
Language of Instruction:	English

Module Code:	BES5104

ECTS Credits:	10

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	1 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module aims to equip students with an introduction to the regulatory pathways for placing medical devices and pharmaceuticals on the market within the EU, US and globally. It explains the legislation applicable and guidelines available to medical device and pharmaceutical manufacturers. There will be a particular focus on the manufacturing processes and controls involved within these industries.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the scope and functions of the regulatory framework pertaining to pharmaceutical and medical devices including medical device classification.
LO2	Demonstrate a detailed understanding of the main US, EU and global regulations.
LO3	Understand concepts to enable learners to work effectively with regulatory affairs professionals.
LO4	Develop an understanding of how regulatory issues affect the manufacturing and development of medical device and pharmaceutical products.
LO5	Demonstrate knowledge of Good Manufacturing Practices and Quality Management Systems and related control processes with respect to the medical device and pharmaceutical industry.
LO6	Describe the scope and functions of the processes for bringing a new drug to market, starting with drug discovery and the clinical trial process and ending in obtaining marketing approval.

BG5101: Frontiers in Biotechnology (Semester:1 Core)

Module Details

Title Short:	Frontiers in Biotechnology APPROVED
Module Code:	BG5101
ECTS Credits:	10
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	12 months long
Module Delivered in	3 programme(s)
Module Owner:	AOIFE BOYD
Module Discipline:	MI - Microbiology
Module Description:	This module gives students the opportunity to acquire knowledge and develop skills that are necessary for successful careers in the field of biotechnology. Experts will discuss recent advances in biotechnological research and applications. Furthermore students will develop their transferable skills on this interactive module through a range of continuous assignments.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	discuss and analyse a range of scientific and biotechnological topics
LO2	carry out independent study of scientific and biotechnology topics
LO3	communicate verbally, visually and in writing on scientific and biotechnological subjects

BG5102: Current Methodologies in Biotechnology (CMB) (Semester:1 Optional)

Module Details

Title Short:	Current Methodologies in Biotechnology (CMB) APPROVED
Module Code:	BG5102
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	12 months long
Module Delivered in	5 programme(s)
Module Owner:	MARY NÍ FHLATHARTAIGH
Module Discipline:	MI - Microbiology
Module Description:	This module gives students the opportunity to acquire knowledge of and develop laboratory and research skills necessary for successful careers in the field of biotechnology. Experts will teach methodologies fundamental to biotechnological research and applications. Skills taught in this module will be further developed during research project or work experience. Furthermore students will develop their transferable skills on this interactive module through a range of continuous assignments.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	carry out advanced methods in biotechnology
LO2	display detailed theoretical knowledge and understanding of the biotechnological methodologies acquired
LO3	effectively communicate verbally, visually and in written reports on methodologies in biotechnology

BG5103: MSC Biotechnology Research and Work Experience (Semester:1 Core)

Module Details

Title Short:	MSC Biotechnology Research and Work Experience APPROVED
Module Code:	BG5103
ECTS Credits:	40
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	12 months long
Module Delivered in	3 programme(s)
Module Owner:	AOIFE BOYD
Module Discipline:	MI - Microbiology
Module Description:	Students undertake a research placement in an industrial, academic or research institution. The purpose of this module is for students to acquire and develop research and/or technical skills. Students investigate a research problem/question with direct or potential relevance to biotechnology. Students prepare a thesis describing the research topic, the research project and the impact of the research findings. Students on 1MT1 complete this module over a 5 month period from April to August. Students on 2MT2 may complete the module over an extended schedule.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	design methodologic approaches to achieve the desired research aims
LO2	successfully perform techniques and methods relevant to the research topic
LO3	analyse and critique research results
LO4	work in a team to plan and maximise the amount of work carried out.
LO5	troubleshoot problems that arise during a research project
LO6	effectively manage and plan their research schedule
LO7	use resources in the library, information databases and original literature.
LO8	collect, organise, synthesise and critically review a large body of information
LO9	write an extensive, structured thesis
LO10	discuss and critique published research papers in the field of the project
LO11	identify and discuss the significance of their work with respect to the state of the art of the topic

BG5104: Protein Technology (Semester:1 Core)

Module Details

Title Short:	Protein Technology APPROVED
Module Code:	BG5104
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Spring
Module Delivered in	7 programme(s)
Module Owner:	MARY NÍ FHLATHARTAIGH
Module Discipline:	MI - Microbiology
Module Description:	This module will cover topics on the application of protein biology to Biotechnology. This includes principles of protein production and purification, proteomic analysis, protein glycobiology and industrial scale-up of protein purification. This module is assessed by written examination in the SPRING exam session.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	discuss the implementation and usefulness of proteomics to biological research
LO2	evaluate and design protein production, extraction and purification strategies
LO3	appraise the many roles glycans play in health and diseases, as well as in clinical and industrial applications
LO4	describe and propose solutions to bottlenecks associated with the scale up of recombinant protein production from lab to industrial scale
LO5	demonstrate knowledge and understanding of industrial enzymes

BG5105: Diagnostic Biotechnology (Semester:1 Core)

Module Details

Title Short:	Diagnostic Biotechnology APPROVED
Module Code:	BG5105
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Spring
Module Delivered in	5 programme(s)
Module Owner:	MARY NÍ FHLATHARTAIGH
Module Discipline:	MI - Microbiology
Module Description:	This course provides a comprehensive overview for students of the fundamental principles of immuno and molecular diagnostics. Topics to be covered include: introduction to antibodies and their properties; ELISA and Western blot based processes for diagnostics; FACS analysis for diagnostic purposes with examples; Nucleic acid structure and function, genetics, introduction to nucleic acid isolation and amplification techniques used in infectious disease diagnosis in the clinical setting.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate a critical knowledge of the principles of antibody-based diagnostic systems
LO2	Understand the concepts of validation and quality control as applied to antibody based analytical systems
LO3	Apply knowledge of cellular structure and function, especially DNA and RNA, to molecular diagnostic procedures
LO4	Demonstrate a thorough working knowledge of nucleic acid extraction, resolution and detection
LO5	Evaluate the most commonly utilized molecular diagnostic testing protocols
LO6	Demonstrate a wide, effective and critical reading of current relevant scientific literature and be conversant in the current trends and future possibilities for both immuno and molecular diagnostics

BG5106: Advanced Industrial Processes (Semester:2 Optional)

Module Details

Title Short:	Advanced Industrial Processes APPROVED
Module Code:	BG5106
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 2
Module Delivered in	5 programme(s)
Module Owner:	MARY NÍ FHLATHARTAIGH
Module Discipline:	MI - Microbiology
Module Description:	This module is designed to develop an awareness of microbial technologies. The overall goal of this module is to present several applications of microbial technologies. To this end, microbial processes involved in energy and resource recovery from waste as well as bioremediation will be explored. In addition bioprocess technology and eukaryotic cell cultures will also be introduced.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	understand the global challenges around energy and nutrient availability
LO2	describe major applications from anaerobic digestion
LO3	understand the concepts of bioremediation
LO4	provide examples of bioremediation
LO5	discuss typical requirements of a bioprocess
LO6	demonstrate the ability to scale up a bioprocess and to design bioprocess sterilisation cycles
LO7	Define and critique methodological approaches for eukaryotic cell culture

BG5107: Quality Management Systems for Biotechnology (Semester:1 Optional)

Module Details

Title Short:	Quality Management Systems for Biotechnology APPROVED
Module Code:	BG5107
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	5 programme(s)
Module Owner:	CYRIL CARROLL
Module Discipline:	MI - Microbiology
Module Description:	This course provides an overview of the key concepts, benefits and principles of an effective quality management system (QMS) based on the ISO 9000 series quality management standards and extend these principles to QMS standards pertaining to the Food Industry (HACCP), the pharmaceutical/ Healthcare Manufacturing (GMP) and preclinical Scientific research (GLP) as well as an effective Environmental Management System based on ISO 14000 series. This module will include lectures, tutorials, case studies, & directed independent learning.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate knowledge and insight of different Quality Management Systems (product quality management, food safety and environmental management)
LO2	Evaluate the principles of quality management and the role of quality management in different organisations.
LO3	Compare the inter relationships between different Quality Management systems (ISO9000, ISO 14000, GMP, GLP and HACCP).
LO4	Have an in-depth familiarity with the fundamentals of each of the different Quality Management Systems.
LO5	Qualify and appraise quality management definitions, concepts and guidelines

BI5101: Molecular biology for quantitative scientists (Semester:1 Optional)

Module Details

Title Short:	Molecular biology for quantitative scientists APPROVED
Language of Instruction:	English

Module Code:	BI5101

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	1 programme(s)

Module Owner:	CATHAL SEOIGHE

Module Discipline:	BI - Biochemistry

Module Description:	no description provided

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the chemical atom, bond and thermodynamic principles that act in biological systems
LO2	Explain how the biochemical properties of DNA and proteins enable their biological functions
LO3	Identify and describe the structures observed within bacterial, plant and animal cells
LO4	Draw labeled diagrams illustrating all stages of the cell cycle, mitosis and meiosis
LO5	Explain the core biochemical processes occurring during transcription, replication and recombination
LO6	Explain the mechanisms of cell signaling and gene regulation in prokaryotes and eukaryotes
LO7	List the core principles of Mendelian genetics and define epigenetics, using relevant examples for each

BI5102: Genomics Techniques 1 (Semester:1 Core)

Module Details

Title Short:	Genomics Techniques 1 APPROVED
Language of Instruction:	English

Module Code:	BI5102

ECTS Credits:	5

NFQ Level:		**EQF Level:**		**EHEA Level:**	

Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 1
Module Delivered in	1 programme(s)
Module Owner:	Pilib O Broin
Module Discipline:	BI - Biochemistry
Module Description:	This module provides a concise introduction to the key principles and features of current next-generation sequencing (NGS) technologies. This is followed by a practical introduction to the techniques used for both study design and preparation of biological samples for sequencing studies across the various applications of NGS technology. The module will be taught using a combination of lectures, student journal club sessions and practical laboratory sessions. This module links with Genomics Techniques II: Genomics Data Analysis, where students will learn about analysis techniques for the studies covered in this module.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the different types of next-generation sequencing technologies that are available and detail the differences between them
LO2	Explain the difference between different types of sequencing studies designs available for human DNA
LO3	Describe the different types of next-generation sequencing techniques that are available for RNA and detail the differences between them
LO4	Describe the different types of next-generation sequencing techniques that are available for studies of functional regulation of the genome
LO5	Perform the design of a target enrichment assay for human DNA sequencing
LO6	Design a sequencing study of small genomes
LO7	Prepare sequencing libraries for DNA and RNA samples

BME405: Tissue Engineering (Semester:1 Core)

Module Details

Title Short:	Tissue Engineering APPROVED
Language of Instruction:	English

Module Code:	BME405

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)

Teaching Period:	Semester 1

Module Delivered in	16 programme(s)

Module Owner:	MANUS BIGGS

Module Discipline:	BME - Biomedical Engineering

Module Description:	Tissue Engineering (BME405) provides students with a comprehensive overview into the scope and potential of this evolving field. This subject addresses the use of natural, synthetic and ceramic biomaterials as scaffolds in tissue engineering; scaffold function, mechanics and fabrication methods; cellular processes that contribute to tissue dynamics (e.g. morphogenesis, regeneration and repair); cell sources, mechanobiology and the use of bioreactors as biomimetic environments; in vitro and in vivo tissue engineering strategies for bone, cartilage and skin regeneration; and ethical and regulatory issues in tissue engineering. The subject integrates aspects of biomedical engineering, biomaterials science and biology and provides functional clinical examples in this evolving area of technology.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	1. Discuss the sources, selection and potential challenges of using stem cells for tissue engineering.
LO2	2. Describe the role of cellular fate processes in tissue morphogenesis, repair and regeneration.
LO3	3. Describe the protein structures and composition of native extracellular matrices.
LO4	4. Discuss the functional requirements, design, fabrication and biomaterials selection criteria for tissue engineering scaffolds.
LO5	5. Predict the mechanical behaviour of tissue engineering scaffolds using cellular solids theory.
LO6	6. Use fluid mechanics theory to characterise mechanical stimulation in tissue engineering scaffolds in flow perfusion bioreactors.
LO7	7. Describe experimental techniques in mechanobiology and outline the role of mechanical signals on stem cell differentiation.
LO8	8. Outline the steps involved in the development of in vitro and in vivo strategies for tissue engineering for bone, cartilage and skin regeneration.
LO9	9. Prepare a manuscript for peer-review according to the publication guidelines of a scientific journal.

BME502: Advanced Tissue Engineering (Semester:2 Optional)

Module Details

Title Short:	Advanced Tissue Engineering APPROVED
Language of Instruction:	English

Module Code:	BME502

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	17 programme(s)

Module Owner:	MANUS BIGGS

Module Discipline:	BME - Biomedical Engineering

Module Description:	Advanced Tissue Engineering (BME502) builds on the students understanding of the field of tissue engineering obtained through the first semester tissue engineering course. The subject allows for increased involvement of the students in the field through project work and the planning and completion of laboratory experiments. Through regular feedback, the students will gain an appreciation of working in the field of tissue engineering. Specific lecture topics to be covered include bioactive materials, biomimetics and experimental planning, as well as specific subfields of tissue engineering, such as neural, cardiovascular and vital organ regeneration.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	1. Describe the concepts of wound healing, immunoresponse and angiogenesis and their importance in the field of tissue engineering.
LO2	2. Design and complete an experiment to investigate a tissue engineering concept in vitro.
LO3	3. Describe in vitro and in vivo strategies for various sub-fields of tissue engineering, including, neural, cardiovascular and vital organ regeneration.
LO4	4. Discuss the merit of bioactive materials, biomemetics and biomaterial functionalisation in tissue engineering.
LO5	5. Prepare a grant application for the investigation of a tissue engineering related problem through the development of a novel method of treatment.

BME505: Introduction to Biomechanics (Semester:2 Optional)

Module Details

Title Short:	Introduction to Biomechanics APPROVED
Language of Instruction:	English

Module Code:	BME505

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	6 programme(s)
Module Owner:	TED VAUGHAN
Module Discipline:	BME - Biomedical Engineering
Module Level:	Continuous Calculator (M.Sc.) (PG Dip)
Module Description:	The mechanical behaviour of biological tissues and systems will be explained in terms of the principles of solid and fluid mechanics. In particular, the way in which the properties of elasticity and visco-elasticity are incorporated into the mechanical characterisation of tissue, will be explained.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate an understanding of how the laws of solid and fluid mechanics can be applied to describe the mechanical behaviour of biological tissues and systems.
LO2	Demonstrate an appreciation of how the properties of elasticity and viscoelasticity are incorporated into the mechanical characterisation of tissues.
LO3	Demonstrate a comprehension of the application of force and stress analyses on anatomical structures including limbs and joints.
LO4	Demonstrate an ability to biomechancially differentiate between various tissues of the body, including blood vessels, muscles, ligaments, cartilage and bone.

BME511: Tissue Engineering (Semester:2 Optional)

Module Details

Title Short:	Tissue Engineering APPROVED
Language of Instruction:	English

Module Code:	BME511

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	3 programme(s)
Module Owner:	MANUS BIGGS
Module Discipline:	BME - Biomedical Engineering
Module Level:	Continuous Calculator (M.Sc.) (PG Dip)
Module Description:	This course integrates the principles and methods if engineering and life sciences towards the fundamental understanding if structure-function relationships in normal and pathological mammalian tissues especially as they relate to the development of biological tissues to restore, maintain, or improve tissue/organ function.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Specify the different types of biodegradable biomaterials that can be used in tissue engineering applications.
LO2	Discuss the complex interactions between biomaterials, cells and signals in biological systems.
LO3	Demonstrate awareness in contemporary topics such as gene therapy, stem cells, proteonomics, genomics and bioreactors.
LO4	Demonstrate their capability in conducting a multidisciplinary project.

CE6118: Environmental Engineering (Semester:1 Optional)

Module Details

Title Short:	Environmental Engineering APPROVED
Language of Instruction:	English

Module Code:	CE6118

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	6 programme(s)

Module Owner:	MARK HEALY

Module Discipline:	CE - Civil Engineering

Module Level:	Honours

Module Description:	his module covers: characterisation and measurement of water parameters, regulations, septic tank design and on-line resources used in the planning applications, 'passive' wastewater treatment using constructed wetlands and sand filters and issues of public acceptance; wastewater and water treatment at municipal-scale.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Recognise the importance of water and wastewater purification in today's society and the role of the environmental engineer in the design, development and maintenance of treatment facilities.
LO2	dentify, describe and measure the main physical, chemical and biological characteristics of water, and relate their importance in terms of water quality.
LO3	List the natural purification processes that occur in natural systems, such as lakes, rivers and estuaries, and explain the mechanisms behind these systems such as filtration, sedimentation and gas transfer.
LO4	Understand the processes involved in the treatment of wastewater using septic tanks, wetlands and filters, and describe the processes involved with the submission of an application to build such systems.
LO5	Assemble individual process units into a working water/wastewater treatment plant and assess the performance of the plant in terms of the quality of effluent in comparison with EU water/wastewater regulations.
LO6	Recognise the importance of 'pollution swapping' in environmental engineering and the importance of greenhouse gas emissions on design of wastewater treatment systems.

NUI Galway
OÉ Gaillimh

CS423: Neural Network (Semester:2 Optional)

Module Details

Title Short:	Neural Network APPROVED
Module Code:	CS423
ECTS Credits:	5
NFQ Level:	8
EQF Level:	6
EHEA Level:	First Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	7 programme(s)
Module Owner:	DANE FLANNERY
Module Discipline:	MA - Mathematics
Module Description:	An introductory course in Neural Networks. Topics include learning algorithms, memory, the Rosenblatt perceptron, back-propagation multilayer perceptrons, and the Hopfield network.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the basic components of a neural network;
LO2	Describe learning tasks for which neural networks are designed;
LO3	Prove convergence of the Rosenblatt learning rule;
LO4	Derive the weight update criteria for a multilayer perceptron;
LO5	Calculate the optimal weight distribution for a Hopfield network.

CT5100: Data Visualisation (Semester:2 Optional)

Module Details

Title Short:	Data Visualisation APPROVED
Language of Instruction:	English

Module Code:	CT5100

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	6 programme(s)

Module Owner:	CONOR HAYES

Module Discipline:	CT - Information Technology

Module Description:	This module with teach the fundamentals of data visualization. It will cover basic design principles and the principles underlying human perception, color theory and narrative. It will focus on the use of open standards for the presentation of data on the Web such as HTML, CSS, SVG, javascript through the use of libraries such as D3.js, jQuery.js and Dimple.js.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	understand the basic design principles underlying human perception, color theory and narrative
LO2	understand how to use different types of visualisations to illustrate concepts and data types
LO3	know how to use the main standards for the presentation of data on the Web such as HTML, CSS, SVG, javascript
LO4	know how to manipulate the Document Object Model programmatically
LO5	know how to deploy visualisation libraries such as D3.js and dimple.js

DER5101: Linked Data (Semester:1 Optional)

Module Details

Title Short:	Linked Data APPROVED
Language of Instruction:	English

Module Code:	DER5101

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	4 programme(s)

Module Owner:	CONOR HAYES

Module Discipline:	DERI - Digital Enterprise Research Institute

Source:	Linked Data Management. Eds: Harth, Hose and Schenkel. CRC Press 2014

Module Description:	This module will teach fundamentals of Linked Data and related standards, including the main principles distinguishing Linked Data from standard database technology. It will focus on designing linked data applications and students will learn how to design ontologies, produce linked data-sets, generate links between data-sets and explain the overall architecture of data integration systems based on Linked Data. It presents techniques for querying and managing Linked Data that is available on today's Web. A large part of the module is devoted to query processing in different setups. The module will focus on managing large-scale collections of Linked Data. It will present methods to publish relational data as Linked Data and efficient centralised processing. It then addresses advanced topics, such as efficient reasoning, and query optimisation for large-scale linked data-sets.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	explain the motivation for creating linked data standards
LO2	explain how data can be modelled as a graph an how this differs from the relational data model
LO3	use RDF and OWL to model graph data
LO4	query a RDF data base using the Sparq query language
LO5	build a linked data enabled application using best practices in Linked Data application design

EV507: Ecosystem Science (Semester:1 Core)

Module Details

Title Short:	Ecosystem Science APPROVED
Module Code:	EV507
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	8 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module explores how the ecosystem can be assessed from a number of different perspectives including; i.e. geology, hydrology, soils, biodiversity, etc. Emphasis will be placed on understanding the connections between these parameters with a view to producing an overall integrated ecosystem assessment procedure.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Recognise the influence of abiotic factors such as geology and hydrology on the ecology of the ecosystem
LO2	Interrelate different parameters that comprise an ecosystem
LO3	Differentiate between a number of different ecosystem types
LO4	Examine ecosystem function and apprise ecosystem services provided
LO5	Identify and assess main landscape features

EV508: Introduction to Flora & Fauna of Ireland (Semester:1 Core)

Module Details

Title Short:	Introduction to Flora & Fauna of Ireland APPROVED
Module Code:	EV508
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	4 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module is an introduction to the skills required to identify Irish plant and animal communities with special reference to legally protected species. The biogeography, life-cycles, distribution and ecology of a number of significant flora and fauna are assessed in addition to which their conservation status will be discussed in relation to ecological requirements. Emphasis will be placed on understanding the connections between their requirements and their conservation status.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Identify key elements of the flora and fauna of Ireland
LO2	Appraise a number of locations to observe/describe the flora and fauna
LO3	Distinguish between structure and morphology in relation to their ecology (e.g. plant architecture and pollination)
LO4	Assess the life history and longevity of the species in relation to factors affecting various stages of the life cycle.
LO5	Relate the flora and fauna observed to a range of features which provide a mosaic of habitats .

EV514: Ecological Survey Techniques (Semester:1 Core)

Module Details

Title Short:	Ecological Survey Techniques APPROVED
Module Code:	EV514
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	4 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	The course objective is to introduce students to a variety of techniques used for ecological field surveys. Methodologies include frame and pin vegetation quadrats, animal surveys using small mammal traps and freshwater surveys with reference to macroinvertebrate sampling and associated physical parameters. Data from field exercises are analysed and discussed in class with the objective of encouraging students to critically appraise data with reference to methodological limitations.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Design and execute appropriate ecological sampling design for both vegetation and animal communities
LO2	Identify appropriate environmental variables and employ relevant techniques in collecting such data
LO3	Plan monitoring programmes and assess both the effectiveness and the importance of the monitored site
LO4	Analyse data gathered and critically assess the analyses of others

EV515: Biodiversity Legislation & Policy (Semester:2 Core)

Module Details

Title Short:	Biodiversity Legislation & Policy APPROVED
Language of Instruction:	English

Module Code:	EV515

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)

Teaching Period:	Semester 2

Module Delivered in	4 programme(s)

Module Owner:	GESCHE KINDERMANN

Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE

Module Description:	This module explores how conservation legislation and biodiversity policy can be linked into day to day planning work at a strategic and local level. Emphasis is placed on understanding the connections between national biodiversity actions, species action plans and local biodiversity action plans.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Apply a range of measures to meet policy drivers and legal obligations in day-to-day work
LO2	Interrelate different articles that comprise the Habitats Directive with measures to conserve the wider countryside and climate change adaptation strategies
LO3	Critique the success of species action plans and conservation strategies to contribute to favourable conservation status
LO4	Assess the effectiveness of site designation to benefit conservation
LO5	Evaluate European Court Judgements issued throughout Europe including Ireland for failure to transpose the terms of the Habitats Directive
LO6	Apply all the learning outcomes above to benefit biodiversity at national and local levels

EV527: Habitat Identification & Assessment (Semester:2 Core)

Module Details

Title Short:	Habitat Identification & Assessment APPROVED
Module Code:	EV527
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	4 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module explores what a habitat is and the factors that influence habitat assessments. Specific reference will be made to habitat requirements, attributes and properties, monitoring issues (such as establishing a baseline, recruitment and mortality) and conservation evaluation criteria etc. Emphasis will be placed on understanding the connections between these requirements with a view to producing an overall habitat assessment procedure. Fossitt's Guide to Habitats in Ireland (2000) will be used to identify and assess habitats.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Differentiate between different habitats and associated parameters
LO2	Explain the interrelation between different parameters that comprise a habitat
LO3	Assess and recommend appropriate survey methods
LO4	Survey a range of habitat types using appropriate survey techniques
LO5	Consider potential habitat attributes and properties which can be used to undertake an assessment of the condition of the habitat

EV528: Habitat Creation, Management and Restoration

(Semester:2 Core)

Module Details

Title Short:	Habitat Creation, Management and Restoration APPROVED
Module Code:	EV528
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	4 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module outlines habitat management, the differences are between habitat management, creation and restoration; why and when each is necessary. It assesses philosophical and ethical approaches to habitat management, creation and restoration. Principles of habitat management are summarised in relation to the objectives of common management techniques, with special reference to management for a number of different taxa. Students will assess the effectiveness of measures to create, manage and restore specific grasslands, wetlands, woodlands, aquatic and coastal habitats.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Differentiate between habitat management and habitat restoration strategies for a range of habitats
LO2	Assess the effectiveness of habitat management strategies for different habitat types
LO3	Develop habitat management guidelines
LO4	Identify and evaluate best practice habitat restoration strategies
LO5	Critique habitat creation strategies to compensate for habitat lost to development or to develop linkages as part of a climate change adaptation measure

EV529: Environmental Impact Assessment (Semester:3 Core)

Module Details

Title Short:	Environmental Impact Assessment APPROVED
Module Code:	EV529
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	2 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module introduces Environmental Impact Assessment (EIA) with regard to European and Irish legislation. It covers the principles of environmental assessment theory and survey methods. This module focuses on the theory and methods of environmental assessment and the decision-making contexts in which these are employed. It explains the procedural stages of, and selected methodologies for, environmental assessment and provides practical experience in applying them. A critical review of the quality of Environmental Impact Statements (EIS) in Ireland is undertaken and recent trends in European Court Judgements (ECJ) are discussed.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Apply EIA best practice methodology
LO2	Differentiate between and select appropriate surveys to predict environmental impacts
LO3	Evaluate a variety of mitigation strategies in relation to EIA
LO4	Prepare and produce an EIS
LO5	Critique the effectiveness of environmental impact assessment process

EV530: Strategic Environmental Assessment (SEA) (Semester:3 Core)

Module Details

Title Short:	Strategic Environmental Assessment (SEA) APPROVED
Module Code:	EV530
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	2 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	The module introduces Strategic Environmental Assessment (SEA) with regard to European and Irish legislation. The module focuses on the systematic approach and methods promoted by the SEA process, including stakeholder engagement and consultation. In addition, it outlines opportunities to embed biodiversity within the SEA process and the decision-making contexts in which these are employed. Links between EIA and SEA a covered.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Differentiate between range of terms and concepts as they apply to the SEA process
LO2	Consider the role of the public in participating in the SEA process.
LO3	Incorporate biodiversity into the SEA proces
LO4	Apply a variety of SEA tools at specific stages in the SEA process to take account of biodiversity impacts.
LO5	Evaluate case studies with regard to effectiveness and evolving best practice.

EV531: Appropriate Assessment (Semester:3 Core)

Module Details

Title Short:	Appropriate Assessment APPROVED
Module Code:	EV531
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	2 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module explores how an Appropriate Assessment (AA) is undertaken. It provides a framework to enable course participants understand legislative requirements and key term to judge the likely impacts taking into account 'individual', 'in combination' and 'cumulative' effects. Emphasis will be placed on understanding the AA process and connections between AA and assessments undertaken to comply with other environmental directives such as EIA and SEA. Case studies will highlight best practice and current legal advice.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Differentiate between a range of terms and concepts as they apply to the process of undertaking an Appropriate Assessment
LO2	Interrelate different stages that comprise an Appropriate Assessment to Local Authority functions involving SEA, EIA etc.
LO3	Distinguish the steps involved in the AA Screening process
LO4	Evaluate cases with regard to current thinking and evolving best practice.
LO5	Critique the effectiveness of the Appropriate Assessment process.

EV532: Climate Change & Biodiversity (Semester:4 Core)

Module Details

Title Short:	Climate Change & Biodiversity APPROVED
Module Code:	EV532
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	2 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	The Convention on Biological Diversity identified Climate Change as one of five global drivers of biodiversity loss. This module on Climate Change and Biodiversity introduces students to the scientific evidence for climate change, direct and indirect impacts on biodiversity, and the policy approaches driving the climate change adaptation process in Ireland. The module outlines the vulnerability of Irish biodiversity to climate change. In the module, special emphasis is given to assessing the resilience of biodiversity to help mitigate climate change impacts. It includes case studies to highlight the implications for biodiversity in implementing climate change adaptation strategies.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Interpret projected climate change impact scenarios and differentiate between a range of associated mitigation and compensation strategies
LO2	Critique the implications of climate change impacts for nature conservation policy and practice
LO3	Consider climate change in preparing and planning for Natura 2000 site conservation targets
LO4	Prepare and produce biodiversity guidelines in light of climate change impacts and climate change adaptation strategies
LO5	Evaluate the role of spatial planning to implement adaptation strategies

EV534: Invasive Species & Biodiversity (Semester:4 Core)

Module Details

Title Short:	Invasive Species & Biodiversity APPROVED
Module Code:	EV534
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	2 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module explores how the local biodiversity can be impacted by a range of invasive species. In particular, this module focuses on the impacts of invasive species on native biodiversity and on the role of humans as vectors of invasive species and minimising the impacts of invasive species. In addition, it outlines the role of planning authorities in supporting resilient ecosystems through invasive species eradication or control programmes. Emphasis will be placed on understanding how invasive species become established and will look at case studies highlighting current thinking on control or eradication measures.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Apply legislative obligations and implement policy measures against invasive species
LO2	Identify a number of invasive plants and animals, and determine the role of humans in different mechanisms of dispersal/spread and colonisation
LO3	Assess impacts of invasive species on a range of habitat types
LO4	Evaluate eradication and biosecurity strategies in terms of cost-effectiveness, time, efficacy, local community participation and implementation
LO5	Prepare, produce and implement control and eradication guidelines

EV535: Research Project (Semester:3 Core)

Module Details

Title Short:	Research Project APPROVED
Module Code:	EV535
ECTS Credits:	30
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	12 months long
Module Delivered in	2 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module is undertaken by the student throughout the first and second year, with assessment taking place in the second year. The student carries out an individual piece of scientific work. The student will write up the research according to the requirements of an appropriate journal

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Construct a well-thought through scientific project idea
LO2	Apply appropriate methodologies and research skills
LO3	Develop expertise in experimental design and planning
LO4	Acquire good practice in data recording
LO5	Become skilled at suitable scientific data analyses: be able to evaluate, examine and understand research data
LO6	Synthesise current thinking and apply it appropriately
LO7	Write a scientific paper based on research according to the guidelines of an appropriate journal
LO8	Present oral and written scientific work

EV602: Ecosystems Assessment (Semester:1 Core)

Module Details

Title Short:	Ecosystems Assessment APPROVED
Module Code:	EV602
ECTS Credits:	10
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	2 programme(s)
Module Owner:	CAITRIONA CARLIN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module introduces students to ecosystem terminology and the key techniques used to assess ecosystems from a number of different perspectives i.e. geology, hydrology, soils, biodiversity, etc. As part of the assessment, students undertake a variety of fieldwork techniques used to appraise the status of plant & animal communities in Ireland. Emphasis is placed on relating the connections between these parameters with a view to producing an overall integrated ecosystem assessment procedure.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	identify a range of habitats and associated ecosystems,
LO2	inspect and assess a range of ecosystem types
LO3	appraise and relate different parameters that comprise an ecosystem to construct an ecological audit of a site,
LO4	plan and produce habitat management guidelines,
LO5	evaluate ecosystem management strategies

EV603: Biodiversity & Conservation (Semester:1 Core)

Module Details

Title Short:	Biodiversity & Conservation APPROVED
Module Code:	EV603
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1 and Semester 2
Module Delivered in	2 programme(s)
Module Owner:	CAITRIONA CARLIN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module explores the design and implementation of effective and sustainable biodiversity policy. Students will gain competencies in critiquing the role of nature conservation legislation as a driver of effective policy while taking cognisance of the role of stakeholders in implementing good practice. Special reference will be made to the need to develop better linkages between emerging research, policy makers and practitioners to inform evidence based policy and practice.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Identify the factors that influence the design of sustainable and effective policy
LO2	Assess the impact of integrating policies and legislation on landscape ecosystems
LO3	Critique effective planning policies, conditions and obligations

EV604: Environmental problems & Solutions (Semester:1 Core)

Module Details

Title Short:	Environmental problems & Solutions APPROVED
Module Code:	EV604
ECTS Credits:	10
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1 and Semester 2
Module Delivered in	2 programme(s)
Module Owner:	MICHAEL JOSEPH GORMALLY
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module utilises case studies to focus on environmental problems and their solutions. It explores best practice in the use of mitigation strategies to ameliorate environmental damage. Special reference will be made to the complexities in solving environmental problems (e.g. social, economic & cultural factors and environmental policy drivers). Particular emphasis will be placed on enhancing student competences to develop innovative and sustainable solutions to environmental problems.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Differentiate between good and poor environmental practice relating to a range of developments.
LO2	Evaluate appropriate mitigation strategies for specific developments.
LO3	Design sustainable solutions to environmental problems

EV5101: Water Framework Directive (WFD) (Semester:4 Core)

Module Details

Title Short:	Water Framework Directive (WFD) APPROVED
Module Code:	EV5101
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	2 programme(s)
Module Owner:	GESCHE KINDERMANN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Description:	This module explores the linkages between the Water Framework Directive (WFD) and conserving biodiversity. It outlines how different EU countries have defined targets such as "good ecological status". Case studies illustrate that increases in the resilience of biodiversity in aquatic ecosystems can be achieved by balancing sustainable water use with the long-term protection of available resources, while recognising limitations to the legislation. Emphasis will be placed on understanding the WFD and connections with other plans and programmes.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Summarise and compare the components of the Water Framework Directive
LO2	Determine the ecological requirements of water-dependent habitats and species designated under the Habitats Directive
LO3	Identify and critique the limitations of the Water Framework Directive
LO4	Review a range of monitoring programmes devised to meet the obligations of the Water Framework Directive
LO5	Identify and assess linkages with other nature conservation obligations
LO6	Evaluate the effectiveness of the Water Framework Directive

HP1100: Occupational Health and Wellbeing (Semester:1 Core)

Module Details

Title Short:	Occupational Health and Wellbeing APPROVED
Language of Instruction:	English

Module Code:	HP1100

ECTS Credits:	10

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	6 programme(s)

Module Owner:	VICTORIA HOGAN

Module Discipline:	HP - Health Promotion

Module Description:	no description provided

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Explain the role of occupational and environmental health in protecting the health and safety of workers and the community.
LO2	Assess and manage health issues arising from exposure to physical, chemical, psychological and ergonomic hazards within the workplace.
LO3	Select and evaluate available and current sources of occupational and environmental health information to utilise in practice.
LO4	Design and implement appropriate occupational health management techniques to reduce risks to tolerable levels within the organisation.
LO5	Analyse relevant legislative requirements that influence occupational and environmental health practice.
LO6	Apply the principles of workplace health promotion.
LO7	Synthesize knowledge of health psychology for occupational and environmental health management.

HP6104: Research Methods (OccH) (Semester:1 Optional)

Module Details

Title Short:	Research Methods (OccH) APPROVED
Language of Instruction:	English

Module Code:	HP6104

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	6 programme(s)

Module Owner:	ANNE O'GRADY

Module Discipline:	HP - Health Promotion

Module Description:	This module takes the students through the quantitative research process, from formulating research questions, identifying the preferred approach to testing them, developing research tools, collecting and analysing data and critically interpreting the findings.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	1. Have an understanding of the research process 2.Appreciate the strengths and weaknesses of different quantitative methodological approaches
LO2	3.Be able to select appropriate quantiatiave research methods for different research questions 4. . Have an understanding of basic quantitative data analysis techniques
LO3	5.Be able to critically review quantitative research articles
LO4	6. Be able to prepare a basic research protocol
LO5	7. Understand basic statistical techniques 8. . Be able to execute statistical techniques employing SPSS.

HP6105: Research Methods Qualitative (OccH) (Semester:1 Optional)

Module Details

Title Short:	Research Methods Qualitative (OccH) APPROVED
Language of Instruction:	English

Module Code:	HP6105

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	4 programme(s)

Module Owner:	ANNE O'GRADY

Module Discipline:	HP - Health Promotion

Module Description:	This module takes the students through the qualitative research process from formulating research areas to explore, identifying the preferred approach, developing research tools, collecting and analysing data and critically interpreting findings.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	have an understanding of the research process
LO2	appreciate the strengths and weaknesses of different qualitative methodological approaches
LO3	be able to select appropriate qualitative research methods for different research questions and areas of exploration
LO4	have an understanding of basic qualitative analysis techniques
LO5	be able to critically review qualitative research articles
LO6	be able to prepare a basic research protocol
LO7	have an understanding of evaluation research

IE323: Information Systems Ergonomics (Semester:2 Optional)

Module Details

Title Short:	Information Systems Ergonomics APPROVED
Language of Instruction:	English

Module Code:	IE323

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	14 programme(s)

Module Owner:	ENDA FRANCIS FALLON

Module Discipline:	ME - Mechanical Engineering

Module Level:	Common

Module Description:	Introduction to systems, task analysis, information processing, short term memory, working memory, long term memory. Selective, divided, focused, sustained attention. Static information, Dynamic information. Visual capabilities.Displaying information. Typography, arrangements of components. compatibility relationships. allocation of functions

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand the role of the human in machine systems
LO2	Understand the way in which information is processed by humans
LO3	assess and specify aspects of visual and auditory displays to improve human information processing in specified tasks
LO4	Design and develop the configuration and layout of displays and controls at work stations
LO5	Analyse and represent tasks for inclusion in the design process

IE520: Ergonomics
(Semester:1 Optional)

Module Details

Title Short:	Ergonomics APPROVED
Language of Instruction:	English

Module Code:	IE520

ECTS Credits:	10

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	23 programme(s)

Module Owner:	ENDA FRANCIS FALLON

Module Discipline:	ME - Mechanical Engineering

Module Level:	Common

Module Description:	Anthropometrics, task analysis, posture assessment, manual handling, work related musculoskeletal disorders (MSDs), display screen equipment, workstations, hand tools, design for assembly, ergonomics in the design process, shift work, working time

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Analyse and represent tasks for inclusion in the design process
LO2	To establish user requirements through the analysis of human machine systems
LO3	The ability to identify, formulate, analyse, and solve ergonomic design and assessment problems
LO4	to utilize mock ups and models to explore and present solutions to ergonomics design and assessment problems
LO5	To adopt a user centered approach to ergonomic design problems, particularly with respect to human machine systems
LO6	The ability to utilize a selection of ergonomic tools and methods in a user centered design and assessment approach
LO7	To develop task analysis of existing and envisioned human machine systems
LO8	to comprehend the measurement of body size, shape, strength and working capacity and their application to ergonomic design and assessment problems
LO9	To comprehend the role of stds and regulations in ergonomics design and assessment problems
LO10	The ability to utilize a selection of ergonomic tools and methods in a user centered design and assessment approach

IE522: Safety And Risk Management (Semester:1 Core)

Module Details

Title Short:	Safety And Risk Management APPROVED
Language of Instruction:	English

Module Code:	IE522

ECTS Credits:	10

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	27 programme(s)

Module Owner:	MARTINA KELLY

Module Discipline:	MBE - Mechanical & biomedical engineering

Module Description:	This module aims to provide students with a framework for managing occupational and environmental safety and risk in all workplaces

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Recognise and discuss basic safety terminology and concepts as they apply to occupational and environmental conditions
LO2	Explain the multifactorial theory of accident causation
LO3	Describe and critique models used to explain the causes of accidents, both occupational and environmental and to promte prevention
LO4	Appraise the role of risk perception in accident causation and assess the principles underlying behaviour
LO5	Discover and recommend methodologies to assess the human contribution to risk
LO6	Perform risk assessments using validated methodologies and judge their effective application to safety systems
LO7	Summarise and justify the cost and acceptability of risk
LO8	Assess the hazards and risks associated with specific work environments
LO9	Formulate and recommend methodologies for the recognition, evaluation and control of workplace occupational and environmental risk and justify their application
LO10	Recognise and specify the components of an integrated management system for managing occupational and environmental risk
LO11	Recognise and specify proprietary and non-proprietary management standards including ISO14001 and OHSAS18001

IE5100: Physical Ergonomics

(Semester:1 Optional)

Module Details

Title Short:	Physical Ergonomics APPROVED
Language of Instruction:	English

Module Code:	IE5100

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 1
Module Delivered in	4 programme(s)
Module Owner:	ENDA FRANCIS FALLON
Module Discipline:	ME - Mechanical Engineering
Module Level:	Common
Module Description:	Anthropometrics, task analysis, posture assessment, manual handling work related musculoskeletal disorders (WRMDs), display screen equipment, workstations, hand tools, design for assembly, ergonomics in the design process, shift work, working time

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Analyse and represent tasks for inclusion in the design process
LO2	To establish user requirements through the analysis of human machine systems
LO3	The ability to identify, formulate, analyse, and solve ergonomics design and assessment problems
LO4	To utilize mock ups and models to explore and present solutions to ergonomics design and assessment problems
LO5	To adopt a user centered approach to ergonomic design problems, particularity with respect to human machine systems
LO6	The ability to utilize a selection of ergonomic tools and methods in a user centered design and assessment approach
LO7	To develop task analysis of existing and envisioned human machine systems
LO8	To comprehend the measurement of body size, shape, strength, and working capacity and their application to ergonomic design and assessment problems
LO9	To comprehend the role of stds and regulations in ergonomic design and assessment problems
LO10	The ability to utilize a selection of ergonomic tools and methods in a user centered design and assessment approach

ITS_REGU0911: Design Assurance, Sterilisation and Biocompatability (Semester:4 Core)

Module Details

Title Short:	Design Assurance, Sterilisation and Biocompatability APPROVED
Language of Instruction:	English

Module Code:	ITS_REGU0911

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	2 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	INTER-INST. - Inter-Institutional

Module Description:	This module aims to provide students with a detailed knowledge and understanding of the design assurance process, common sterilization techniques for medical devices, associated standards and validation. It also aims to provide a basic understanding of common biocompatibility testing methods and interpretation of results.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate an ability to develop verifiable design inputs and understand the links to risk management activities
LO2	Design a test protocol including risk based acceptance criteria, sample sizes and use of appropriate statistical methods.
LO3	Develop a test report strategy and demonstrate ability to generate reports.
LO4	Critically assess the use of standard and non standard test reports.
LO5	Illustrate they have a detailed knowledge and understanding of the common sterilization techniques for medical devices.
LO6	Critique procedures and standards currently regulating medical device sterilization and validation requirements.
LO7	Source and interpret ISO10993 1 for evaluation of the biocompatibility of medical devices. Apply classification of the device as outlined in the standard
LO8	Demonstrate an understanding of the common biocompatibility testing methods and interpretation of the test results.
LO9	Formulate and communicate an understanding of the rationale and benefit of product characterization.
LO10	Evaluate sterilization methods under various headings to include packaging, products effects, costs etc.
LO11	Formulate and communicate an ability to generate biocompatibility reports to meet regulatory requirements

ITS_REGU0912: Post Market Surveillance (Semester:4 Core)

Module Details

Title Short:	Post Market Surveillance APPROVED
Language of Instruction:	English

Module Code:	ITS_REGU0912

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	2 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	INTER-INST. - Inter-Institutional

Module Description:	This module aims to provide students with a detailed knowledge and understanding of post market requirements for medical devices. Specifically this module aims to develop the student's ability to create and implement a comprehensive post market surveillance plan to collect, evaluate and respond to data on device safety and performance after market approval.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate they have detailed knowledge and understanding of global statutory reporting requirements including local interpretation and current expectations with particular emphasis on EU and US requirements.
LO2	Illustrate they have detailed knowledge and understanding of post market surveillance requirements and development of a post market surveillance plan that is consistent with the risk associated with the device based on its intended use.
LO3	Communicate a detailed knowledge and understanding of complaint management including assessment, evaluation and response to post market data.
LO4	Demonstrate they have detailed knowledge and understanding of risk management principles and requirements including the role of detailed risk assessment in the evaluation and response to post market data.
LO5	Illustrate they have detailed knowledge and understanding of requirements for all types of potential field actions including field safety corrective actions, advisory notices and recalls. This shall include an understanding of the critical components of effective field action management.
LO6	Understand the links between CER and risk management and other documentation to proactively incorporate these into routine post market surveillance activities.
LO7	Analyse and evaluate post market surveillance data within a risk management process to achieve a lower risk/better product, e.g. data from US FDA MAUDE (Manufacturer and user facility device experience) database.
LO8	Formulate and communicate a post marketing surveillance strategy which meets appropriate regulatory requirements.

ITS_REGU09003: Technical Report Writing (Semester:1 Core)

Module Details

Title Short:	Technical Report Writing APPROVED
Language of Instruction:	English

Module Code:	ITS_REGU09003

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)

Teaching Period:	Semester 1

Module Delivered in	4 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	INTER-INST. - Inter-Institutional

Module Description:	Technical Report Writing teaches the participant not only the critical techniques a scientist needs to know when conducting research but also how to write about his or her work. Not only is this relevant for a dissertation and assignments but also for generating formal reports such as clinical evaluation reports. Professionals in industry require the skills to share their work with others, to communicate their learning, their discoveries and their failures, thus improving research and thus benefiting the industry as a whole and more importantly, the patient.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Appreciate the nature and importance of technical report writing and review in industry
LO2	Evaluate the suitability of research methodologies for the purpose of undertaking research
LO3	Conduct and synthesise an academic literature search relevant to a proposed dissertation or topic
LO4	Present the research findings in a critically reflective manner which acknowledges the limitations of the research methods and knowledge prod
LO5	Critically review the ethical issues involved in the undertaking of clinical research
LO6	Formulate and compare methods for data analysis and the presentation of results and compare different methods when presenting different results
LO7	Present a comprehensive dissertation proposal

ITS_REGU09006: Quality Management Systems (Semester:2 Core)

Module Details

Title Short:	Quality Management Systems APPROVED
Language of Instruction:	English

Module Code:	ITS_REGU09006

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	4 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module aims to provide students with a detailed knowledge and understanding of setting up a basic QMS and its implementation. It also aims to provide the students with a thorough understanding of the requirement for a quality management system and how to design this quality system under the CFR 820 or ISO13485 headings. It also aims to provide an overview of compliance assessment in relation to self assessment, external audits, vendor audits and demonstration of ongoing compliance, focusing on Part 11 compliance. The module is broken down as follows: ca 10% Intro/overview of QMS; 75% subsections of CFR 820; 15% Auditing and Part 11 compliance.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate they have detailed knowledge and understanding of how a medical device is designed, developed and manufactured in line with 20 CFR 820 and ISO13485.
LO2	Source and interpret ISO13485, CFR 820 and various other relevant standards
LO3	Understand and evaluate the key elements of 21 CFR 820 including but not exclusive to Quality Management System, Management responsibility, Resource Management, Product Realization, Measurement Analysis and Improvement
LO4	Demonstrate they have detailed knowledge and understanding of a QMS as specified by CFR820.
LO5	. Illustrate a thorough understanding of the underlying principles involved in regulatory compliance, the importance of auditing, best practice on dealing with auditors, Supplier and vendor approach, audit programme , preparation, audit management, dealing with regulatory agencies , audit response process, internal quality standards communication, effective line clearance, training, process flow charts, Part 11 compliance etc.
LO6	Conduct a systematic and independent examination of the effectiveness of a quality system or of its parts. Demonstrate an awareness of the importance of auditor training and the internal auditing programme and how to deal with unannounced audits.
LO7	Formulate and communicate an ability to implement quality and technical agreements.
LO8	Communicate they have a detailed knowledge and understanding of the required actions to release product post regulatory approval.
LO9	Demonstrate they have detailed knowledge and understanding of the regulatory role and requirements throughout the product development process.

ITS_REGU09009: Risk Management, Labelling and Promotion (Semester:3 Core)

Module Details

Title Short:	Risk Management, Labelling and Promotion APPROVED
Language of Instruction:	English

Module Code:	ITS_REGU09009

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	2 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	INTER-INST. - Inter-Institutional

Module Description:	This module aims to provide students with a detailed knowledge and understanding of the labelling, sale and supply regulatory requirements for medical devices. The module also covers the application of risk management to medical devices.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate they have detailed knowledge and understanding of the content and application of ISO 14971: Medical devices application of risk management to medical devices & risk management planning and the key components of a risk management file.
LO2	Implement a risk management plan including risk analysis, risk evaluation, implemetation of appropriate risk controls and conduct a risk/benefit analysis.
LO3	Communicate they have a detailed knowledge and understanding of the EU/US/Global legislation and regulations associated with medical device labelling and global perspectives on UDI, harmonised symbols, structure of IFU, intended use, contraindications, label / IFU review best practice , elabelling.
LO4	Demonstrate they have a detailed knowledge and understanding of the legislation and regulations associated with medical device advertising and promotion from EU/US and Gobal perspective and also country specific requirements.
LO5	Communicate a detailed knowledge of context of off label use/on label use and particular requirements for website content.
LO6	Evaluate the relevance of social media (twitter, blogs..) and future directions for advertising and promotion. Evaluate the place of physician /customer contact and direct to consumer advertising in promotion strategy.
LO7	Formulate and communicate judgements from a regulatory standpoint in each step of the risk management process and demonstrate ability to interact effectively with regulatory agents.

LW3113: Health & Safety and Environmental Law (Semester:1 Core)

Module Details

Title Short:	Health & Safety and Environmental Law APPROVED
Language of Instruction:	English

Module Code:	LW3113

ECTS Credits:	10

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	6 programme(s)

Module Owner:	DEIRDRE CALLANAN

Module Discipline:	LAW - Law

Module Description:	This module aims to examine the major pieces of legislation governing environmental, health and safety stds in the workplace and the International background to the provisions. To enhance the skills required to read and understand Acts, Regulations and the roles of the enforcement agencies responsibility for processing environmental, health and safety claims. Cases will be discussed and new developments will be examined

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	To identify, locate and evaluate available and current sources of health and safety and environmental law systems to utilize in practice
LO2	To examine, analyse, discuss and critique key health and safety legal environmental cases
LO3	To explain, and discuss critical factors that influence the practice of health and safety law and environmental law within organisations
LO4	To understand the enforcement agencies responsibility for processing health and safety and environmental claims
LO5	To understand and interpret relevant legislative requirements that influence work practice
LO6	To understand the importance of tracking injuries and ill health within the workplace and to comprehend the relevant legislative requirements
LO7	To identify core legislative elements of environmental health and safety management programmes

MA170: Introduction to Programming for Biologists (Semester:1 Optional)

Module Details

Title Short:	Introduction to Programming for Biologists APPROVED
Language of Instruction:	English

Module Code:	MA170

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)

Teaching Period:	Semester 1

Module Delivered in	9 programme(s)

Module Owner:	CATHAL SEOIGHE

Module Discipline:	MA - Mathematics

Module Description:	This module provides biology students with foundation programming skills in Perl and enables them to perform core bioinformatics tasks. It will also introduce them to the scope for further learning and more advanced applications, and allow them to appreciate that computer-based tools are fundamental to modern biology and medicine.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Access, interpret and apply programming education resources
LO2	Assess the usefulness of programming to perform fundamental tasks in molecular biology
LO3	Create different types of programming code to compare molecular biology data.
LO4	Create and structure a computer program that alters molecular biology data.
LO5	Identify and co-opt other coding solutions to perform specific tasks

MA215: Mathematical Molecular Biology I (Semester:1 Core)

Module Details

Title Short:	Mathematical Molecular Biology I APPROVED
Language of Instruction:	English
Module Code:	MA215
ECTS Credits:	5
NFQ Level:	8
EQF Level:	6
EHEA Level:	First Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	23 programme(s)
Module Owner:	CATHAL SEOIGHE
Module Discipline:	MA - Mathematics
Module Level:	Pass
Module Description:	This course covers mathematical and algorithmic methods applied to problems in molecular biology, including genome sequence assembly, DNA and amino acid sequence alignment, phylogenetics and models of RNA secondary structure.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	describe several problems in molecular sequence biology;
LO2	use graph theoretical methods to solve toy genome assembly problems;
LO3	apply algorithms to align homologous DNA sequences;
LO4	infer phylogenetic trees using parsimony and/or genetic distance based methods;
LO5	describe concepts in transformational grammars;
LO6	determine the grammar class that corresponds to a set of rules;
LO7	parse a DNA (or other) string using regular and context-free grammars;
LO8	describe key concepts in systems biology.

MA216: Mathematical Molecular Biology II (Semester:2 Optional)

Module Details

Title Short:	Mathematical Molecular Biology II APPROVED
Language of Instruction:	English

Module Code:	MA216

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	23 programme(s)
Module Owner:	HAIXUAN YANG
Module Discipline:	MA - Mathematics
Acknowledgment:	This module is developed from Dr. Tim Downing's work. Also thanks Prof. Cathal Seoighe for his help.
Module Level:	Pass
Module Description:	This module is intended to give students an understanding and knowledge of the application of mathematical or algorithmic methods to defined problems in molecular biology. The focus is primarily on problems involving mutation discovery and evolutionary inference.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	describe how genes and genomes can change between generations;
LO2	apply algorithmic methods to infer unknown genotypes in a sample;
LO3	understand how genome structure alters mutation discovery power;
LO4	use DNA linkage patterns to assess evolutionary neutrality in a population;
LO5	infer historical changes in genetic diversity for defined examples;
LO6	outline fundamental concepts in molecular evolution;
LO7	use population genetic methods to measure mutation at a gene;
LO8	outline methods for genome-wide association studies using simple data.

MA324: Introduction to Bioinformatics (Honours) (Semester:2 Optional)

Module Details

Title Short:	Introduction to Bioinformatics (Honours) APPROVED
Module Code:	MA324
ECTS Credits:	5
NFQ Level:	8
EQF Level:	6
EHEA Level:	First Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	11 programme(s)
Module Owner:	CATHAL SEOIGHE
Module Discipline:	MA - Mathematics
Module Description:	The course will give students an appreciation of the application of computers and algorithms in molecular biology. This includes foundation knowledge of bioinformatics; the ability to perform basic bioinformatic tasks; and to discuss current bioinformatic research with respect to human health.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	outline key bioinformatics principles and approaches
LO2	discuss the relevance of bioinformatics to medicine
LO3	obtain molecular sequence data from public repositories
LO4	implement key bioinformatics algorithms by hand on toy datasets
LO5	use bioinformatics software tools, including tools for sequence alignment, homology searching, phylogenetic inference and promoter analysis;
LO6	describe key high throughput data generation technologies and the steps involved in data pre-processing and basic analysis of these data.

MA461: Probabilistic Models for Molecular Biology (Semester:2 Optional)

Module Details

Title Short:	Probabilistic Models for Molecular Biology APPROVED
Language of Instruction:	English

Module Code:	MA461

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)

Teaching Period:	Semester 2

Module Delivered in	28 programme(s)

Module Owner:	CATHAL SEOIGHE

Module Discipline:	MA - Mathematics

Module Description:	This course covers applications of probabilistic models and related techniques in genomics and systems biology. Beginning with a review of stochastic processes, the course will consider the use of Hidden Markov models (HMMs) to predict genes and identify genomic regions with shared epigenetic characteristics; the use of continuous-time Markov processes to model molecular evolution; applications of Gibbs sampling to infer haplotypes from genotype data among other models and applications.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	derive key results that are applied in the course;
LO2	decode sequences of symbols generated from a HMM using the Viterbi algorithm;
LO3	calculate hidden state probabilities using forward/backward algorithms;
LO4	align a pair of DNA or amino acid sequences using a probabilistic model;
LO5	apply probabilistic models to describe sequence evolution over a phylogenetic tree;
LO6	infer haplotypes from a set of genotype data by hand;
LO7	describe several problems in molecular biology/systems biology and explain the application of probabilistic models to solve these problems;
LO8	construct a pair-HMM for sequence alignment.

MA570: Data Analysis for genomics technologies (Semester:2 Core)

Module Details

Title Short:	Data Analysis for genomics technologies APPROVED
Language of Instruction:	English

Module Code:	MA570

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	10 programme(s)

Module Owner:	CATHAL SEOIGHE

Module Discipline:	MA_ST_AM - School of Mathematics, Statistics and Applied Mathematics

Module Description:	no description provided

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Discuss key historical developments in genomics research.
LO2	Access and apply core programming interfaces for bioinformatic analyses.
LO3	Discover differential expression in gene transcript sequencing data.
LO4	Compare new high-throughput sequencing experiments to other published results.
LO5	Evaluate functional genomics experimental datasets.

MA5105: Genomics Project (Semester:2 Core)

Module Details

Title Short:	Genomics Project APPROVED
Module Code:	MA5105
ECTS Credits:	30
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Trimester 3
Module Delivered in	1 programme(s)
Module Owner:	CATHAL SEOIGHE
Module Discipline:	MA_ST_AM - School of Mathematics, Statistics and Applied Mathematics
Module Description:	In this module, the student works either on an experimental genomics project or on the analysis of genomics data, under the supervision of a genomics researcher.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Perform genomics research to a high standard
LO2	Carry out genomics experiments and/or perform analysis of high throughput genomics data
LO3	Present research findings in written, graphical and oral forms

MA5106: Medical Genomics 1

(Semester:1 Core)

Module Details

Title Short:	Medical Genomics 1 APPROVED
Language of Instruction:	English

Module Code:	MA5106

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	2 programme(s)

Module Owner:	Pilib O Broin

Module Discipline:	MA_ST_AM - School of Mathematics, Statistics and Applied Mathematics

Module Description:	This module is designed to provide students with an understanding of the role of genetic variation in human health, and how modern high-throughput genomics techniques can be used to help understand, diagnose, and treat a variety of common and rare genetic disorders. This will include learning the appropriate analytical and statistical techniques required to detect de novo variation within a given population and to link information regarding genetic variation to other relevant genomic data such as gene expression profiles.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe different approaches to the design of genomics experiments and apply appropriate statistical methods to their analysis
LO2	Critically analyze the outcome of a genomics-based study
LO3	Describe modern genomics tools and techniques used to understand and diagnose genetic disorders
LO4	Perform a GWAS analysis to detect disease-associated variants
LO5	Explain the role of genomics in personalized medicine
LO6	Describe the privacy and ethical issues associated with medical and personal genomics

MA5107: Medical Genomics II

(Semester:2 Core)

Module Details

Title Short:	Medical Genomics II APPROVED
Language of Instruction:	English

Module Code:	MA5107

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	1 programme(s)

Module Owner:	CATHAL SEOIGHE

Module Discipline:	MA_ST_AM - School of Mathematics, Statistics and Applied Mathematics

Module Description:	This module is designed to provide students with an understanding of the role of genetic variation in human health, and how modern high-throughput genomics techniques can be used to help understand, diagnose, and treat a variety of common and rare genetic disorders. This will include learning the appropriate analytical and statistical techniques required to detect de novo variation within a given population and to link information regarding genetic variation to other relevant genomic data such as gene expression profiles.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe contemporary models of carcinogenesis
LO2	Explain machine learning concepts, including supervised/unsupervised learning and cross validation
LO3	Select appropriate machine learning techniques for cancer class discovery from genomics data
LO4	Design a study to identify cancer classes and associated biomarkers
LO5	Apply supervised learning methods for biomarker discovery
LO6	Describe common cancer pathways
LO7	Outline the steps appropriate to identify somatic and driver mutations in cancer sequence data
LO8	Describe applications of tumour genome sequencing for targeted therapy

MI853: Project (Semester:2 Core)

Module Details

Title Short:	Project APPROVED
Language of Instruction:	English

Module Code:	MI853

ECTS Credits:	10

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	1 programme(s)

Module Owner:	CYRIL CARROLL

Module Discipline:	MI - Microbiology

Module Description:	The Project is a 6-8 week training period in microbiological techniques relevant to industrial microbiology. Students work in groups, to investigate a research problem in the laboratory. Background literature and initial protocols are provided at the beginning of the work. Students develop and progress the initial project plan through formulation of original ideas and reading of relevant literature. Results interpretation and experimental troubleshooting are important for successful completion of the described project. “Dry” projects may also be offered. In the case of dry projects, students working in teams, will take part in a blended learning module involving, lectures and tutorials and carry out a library- and web-based Scientific literature reviews, typically involving the identification and critical appraisal of key papers relevant to a specific Microbiological Risk Assessment (MRA) question. By this ”hands on” approach, the student will gain an understanding of the different elements in a risk analysis. 1) hazard characterization, 2) risk characterization, 3) exposure assessment and 4) risk characterization. Examination is through preparation of a ~25-page thesis or MRA document and presentation and defence of the project work in a 30-min oral presentation.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	For laboratory projects, the student should be able to: 1. demonstrate an understanding of and discuss the scientific literature related to the project.
LO2	2. demonstrate good ability in lab techniques relevant to the research topic.
LO3	design experiments and troubleshoot technical problems that arise
LO4	work in a team with project partners to plan and maximise the amount of work carried out.
LO5	identify novel approaches to progress the project.
LO6	discuss and critique published research papers in the field of the project and critically evaluate their own laboratory generated results
LO7	In the case of “dry” projects, the student should be able to: 1. Develop the thinking skills necessary to plan, assemble the appropriate expertise and work on a multidisciplinary team to conduct a baseline risk analysis.
LO8	demonstrate working knowledge of the steps in conducting a risk analysis using the CODEX (FAO/WHO) approach and how they apply specifically to microbial risk assessments
LO9	conduct an in depth study on a topic associated with zoonotic disease transmission.
LO10	use resources in the library, information databases and original literature.
LO11	describe the meaning with the word “risk” in the context of risk analysis
LO12	identify “risks” in specific food chains
LO13	carry out - Problem formulation, Hazard identification, Dose-response assessment, Exposure assessment, Risk characterization
LO14	present aspects of the work in an oral presentation.
LO15	identify a related area of research which needs further investigation.
LO16	explain why this research is worth investigating.
LO17	communicate and justified the concepts of the research project to a diverse range of target audiences
LO18	design and carry out experiments on research identified as a key uncertainty needing further scientific bench-work research.

MI857: Laboratory Quality Management Systems (Semester:1 Core)

Module Details

Title Short:	Laboratory Quality Management Systems APPROVED
Module Code:	MI857
ECTS Credits:	10
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1 and Semester 2
Module Delivered in	1 programme(s)
Module Owner:	CYRIL CARROLL
Module Discipline:	MI - Microbiology
Module Description:	This course is conducted using a role-play learning model that will comprise students setting up a “fictitious” Microbiological-testing laboratory with corresponding laboratory processes, practices and quality data systems. The course provides students with an understanding of a process approach to implementing a quality management system for a microbiological testing Laboratory. It requires participants to implement a Quality Management System (QMS package/ Manual) for a microbiological testin

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand the purpose of Quality Management System as applied to an analytical microbiology testing laboratory
LO2	Demonstrate knowledge of Quality Management Systems, their implementation and the practical steps needed for implementation.
LO3	Implement a QMS in Microbiology Laboratory (Quality Manual) and measure the performance of the same during a series of Quailty audit
LO4	Acquire and improve, Analytical Laboratory skills, work practices and planning skills associated with an analytical Microbiological Laboratory, data recording and reporting skills and scientific data analysis skills

MI5101: Quality Management Systems (Semester:1 Core)

Module Details

Title Short:	Quality Management Systems APPROVED
Language of Instruction:	English

Module Code:	MI5101

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	3 programme(s)

Module Owner:	CYRIL CARROLL

Module Discipline:	MI - Microbiology

Module Description:	This course provides an overview of the key concepts, benefits and principles of an effective quality management system (QMS) based on the ISO 900O series quality management standards and extend these principles to QMS standards pertaining to the Food Industry (HACCP), the pharmaceutical/ Healthcare Manufacturing (GMP) and preclinical Scientific research (GLP) as well as an effective Environmental Management System based on ISO 14000 series. This module will include lectures, tutorials, case studies, & directed independent learning.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate knowledge and insight of different Quality Management Systems (product quality management, food safety and environmental management)
LO2	Evaluate the principles of quality management and the role of quality management in different organisations.
LO3	To compare the inter relationships between different Quality Management systems (ISO9000, ISO 14000, GMP, GLP and HACCP).
LO4	Have an in-depth familiarity with the fundamentals of each of the different Quality Management Systems.
LO5	To qualify and appraise quality management definitions, concepts and guidelines

MI5103: Advanced Industrial Processes (Semester:2 Optional)

Module Details

Title Short:	Advanced Industrial Processes APPROVED
Module Code:	MI5103
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	5 programme(s)
Module Owner:	FLORENCE ABRAM
Module Discipline:	MI - Microbiology
Module Description:	This module is designed to develop an awareness of microbial technologies. The overall goal of this module is to present several applications of microbial technologies. To this end, microbial processes involved in energy and resource recovery from waste as well as bioremediation will be explored. In addition bioprocess technology and eukaryotic cell cultures will also be introduced.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	understand the global challenges around energy and nutrient availability
LO2	describe major applications from anaerobic digestion
LO3	understand the concepts of bioremediation
LO4	provide examples of bioremediation
LO5	discuss typical requirements of a bioprocess
LO6	demonstrate the ability to scale up a bioprocess and to design bioprocess sterilisation cycles
LO7	Define and critique methodological approaches for eukaryotic cell culture

MI5105: DNA and Immuno Diagnostic Technology (Semester:2 Core)

Module Details

Title Short:	DNA and Immuno Diagnostic Technology APPROVED
Module Code:	MI5105
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	3 programme(s)
Module Owner:	THOMAS BARRY
Module Discipline:	MI - Microbiology
Module Description:	This course provides a comprehensive overview for students of the fundamental principles of immuno and molecular diagnostics. Topics to be covered include: introduction to antibodies and their properties; ELISA and Western blot based processes for diagnostics; FACS analysis for diagnostic purposes with examples; Nucleic acid structure and function, genetics, introduction to nucleic acid isolation and amplification techniques used in infectious disease diagnosis in the clinical setting.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate a critical knowledge of the principles of antibody-based diagnostic systems
LO2	Understand the concepts of validation and quality control as applied to antibody based analytical systems
LO3	Apply knowledge of cellular structure and function, especially DNA and RNA, to molecular diagnostic procedures
LO4	Demonstrate a thorough working knowledge of nucleic acid extraction, resolution and detection
LO5	Evaluate the most commonly utilized molecular diagnostic testing protocols
LO6	Demonstrate a wide, effective and critical reading of current relevant scientific literature and be conversant in the current trends and future possibilities for both immuno and molecular diagnostics

MTR5101: EU Medical Device Regulatory Affairs - Introduction (Semester:1 Core)

Module Details

Title Short:	EU Medical Device Regulatory Affairs - Introduction APPROVED
Language of Instruction:	English

Module Code:	MTR5101

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	4 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module aims to provide students with a detailed knowledge and understanding of the regulatory pathway for placing medical devices on the market in the EU. It explains the legislation applicable and guidelines available to medical device manufacturers.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate they have detailed knowledge and understanding of the main EU regulations, directives and their context within the EU legislative framework
LO2	Source and interpret medical device directives currently regulating medical device classification within the EU and demonstrate ability to classify devices, including complex combination or novel devices appropriately.
LO3	Demonstrate they have detailed knowledge and understanding of the role and expectations of the manufacturer, authorized representative, notified body and Competent Authority.
LO4	Demonstrate they have detailed knowledge and understanding of current conformity assessment procedures.
LO5	Source and interpret ISO13485 and various other relevant standards and guidance documents e.g.. MEDDEVS, NB MEDS, GHTF guidance.
LO6	Demonstrate they have detailed knowledge and understanding of the essential requirements of each device and how a manufacturer will address and meet each essential requirement.
LO7	Demonstrate that they have detailed knowledge and understanding of the submission types involved in the EU regulatory system.

MTR5102: US Medical Device Regulatory Affairs - Introduction (Semester:1 Core)

Module Details

Title Short:	US Medical Device Regulatory Affairs - Introduction APPROVED
Language of Instruction:	English

Module Code:	MTR5102

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	4 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module aims to provide students with a detailed knowledge and understanding of the regulatory pathway for placing medical devices on the market in the US. It explains the legislation applicable and guidelines available to medical device manufacturers.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate they have detailed knowledge and understanding of the US FDA administrative and legislative structure (FD&C Act) and requirements
LO2	Source and interpret regulations and guidance documents currently applicable to medical device classification within the US and demonstrate ability to classify devices appropriately.
LO3	Critique FDA guidance documents, consensus standards, FDA forms etc.
LO4	Illustrate an understanding of the steps required to achieve market clearance/approval for a US destined medical device including all aspects and types of 510(k), PMA, IDE and De Novo applications.
LO5	Analyze requirements for device registration, device listing and establishment registration and post market surveillance requirements once a product is placed on the market.

MTR5104: Global Medical Technology Regulatory Affairs Part 1 (Semester:2 Core)

Module Details

Title Short:	Global Medical Technology Regulatory Affairs Part 1 APPROVED
Language of Instruction:	English

Module Code:	MTR5104

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	4 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module aims to provide students with a detailed knowledge and understanding of the regulatory pathway for placing medical devices on the market outside of the US and EU, specifically Russia/CiS; Brazil/Latin America; Canada/Australia. It explains the legislation applicable and guidelines available to medical device manufacturers. It also addresses emerging technologies.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate they have detailed knowledge and understanding of the administrative and legislative structure and requirements for medical devices in key global markets to include Russia/CIS; Brazil/Latin America; Canada/Australia.
LO2	Identify key differences between these regulatory systems and that of the EU and US and outline methodology to ensure a device can utilize key documentation from EU and US applications in achieving market approval in the above defined jurisdictions.
LO3	Critique guidances,directives and legislation currently regulating medical device classification within these global markets and demonstrate ability to classify devices appropriately.
LO4	Articulate an understanding of how to define the regulatory pathway for medical devices in these global markets including complex combination or novel devices.
LO5	Demonstrate they have detailed knowledge and understanding of how to manage change control from a global point of view.
LO6	Source and interpret reimbursement requirements.

MTR5105: Clinical Evaluation

(Semester:2 Core)

Module Details

Title Short:	Clinical Evaluation APPROVED
Language of Instruction:	English

Module Code:	MTR5105

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	4 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module aims to provide students with a detailed knowledge and understanding of when a clinical investigation is necessary and the regulatory processes involved in such an evaluation.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate they have detailed knowledge and understanding of the key clinical terms, types of studies, key clinical requirements and associated standards.
LO2	Source and interpret, regulations, standards and guidances on how clinical requirements in chosen markets are achieved
LO3	Critique the role of human factors studies and the impact of risk assessment.
LO4	Demonstrate an ability to prepare documentation associated with clinical evaluations.
LO5	Illustrate an ability to prepare regulatory submissions and clinical trial applications.
LO6	Formulate and communicate a competency in how to complete a full clinical evaluation plan, which will include objectives, methodology and literature searching processes and resulting clinical evaluation report including format, contents and layout
LO7	Prepare a clinical evaluation report.
LO8	Evaluate and assess a medical device to determine what, if any, clinical studies are required based upon a critical review of existing data for comparable medical devices. (consider strategy development, trial design and clinical evaluation context).

MTR5107: EU Medical Technology Regulatory Affairs Advanced (Semester:3 Core)

Module Details

Title Short:	EU Medical Technology Regulatory Affairs Advanced APPROVED
Language of Instruction:	English

Module Code:	MTR5107

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	2 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module aims to provide students with a detailed knowledge and understanding of the regulatory pathway for placing medical devices on the market in the EU, the essential requirements of devices and submission types & emerging technologies.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate they have detailed knowledge and understanding of how to manage change control from a EU regulatory perspective throughout the entire medical device lifecycle
LO2	Define the regulatory pathway for medical devices including complex combination or novel devices and devise appropriate regulatory strategies for a number of theoretical devices
LO3	Illustrate they have detailed knowledge and understanding of the submission types involved by completion of mock technical documentation from classification through to commercialization
LO4	Communicate detailed knowledge and understanding of CE Mark renewal process and Directive 98/79/EC
LO5	Demonstrate they have detailed knowledge and understanding of additional country specific requirements prior and post placement on market.
LO6	Source and interpret reimbursement requirements in each member state

MTR5108: US Medical Device Regulatory Affairs - Advanced (Semester:3 Core)

Module Details

Title Short:	US Medical Device Regulatory Affairs - Advanced APPROVED
Language of Instruction:	English

Module Code:	MTR5108

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	2 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module aims to provide students with a detailed knowledge and understanding of the regulatory pathway for placing medical devices on the market in the US, the essential requirements of devices, submission types, change control and emerging technologies.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate they have detailed knowledge and understanding of the submission types involved by completion of mock submission documentation from classification through to commercialization.
LO2	Formulate and communicate judgements with regard to regulatory decision making process for devices and demonstrate ability to interact effectively with FDA agents
LO3	Analyse and evaluate data from US FDA MAUDE (Manufacturer and user facility device experience) database.
LO4	Communicate a detailed knowledge and understanding of how to manage change control for a product destined for US market.
LO5	Source and interpret relevant reimbursement requirements.

MTR5110: Global Medical Technology Regulatory Affairs Part 2 (Semester:4 Core)

Module Details

Title Short:	Global Medical Technology Regulatory Affairs Part 2 APPROVED
Language of Instruction:	English

Module Code:	MTR5110

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	2 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module aims to provide students with a detailed knowledge and understanding of the regulatory pathway for placing medical devices on the market outside of the US and EU, specifically China, Japan, SE Asia (Taiwan/Korea). It explains the legislation applicable and guidelines available to medical device manufacturers. It also addresses emerging technologies.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate they have detailed knowledge and understanding of the administrative and legislative structure and requirements for medical devices in key global markets to include but not limited to China, Japan, SE Asia (Taiwan/Korea etc)
LO2	Identify key differences between these regulatory systems and that of the EU and US and outline methodology to ensure a device can utilize key documentation from EU and US applications in achieving market approval in the above defined jurisdictions.
LO3	Source and interpret guidlines, directives and legislation currently regulating medical device classification within these global markets and demonstrate ability to classify devices appropriately.
LO4	Illustrate they have detailed knowledge and understanding of how to define the regulatory pathway for medical devices in these global markets including complex combination or novel devices.
LO5	Communicate how to achieve market clearance/approval for a medical device destined for a global marketplace and how to address post market surveillance requirements once a product is placed on the market
LO6	Demonstrate they have detailed knowledge and understanding of the submission types involved by completion of mock technical documentation from classification through to commercialization.
LO7	Formulate and communicate judgements with regard to regulatory issues for devices such as country specific nuances connected with entry/exit from each country and demonstrate ability to interact effectively with appropriate authorities.

MTR5113: Medical Technology Regulatory Affairs DISSERTATION (Semester:3 Core)

Module Details

Title Short:	Medical Technology Regulatory Affairs DISSERTATION APPROVED
Language of Instruction:	English

Module Code:	MTR5113

ECTS Credits:	30

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	1 programme(s)

Module Owner:	TERRY SMITH

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module aims to equip participants with the requisite advanced knowledge, understanding and skills to perform medical device related research using traditional and emerging research designs informed by a critical awareness of developments at the forefront of legislation and practice in the medical device industry

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Articulate and elaborate an understanding of current thinking on the nature of medical device industry challenges and the value of related research in that context.
LO2	Articulate and elaborate an awareness of the ethical dimensions and philosophical consideration relating to the device industry in a range of contexts.
LO3	Manage a research project combining independent study, support sessions and supervision effectively.
LO4	Write a coherent research proposal with an acceptable research question or hypothesis.
LO5	Conduct a critically focused literature review.
LO6	Analyse data according to accepted models of analysis, showing awareness of alternative models of analysis and theoretical frameworks.
LO7	Sustain from the evidence obtained, a reasoned argument and draw consistent and coherent conclusions from the research evidence.
LO8	Express the relevance and significance of the outcomes/ conclusions of the research project.
LO9	Reflect self critically on the outcomes/conclusions of the enquiry and on the research process itself.
LO10	Write a dissertation which meets postgraduate standards of technical expertise investigating the subject area or testing the hypothesis outlined in the research proposal.
LO11	Develop the skills to present and defend aspects of their research at seminars, conferences and vivas.

PAB3101: Soil Science
(Semester:1 Core)

Module Details

Title Short:	Soil Science APPROVED
Language of Instruction:	English

Module Code:	PAB3101

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	10 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	An introduction to soil sciences in natural and agricultural environments. The module will also include assessment of plant interactions with their physical environment. The course examines how the distribution and growth of plants responds to climate, soil, nutrients and salinity. The course will prepare students for understanding soil-plant-environment interactions in ecological, physiological and agronomic contexts.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Critically assess the importance of links between plant and crop communities and their prevailing environment, including climate, soil type, and the availability of water and nutrients.
LO2	Relate the characters of plant communities to variation in nutrient status, soil and salinity.
LO3	Describe, measure and calculate key characteristics of soils from different habitats.
LO4	Make and interpret soil profiles and texture triangles.
LO5	Relate different soils to their possible agricultural uses, and consider the possible environmental impacts of these.

PAB4104: Plant and Agri-Biotechnologies (Semester:2 Core)

Module Details

Title Short:	Plant and Agri-Biotechnologies APPROVED
Language of Instruction:	English
Module Code:	PAB4104
ECTS Credits:	5
NFQ Level:	8
EQF Level:	6
EHEA Level:	First Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 2
Module Delivered in	7 programme(s)
Module Owner:	SARA FARRONA
Module Discipline:	NAT_SCI - School of Natural Sciences
Module Description:	This module provides an advanced understanding of plant and agri-biotechnologies. Such biotechnologies encompass a wide range of technologies and they can be applied for a range of different purposes, such as the genetic improvement of plant varieties and animal populations to increase their yields or efficiency; genetic characterization and conservation of genetic resources; plant or animal disease diagnosis; vaccine development; and improvement of feeds. Some of the technologies may be applied to all the food and agriculture sectors, such as the use of molecular DNA markers or genetic modification, while others are more sector-specific, such as tissue culture (in crops and forest trees), embryo transfer (livestock) or triploidization and sex-reversal (fish). When appropriately integrated with other technologies for the production of food, agricultural products and services, biotechnology can be of significant assistance in meeting the needs of an expanding and increasingly urbanized population.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	To provide an advanced understanding of the range and applications of plant and agricultural biotechnologies for meeting human needs.
LO2	To be able to describe plant and livestock improvement strategies using biotechnological approaches.
LO3	To consider how biotechnological approaches can be used to meet agricultural and sustainability challenges.

PAB5101: Climate Change, Agricultural & Global Food Security (Semester:1 Core)

Module Details

Title Short:	Climate Change, Agricultural & Global Food Security APPROVED
Language of Instruction:	English

Module Code:	PAB5101

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	2 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Acknowledgment:	Student Self-study hours = 80hrs. How the student uses their 80 hrs of self-study hours (how much time to devote to different assignments) for this module Lectures =14 hours Tutorials = 3 X 2 hours = 6 hours Sitting exams = 2 hours Reading assigned textbook chapters = 25 hours Reading assigned PDFs of literature = 25 hours Preparing for exams =28 hours TOTAL = 100 hours Each 5 ECTS module should involve the student doing at least 100 hours of work, including attending lectures, reading, writing coursework, preparing for exams and sitting exams.

Module Description:	This module provides an introductory overview of the key topics on the Climate Change, Agriculture and Global Food Security masters degree. The module will provide students with an introduction to a range of climate change, agriculture and food security topics in the context of current challenges regarding sustainable global development.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate knowledge of the current climate change challenges regarding sustainable global development.
LO2	Display a clear understanding of the implications of these challenges on sustainable production and global food security.
LO3	Identify and discuss the issues and evidence surrounding these challenges and related approaches to mitigation.
LO4	Evaluate options for climate change mitigation and adaptation stategies in the context of sustainable production and food security.

PAB5102: Climate Change, Agriculture, Nutrition & Global Health (Semester:1 Core)

Module Details

Title Short:	Climate Change, Agriculture, Nutrition & Global Health APPROVED
Language of Instruction:	English

Module Code:	PAB5102

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	1 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Acknowledgment:	Student Self Study Hours = 80 How the student uses their 80 hrs of self-study hours (how much time to devote to different assignments) for this module Lectures =14 hours Tutorials = 3 X 2 hours = 6 hours Sitting exams = 2 hours Reading assigned textbook chapters = 25 hours Reading assigned PDFs of literature = 25 hours Preparing for exams =28 hours TOTAL = 100 hours Each 5 ECTS module should involve the student doing at least 100 hours of work, including attending lectures, reading, writing coursework, preparing for exams and sitting exams.

Module Description:	This module covers the key issues and topics regarding climate change, agriculture, nutrition and global health. The module will provide students with the latest scientific evidence and approaches regarding how climate change can impact on; global health, malnutrition, water, sanitation, food systems, infectious diseases, disasters and emergencies and emerging environmental health issues. A key focus will be on case studies and emerging approaches to address problems.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Identify and discuss the key global health challenges for sustainable development
LO2	Describe how climate change currently impacts upon global health
LO3	Discuss the links between climate change, agriculture and health impacts
LO4	Gain insights regarding how health outcomes are linked to climate change challenges
LO5	Assess emerging environmental health issues and their relationships with climate change
LO6	Harness effective methods and approaches for assessing health impacts due to climate change

PAB5103: Policy & Scenarios for Climate Change Adaptation & Mitigation (Semester:1 Core)

Module Details

Title Short:	Policy & Scenarios for Climate Change Adaptation & Mitigation APPROVED
Language of Instruction:	English

Module Code:	PAB5103

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	1 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Acknowledgment:	Student Self Study Hours = 80 How the student uses their 80 hrs of self-study hours (how much time to devote to different assignments) for this module Lectures =14 hours Tutorials = 3 X 2 hours = 6 hours Sitting exams = 2 hours Reading assigned textbook chapters = 25 hours Reading assigned PDFs of literature = 25 hours Preparing for exams =28 hours TOTAL = 100 hours Each 5 ECTS module should involve the student doing at least 100 hours of work, including attending lectures, reading, writing coursework, preparing for exams and sitting exams.

Module Description:	This module will highlight the importance of policy analysis methods to address challenges posed by climate change, including how to engage in policy processes and prepare policy-relevant information. The module will cover policy options for dealing with the effects of climate change on agriculture and food security that are being pursued or considered by policy makers globally and locally as well as provide an understanding of how to engage in the policy process.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Display a clear understanding of policy processes and policy frameworks relating to climate change, agriculture and food security, and the importance of linkages between different policies.
LO2	Identify and evaluate a range of policy options for dealing with the effects of climate change on livelihoods, agriculture and food security.
LO3	Identify, utilise and apply policy analysis tools and frameworks for development of improved policies for climate change, agriculture and food security.
LO4	Be aware of the latest policy developments, trends and issues relating to climate change, agriculture and food security
LO5	Evaluate a range of policy options for dealing with the effects of climate change on livelihoods, agriculture and food security.
LO6	Update students on the latest policy developments, trends and issues relating to climate change, agriculture and food security

PAB5104: Gender, Agriculture & Climate Change (Semester:1 Core)

Module Details

Title Short:	Gender, Agriculture & Climate Change APPROVED
Language of Instruction:	English

Module Code:	PAB5104

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	2 programme(s)

Module Owner:	UNA MURRAY

Module Discipline:	NAT_SCI - School of Natural Sciences

Acknowledgment:	Student Self Study Hours = 80 How the student uses their 80 hrs of self-study hours (how much time to devote to different assignments) for this module Lectures =14 hours Tutorials = 3 X 2 hours = 6 hours Sitting exams = 2 hours Reading assigned textbook chapters = 25 hours Reading assigned PDFs of literature = 25 hours Preparing for exams =28 hours TOTAL = 100 hours Each 5 ECTS module should involve the student doing at least 100 hours of work, including attending lectures, reading, writing coursework, preparing for exams and sitting exams.

Module Description:	This module will address climate change from a social perspective, including considering how its causes and effects relate to concepts of equity. This will include examining issues such as gender equality, human rights and livelihoods in relation to climate change, agriculture and food security.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand climate change and gender linked ramifications in four pillars of food security: food availability, food accessibility, food utilization and food systems stability.
LO2	Outline gender linked differences in other key issues in the context of climate change (water, health, migration patterns due to environmental degradation)
LO3	Underline the importance of involving women as agents of change in climate change responses and incorporate gender perspectives in research agendas, information, and climate change responses.
LO4	Appreciate the gender-relevance of frameworks for policy analysis, databases, methods and ex ante impact assessment for planning responses to climate change in agriculture.
LO5	Generate ideas for gender sensitive responses to the effects of climate change – in technology developments and financing mechanisms (gender analysis of budget lines and financial instruments for climate change, gender-sensitive investments in programmes for adaptation, mitigation, technology transfer and capacity building).
LO6	Outline how governments can incorporate gender perspectives into their interventions on climate change

PAB5105: Low-Emissions & Climate-Smart Agriculture & AgriFood Systems (Semester:1 Core)

Module Details

Title Short:	Low-Emissions & Climate-Smart Agriculture & AgriFood Systems APPROVED
Language of Instruction:	English

Module Code:	PAB5105

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	1 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Acknowledgment:	Student Self Study Hours = 80 How the student uses their 80 hrs of self-study hours (how much time to devote to different assignments) for this module Lectures =14 hours Tutorials = 3 X 2 hours = 6 hours Sitting exams = 2 hours Reading assigned textbook chapters = 25 hours Reading assigned PDFs of literature = 25 hours Preparing for exams =28 hours TOTAL = 100 hours Each 5 ECTS module should involve the student doing at least 100 hours of work, including attending lectures, reading, writing coursework, preparing for exams and sitting exams.

Module Description:	Agriculture and food production/supply is threatened by climate change with impacts of climate change expected to be overall negative, thereby threatening global food supply and food security. This module will evaluate low-emissions and climate-smart agriculture strategies for the emerging decades where sustainable intensification is urgently required to meet food and bio-resource demands.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe past and present day impacts of agriculture on greenhouse gas emissions and climate change.
LO2	Evaluate the synergies and trade-offs which exist among emissions reductions, food and energy security, climate change adaptation and other sustainable development goals.
LO3	Examine the incentives for lower emissions food systems that have a lower environmental footprint.
LO4	Assess how to quantify greenhouse gas emissions from smallholder farming systems.
LO5	Assess emerging technologies for precision and smart agriculture for their potential to deliver significant emissions reductions from agriculture

PAB5106: Climate Change Adaptation, Mitigation & Risk Management (Semester:1 Core)

Module Details

Title Short:	Climate Change Adaptation, Mitigation & Risk Management APPROVED
Language of Instruction:	English

Module Code:	PAB5106

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	1 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	Managing risks associated with climate change is an integral component of a comprehensive strategy for adapting agriculture and food systems to a changing climate. This module will assess climate innovations for managing climate-related agricultural risk at local, national and international level and strategies for their implementation in both the developed and developing worlds.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the underlying basis and parameters of climate change prediction models in relation to agriculture and food security.
LO2	Identify evidence-based risks associated with climate variability and emerging strategies for adapting agriculture and food systems to a changing climate.
LO3	Identify and evaluate innovations in partnerships between rural communities that enable then to better manage climate-related risk and build more resilient livelihoods.
LO4	Apply strategies/tools to use advance information to better manage climate challenges associated with food production, supply and crisis management.
LO5	Appreciate the role of risk management through enhanced prediction tools and techniques for climate impacts on agriculture and food security.

PAB5107 : Sustainable Bio-Based & Circular Economy (Semester:1 Core)

Module Details

Title Short:	Sustainable Bio-Based & Circular Economy APPROVED
Language of Instruction:	English

Module Code:	PAB5107

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	1 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	Humanity needs to meet the climate change challenge and stay within critical planetary boundaries over the decades ahead. This will require transitioning to a more sustainable bio-based economy and to circular economy business models.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Appreciate the drivers for the development of a more sustainable bio-based economy
LO2	Describe different models of biorefineries and associated cascading concepts
LO3	Highlight the potential of Bioenergy and Carbon Capture Systems (BECCS)
LO4	Communicate and understand the principles underlying the Circular Economy concept

PAB5108: Climate Change, Natural Resources & Livelihoods (Semester:2 Core)

Module Details

Title Short:	Climate Change, Natural Resources & Livelihoods APPROVED
Language of Instruction:	English

Module Code:	PAB5108

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	2 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module deals with how climate change is affecting soils, microbes, water and marine systems, including impacts on sustainable livelihoods and livelihood security. In many instances, climate change impacts are requiring an urgent need for response measures that minimize current vulnerabilities. By understanding how climate change impacts on natural resources and capital, response and resilience systems for adaptation and mitigation of negative effects of climate change can be fostered.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe which social or economic groups within the community are particularly vulnerable to climate change
LO2	Evaluate which resources are most important to the livelihoods of different social groups
LO3	Identify how current climate hazards affect livelihoods and related resources of different groups
LO4	Assess which livelihoods resources are most vulnerable to climate change
LO5	Investigate adaptation and mitigation strategies to maintain viable livliehoods when faced with climate change challenges

PAB5109: PAB5109 AgriBiological Responses to Climate Change (Semester:2 Core)

Module Details

Title Short:	PAB5109 AgriBiological Responses to Climate Change APPROVED
Language of Instruction:	English

Module Code:	PAB5109

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 2
Module Delivered in	2 programme(s)
Module Owner:	PETER MC KEOWN
Module Discipline:	NAT_SCI - School of Natural Sciences
Acknowledgment:	Student Self Study Hours = 80 How the student uses their 80 hrs of self-study hours (how much time to devote to different assignments) for this module Lectures =14 hours Tutorials = 3 X 2 hours = 6 hours Sitting exams = 2 hours Reading assigned textbook chapters = 25 hours Reading assigned PDFs of literature = 25 hours Preparing for exams =28 hours TOTAL = 100 hours Each 5 ECTS module should involve the student doing at least 100 hours of work, including attending lectures, reading, writing coursework, preparing for exams and sitting exams.
Module Description:	Global climate change impacts can already be observed in many physical and biological systems. Climate change will affect agriculture and forestry systems through higher temps, elevated CO2 concentration, precipitation changes, increased weeds, pests, and disease pressure, and increased vulnerability of carbon pools. This module will examine biological responses of plants/crops and agri-systems to climate changes.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Appreciate how climate change can impact on environmental adaptation of biological organisms of relevance to agriculture and agri-food systems
LO2	Discuss the difference between avoidance, acclimation and adaptation
LO3	Describe how susceptibility to, or tolerance of stress can explain plant survival and habitat preferences
LO4	Summarise photosynthetic pathways and how they are affected by different environmental conditions, including climate change
LO5	Describe different plant stresses and the implications for global crop productivity.

PAB5110: CCAFS Science Communication (Semester:2 Core)

Module Details

Title Short:	CCAFS Science Communication APPROVED
Language of Instruction:	English

Module Code:	PAB5110

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	2 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	Science communication can aim to generate support for scientific research or study, to inform decision making, political and policy thinking. This module will develop an understanding of the interactions between science and society, ensuring an understanding of the social significance of science in society. This module with introduce topics in science communication, internet and social media skills, social marketing and critical thinking regarding science and CCAFS communication activities.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Critically evaluate which sources of information regarding climate change, agriculture and food security are most reliable and trustworthy.
LO2	Discuss a technical scientific topic for various audiences through news print, broadcast and social media
LO3	Identify key approaches and constraints for environmental and risk communication regarding CCAFS
LO4	Assess the efficacy of different science communication approaches in context of CCAFS
LO5	Consider different approaches for the analysis and implementation of effective science communication

PAB5111: PAB5111 CCAFS Perspectives (Semester:1 Core)

Module Details

Title Short:	PAB5111 CCAFS Perspectives APPROVED
Language of Instruction:	English

Module Code:	PAB5111

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	2 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Acknowledgment:	Student Self Study Hours = 80 How the student uses their 80 hrs of self-study hours (how much time to devote to different assignments) for this module Lectures =14 hours Tutorials = 3 X 2 hours = 6 hours Sitting exams = 2 hours Reading assigned textbook chapters = 25 hours Reading assigned PDFs of literature = 25 hours Preparing for exams =28 hours TOTAL = 100 hours Each 5 ECTS module should involve the student doing at least 100 hours of work, including attending lectures, reading, writing coursework, preparing for exams and sitting exams.

Module Description:	This module will provide a range of different and multi-disciplinary perspectives & case studies on Climate Change, Agriculture and Food Security involving seminars and discussion with CCAFS experts from government, research centres, universities, NGOs, private sector and other stakeholders. The module will develop students breadth of knowledge and perspectives regarding CCAFS and develop critical thinking skills that are of relevance for research to inform decision-making and actions regarding climate change, agriculture and food security.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Consider how different disciplines and sectors have differing perspectives regarding climate change, agriculture and food security
LO2	Appreciate how presentations and case studies on CCAFS topics can be differently framed by different sectors and disciplines
LO3	Critically review case studies and perspectives in the context of CCAFS challenges
LO4	Present and discuss opinions in an open forum as a group and individually.
LO5	Learn how to present questions to different CCAFS stakeholders and to engage in dialogue with other disciplines/sectors regarding CCAFS topics

PAB5112: CCAFS Research Skills & Techniques (Semester:2 Core)

Module Details

Title Short:	CCAFS Research Skills & Techniques APPROVED
Language of Instruction:	English

Module Code:	PAB5112

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	1 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module aims to formally introduce MSc CCAFS trainees to the research process regarding CCAFS, including theory, critical thinking and provide an overview of methodologies and methods associated with carrying out independent research or research within a team. This module is designed to provide a basic understanding of the scientific research process and how to identify quality research that is robust and reliable.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Provide an overview of the research process in relation to climate change, agriculture and food security
LO2	State clearly their research problem and associated research questions arising, including both descriptive and either explanatory or exploratory questions
LO3	Conduct a preliminary literature review of the concepts comprising the research questions
LO4	Set out clearly a series of theoretical propositions for testing and demonstrate clearly how they arise from the literature review
LO5	Set out the main elements of a potential research instrument for testing the hypotheses
LO6	Develop skills for how to classify, analyse, interpret and present quantitative and qualitative data

PAB5113: PAB5113 CCAFS Research Project (Semester:1 Core)

Module Details

Title Short:	PAB5113 CCAFS Research Project APPROVED
Language of Instruction:	English

Module Code:	PAB5113

ECTS Credits:	30

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	12 months long

Module Delivered in	1 programme(s)

Module Owner:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Acknowledgment:	The student will be supervised by an academic staff member and associated experts affiliated to the CCAFS Masters degree. 600 hrs

Module Description:	The CCAFS research project placement will allow students to conduct research to address the challenges climate change poses to agriculture and food production and overall sustainable global development. The CCAFS research project will be conducted with partners & research groups who are engaged in research on climate change, agriculture and food security.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate knowledge of the specific climate change challenges regarding sustainable global development in the region where CCAFS research project is conducted.
LO2	Display a clear understanding of the implications of these challenges on sustainable production and global food security in the region of their CCAFS project placement.
LO3	Identify and discuss the issues surrounding these challenges and related approaches to mitigation in a practical context in the region.
LO4	Evaluate options for mitigation and adaptation stategies in the context of sustainable production and food security given the available resources.
LO5	Identify future projects that can be valuable in the region of the CCAFS project placement.
LO6	Engage in a research program or support an existing research program in the region of the CCASF research project that is already addressing some of the challenges of climate change, agriculture and food security.

PAB5116: Understanding AgriBusiness & AgriFood Market Trends (Semester:1 Core)

Module Details

Title Short:	Understanding AgriBusiness & AgriFood Market Trends APPROVED
Language of Instruction:	English

Module Code:	PAB5116

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	4 programme(s)

Module Owner:	PETER MC KEOWN

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Level:	Pass

Module Description:	This module will provide research students with an improved understanding of agribusiness structures and dynamics, in Ireland and internationally. The student will gain insights into agri-economics, agri-business, and agri-market trends. Particular focus will be placed on understanding value chains and the role of research and innovations in driving change, economic and commercial benefits for value-chain stakeholders. Students be provided with insights into food systems and geospatial, material and environmental footprint dimensions of agrifood systems. The module will also provide insights into social, demographic, behavioural and gender dimensions of agriculture and agrifood systems, particular in relation to agrifood systems generating both social and economic impacts in Ireland and internationally. The module will be taught by NUI Galway PABC members in conjunction with experts from Teagasc and other partner organisations of the PABC, and will include lectures/seminars from leading international experts. The module will involve a field study visit to the Teagasc Rural and Economy Centre in Athenry. During the course, students will maintain a Blackboard journal in which they record their experiences and are encourage to reflect on how the topics relate to the future impacts of their own research; an overview of this process will be included in the first taught session. The final assessment of the course is via a 'business elevator pitch' to a judging jury in which the student presents how an idea developed during a research program (related to their own project, where applicable) could be used to develop a new product, service or market opportunity.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Summarise the dynamics of national and international agrifood markets and trends
LO2	Understand the basic components for developing an agri-business plan
LO3	Identify new export markets for agricultural and food products or services
LO4	Develop and present a business plan for exploitation of an international market
LO5	Appreciate the contribution of different disciplines and research approaches for developing and implementing a business plan for an agrifood product or service

PAB5117: Understanding Ireland's Agriculture & AgriFood Sector (Semester:1 Core)

Module Details

Title Short:	Understanding Ireland's Agriculture & AgriFood Sector APPROVED
Language of Instruction:	English

Module Code:	PAB5117

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	5 programme(s)

Module Owner:	PETER MC KEOWN

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Level:	Pass

Module Description:	The module is designed to allow postgraduate students working on an agri or agrifood related topics to contextualise their research within the broader context of agriculture and the agrifood sector in Ireland. Students will be enabled to understand the origins of the Irish agriculture and agrifood sectors, current status, challenges and opportunities of national and international relevance. The module will be of particular relevance to PhD and Masters degree students within the Plant and AgriBiosciences Research Centre, Teagasc Walsh Fellows in NUI Galway and other universities, and in general any research students seeking to contextualise their research through improved understanding of Ireland agriculture and agrifood systems. The module will be taught in conjunction with experts from Teagasc and other partner organisations of the PABC, and will include lectures/seminars from leading international experts. The course will provide an overview of the origins of Irish agriculture, its place in local, national and European context, the policy which regulates it and how research in related areas contributes to its continued sustainable development. Students will augment their learning experience with a visit to a local farming enterprise and interaction with the agricultural community. Students will conclude the module by making a presentation of a topic of relevance to Irish agriculture; and by writing a report that describes how their own area of Thesis research relates to the wider context of the field. This report will be of written following the guidelines for Thesis preparation (including referencing), to ensure that it can be adapted as a component of the introductory chapter of the student's Thesis. Successful completion of the module will depend upon satisfactory performance in both elements of the assessment.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Summarise the main factors which have affected the development of agriculture in Ireland
LO2	Explain the linkages between agri-related research across different research areas;
LO3	Identify priority and opportunity areas in which research can assist the development of Irish agriculture and agrifood systems;
LO4	Write a report placing their own research topic in the broader context of Irish agriculture and agrifood systems;
LO5	Demonstrate an improved ability to make oral and written communications of their research topic in context of Irish agriculture and agrifood systems;

PH339: Radiation and Medical Physics (Semester:1 Core)

Module Details

Title Short:	Radiation and Medical Physics APPROVED
Language of Instruction:	English

Module Code:	PH339

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)

Teaching Period:	Semester 1

Module Delivered in	12 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This module provides an introduction to the medical imaging and instrumentation aspects of real imaging environments, ranging from obsolete modalities to the modern tomographic imaging modalities (such as PET and SPECT). This module also covers the fundamental processes involved in forming images using ionising radiation, safety issues associated with ionising radiation and methods of radiation detection.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	define terms and explain concepts relating to the physical principles covered by this module's syllabus.
LO2	describe the physical laws that connect terms and concepts covered by this module's syllabus and, where appropriate, derive the mathematical relationships between those terms and concepts.
LO3	outline applications to real-world situations of the physical principles covered by this module's syllabus.
LO4	analyze physical situations using concepts, laws and techniques learned in this module.
LO5	identify and apply pertinent physics concepts, and appropriate mathematical techniques, to solve physics problems related to the content of this module's syllabus.
LO6	analyze data, interpret results and draw appropriate conclusions.
LO7	prepare scientific reports.

PH5107: Monitoring for Health Hazards at Work (Semester:2 Core)

Module Details

Title Short:	Monitoring for Health Hazards at Work APPROVED
Module Code:	PH5107
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 2
Module Delivered in	4 programme(s)
Module Owner:	MARIE COGGINS
Module Discipline:	EP - Physics
Module Description:	This module aims to provide students with an introduction to skills required to anticipate, evaluate and control workplace hazards

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand the importance of the role of exposure measurment within the Health and Safety Function
LO2	Identify, locate and interpret health and safety legislation, guidance and standards relevent to the measurement and control of workplace hazards
LO3	Describe techniques used to evaluate exposure risk from physical, chemical and biological hazards in the work environment
LO4	Interpret and communicate occupational exposure data
LO5	Appreciate the need for suitable workplace exposure control
LO6	Appreciate the need for continuous professional development and the role of professional ethics in this area

PH5111: Exposure Science (Semester:1 Core)

Module Details

Title Short:	Exposure Science APPROVED
Language of Instruction:	English

Module Code:	PH5111

ECTS Credits:	10

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 1 and Semester 2
Module Delivered in	6 programme(s)
Module Owner:	MARIE COGGINS
Module Discipline:	EP - Physics
Source:	MSc/HDip Occupational and Environmental Health & Safety
Module Level:	Common
Module Description:	This module aims to provide students with the fundamental principles of occupational hygiene and environmental assessment. Students will develop specific skills and competencies to anticipate, evaluate and control occupational and environmental hazards through practical application

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand the role of occupational and environmental assessment in protecting the health and well being of the worker and the community
LO2	Anticipate exposure risks to the worker and the environment arising from biological chemical and physical hazards at work
LO3	Assess exposure risk arising from the presence of physical, chemical and biological hazards in the work environment
LO4	Select and apply appropriate measurement tools and protocols for assessing occupational and environmental hazards
LO5	Analyse and interpret occupational and environmental assessment data
LO6	Communicate the results from occupational and environmental assessments both orally and in written form
LO7	Develop policies for management of exposure risks to the worker and the environment arising from work activities
LO8	Appreciate the need for continuous professional development in this area

PH5112: Research Thesis OEHS (Semester:1 Core)

Module Details

Title Short:	Research Thesis OEHS APPROVED
Language of Instruction:	English

Module Code:	PH5112

ECTS Credits:	30

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	12 months long

Module Delivered in	3 programme(s)

Module Owner:	MARIE COGGINS

Module Discipline:	EP - Physics

Module Level:	Common

Module Description:	This module aims to allow students to develop specific skills and competencies to design and execute research work in occupational and environmental health and safety

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Develop a research hypothesis
LO2	Conduct a research literature review
LO3	Select, refine and implement research methodologies
LO4	Collect research data
LO5	Analyse and interpret research data
LO6	communicate research data to the scientific community

PM208: Fundamental Concepts in Pharmacology (Semester:1 Core)

Module Details

Title Short:	Fundamental Concepts in Pharmacology APPROVED
Module Code:	PM208
ECTS Credits:	5
NFQ Level:	8
EQF Level:	6
EHEA Level:	First Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 1
Module Delivered in	25 programme(s)
Module Owner:	MAURA GREALY
Module Discipline:	PM - Pharmacology
Module Description:	This module introduces students to fundamental pharmacological concepts of pharmacodynamics and pharmacokinetics. A combination of lectures, tutorials and workshops will be used.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	describe the main drug targets
LO2	interpret dose response curves for agonists, antagonists, inverse agonists
LO3	calculate molarities, concentrations, volumes required in making solutions
LO4	access and critically analyse and interpret pharmacological data
LO5	describe the processes of absorption, distribution, metabolism and excretion for specific drugs
LO6	explain the effects of different routes of administration on absorption of drugs, and effects of food and drug interactions on drug disposition
LO7	derive pharmacokinetic data and use them to predict clinical properties of drugs

PM209: Applied Concepts in Pharmacology (Semester:1 Core)

Module Details

Title Short:	Applied Concepts in Pharmacology APPROVED
Language of Instruction:	English

Module Code:	PM209

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	21 programme(s)

Module Owner:	MAURA GREALY

Module Discipline:	PM - Pharmacology

Module Description:	This module introduces students to autonomic pharmacology and drug discovery and development. A combination of lectures, tutorials and workshops will be used.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the process of adrenergic and cholinergic neurotransmission including receptors and transporters.
LO2	Relate drug mechanism of action to autonomic neurotransmission
LO3	Describe how new molecular entities are discovered and developed into drug candidates for human clinical trials
LO4	Summarize the clinical trial process including adverse effects
LO5	Derive dose-response curves for agonists and antagonists in the ANS
LO6	Interpret clinical trial data

PM311: Introduction to Toxicology (Semester:1 Core)

Module Details

Title Short:	Introduction to Toxicology APPROVED
Language of Instruction:	English

Module Code:	PM311

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	11 programme(s)

Module Owner:	HOWARD OLIVER FEARNHEAD

Module Discipline:	PM - Pharmacology

Module Description:	A 5ECTS module developed to provide an introduction to Toxicology to third year science students who have an interest in poisons and a background in Pharmacology, Biochemistry, Physiology, Anatomy or Chemistry. The course involves lectures delivered over one semester and is assessed through continuous assessment and a 2 hour written examination at semester's end.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	use the language, terms, and definitions of toxicology
LO2	describe the factors affecting toxic responses
LO3	describe specific mechanisms of toxic action
LO4	apply this knowledge to explain specific examples of target organ toxicity
LO5	describe how toxicity assessed and the challenges of risk assessment
LO6	collect toxicological information and apply toxicological principles to specific classes of toxicant and specific situations

PM5101: Central Neurotransmission (Semester:1 Core)

Module Details

Title Short:	Central Neurotransmission APPROVED
Language of Instruction:	English

Module Code:	PM5101

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)

Teaching Period:	Semester 1

Module Delivered in	3 programme(s)

Module Owner:	DECLAN PATRICK MCKERNAN

Module Discipline:	PM - Pharmacology

Module Description:	This module introduces students to the concepts and chemicals involved in neurotransmission. It also provides students with the basis for pharmacological interventions in disorders of the central nervous system.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the major chemicals involved in neurotransmission
LO2	Explain the process of neurotransmission
LO3	Name targets that are used to intervene pharmacologically in CNS disorders
LO4	Identify targets that could potentially be used for pharmacological interventions in disease states
LO5	Describe the biochemical and cellular consequences of neurotransmission

PM5102: Experimental Methods in Pharmacology (Semester:1 Core)

Module Details

Title Short:	Experimental Methods in Pharmacology APPROVED
Module Code:	PM5102
ECTS Credits:	10
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 1
Module Delivered in	5 programme(s)
Module Owner:	DECLAN PATRICK MCKERNAN
Module Discipline:	PM - Pharmacology
Module Description:	A practical-based module that aims to develop laboratory skills in conjunction with data analysis and interpretation using computer software

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Be proficient in lab skills
LO2	Construct graphical representations of data sets
LO3	Interpret experimental data
LO4	Analyse data using the appropriate methods
LO5	Provide rationale for choosing appropriate statistical methods
LO6	Critically evaluate scientific data in the literature
LO7	Create experimental reports based on the analysis of data sets

PM5103: Experimental Neuropharmacology (Semester:2 Core)

Module Details

Title Short:	Experimental Neuropharmacology APPROVED
Language of Instruction:	English

Module Code:	PM5103

ECTS Credits:	15

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	4 programme(s)

Module Owner:	UNA RYAN

Module Discipline:	PM - Pharmacology

Module Description:	This is a practical-based module with the aim of preparing students for their research project. This module consists of mini-projects in topics relevant to neuropharmacology research

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe and critically discuss advanced principles and concepts of ligand-receptor binding
LO2	Observe and record behavioural changes following drug exposure
LO3	Perform experiments to measure changes in molecular events following toxicant treatment in cells
LO4	Anaylse, present and derive conclusions from scientific data
LO5	Interpret experimental data

PM5104: Current Topics in Neuropharmacology (Semester:2 Core)

Module Details

Title Short:	Current Topics in Neuropharmacology APPROVED
Module Code:	PM5104
ECTS Credits:	10
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	2 programme(s)
Module Owner:	DECLAN PATRICK MCKERNAN
Module Discipline:	PM - Pharmacology
Module Description:	This is a self-directed assignment-based module that aims to develop students' capabilities in data analysis, interpretation and presentation and to familiarise them with recent advances and controversial topics in the field of neuropharmacology.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	. Evaluate the current efficacy and safety information for a named drug at various stages of its development
LO2	Critically analyse the evidence and synthesise an opinion on a controversial topic in neuropharmacology
LO3	Develop a research proposal and design experiments to address a project title

PM5105: Neuropharmacology & Therapeutics (Semester:2 Core)

Module Details

Title Short:	Neuropharmacology & Therapeutics APPROVED
Language of Instruction:	English

Module Code:	PM5105

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	4 programme(s)

Module Owner:	DECLAN PATRICK MCKERNAN

Module Discipline:	PM - Pharmacology

Module Description:	This is a lecture-based module designed to further develop knowledge in drugs acting on the nervous system (e.g. psychiatric disorders, neurological disorders, pain and drugs of abuse) as well novel cell and gene therapies for the nervous system.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe and critically discuss the role of CNS neurotransmitters in psychiatric and neurological disease and in reward processes
LO2	Relate mechanisms of drug action to management of psychiatric and neurological disorders
LO3	Critically discuss the contribution that modern approaches to technologies for therapeutics have made (or may make in the future) to human health, specifically in the areas of cell therapy and gene therapy.

PM5108: Applied Toxicology (Semester:1 Core)

Module Details

Title Short:	Applied Toxicology APPROVED
Module Code:	PM5108
ECTS Credits:	5
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	3 programme(s)
Module Owner:	HOWARD OLIVER FEARNHEAD
Module Discipline:	PM - Pharmacology
Module Description:	Self-directed learning module to apply the principles of toxicology to the assessment of toxicological catastrophes, individual toxicants and classes of toxicants

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Collect/collate toxicological data on specific toxicants or classes of toxicants
LO2	Interpret toxicological data
LO3	Apply knowledge of toxicity assessment including challenges faced in extrapolating risks to man to interpret risk posed by specific toxciants or classes of toxicants
LO4	Apply knowledge of the factors affecting toxic responses, specific mechanisms of toxic action, and knowledge of target organ toxicity to specific toxicants or classes of toxicants

PM5109: Experimental Toxiocology (Semester:2 Core)

Module Details

Title Short:	Experimental Toxiocology APPROVED
Language of Instruction:	English

Module Code:	PM5109

ECTS Credits:	15

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	1 programme(s)

Module Owner:	DECLAN PATRICK MCKERNAN

Module Discipline:	PM - Pharmacology

Module Description:	This is a practical-based module with the aim of preparing students for their research project. This module consists of mini-projects in topics relevant to toxicology research

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Design appropriately statistically powered experiments to observe toxicant-induced behavioural effects
LO2	0bserve and record behavioural changes following toxicant exposure
LO3	Perform experiments to determine cytotoxicity
LO4	Perform experiments to measure changes in molecular events following toxicant treatment in cells
LO5	Anaylse and present from scientific data
LO6	Interpret and derive conclusions from experimental data

PM5110: Current Topics in Toxicology (Semester:2 Core)

Module Details

Title Short:	Current Topics in Toxicology APPROVED
Module Code:	PM5110
ECTS Credits:	10
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	1 programme(s)
Module Owner:	DECLAN PATRICK MCKERNAN
Module Discipline:	PM - Pharmacology
Module Description:	This is a self-directed assignment-based module that aims to develop students' capabilities in data analysis, interpretation and presentation and to familiarise them with recent advances and controversial topics in the field of toxicology.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	. Evaluate the current safety information for a named drug at various stages of its development
LO2	Critically analyse the evidence and synthesise an opinion on a controversial topic in toxicology
LO3	Develop a research proposal and design experiments to address a project title

PM5111: Advanced Toxicology (Semester:2 Core)

Module Details

Title Short:	Advanced Toxicology APPROVED
Language of Instruction:	English

Module Code:	PM5111

ECTS Credits:	5

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 2

Module Delivered in	3 programme(s)

Module Owner:	DECLAN PATRICK MCKERNAN

Module Discipline:	PM - Pharmacology

Module Description:	This module is designed to further develop knowledge in mechanisms of toxicity and target organ toxicity and to apply principles of toxicology in specific topics such as environmental toxicology, developmental toxicology and risk assessment.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the mechanisms of chemically induced mutagenesis, carcinogenesis and teratogenesis
LO2	Decribe how toxicants can lead to organ failure and diseases related to the heart, skin, blood and kidney
LO3	Describe how toxicants can affect the environment and how environmental chemicals can cause toxicity
LO4	Describe how risk assessment can be used to ensure safety of populations and how new legislation is being applied
LO5	Describe the mechanisms by which toxicants can interfere with the developmental process, in particular how epigenetics of organisms can be affected
LO6	Apply knowledge of target organ toxicity to specific toxicants
LO7	Interpret risk assessment and environmental data from the literature on specific toxicants
LO8	Critically discuss the legislation now in place for risk assessment of commonly encountered chemicals in foods and drugs.

PM5112: Research Project in Toxicology (Semester:2 Core)

Module Details

Title Short:	Research Project in Toxicology APPROVED
Language of Instruction:	English

Module Code:	PM5112

ECTS Credits:	30

NFQ Level:	9	**EQF Level:**	7	**EHEA Level:**	Second Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)

Teaching Period:	Trimester 3

Module Delivered in	1 programme(s)

Module Owner:	DECLAN PATRICK MCKERNAN

Module Discipline:	PM - Pharmacology

Module Description:	This is a 12-week individual laboratory-based research project. The aim of this module is to provide the students with experience of conducting scientific research as well as communicating their research via oral presentation and written dissertation.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Design scientific experiments to address a specific research question.
LO2	Demonstrate technical skill and competency in relevant scientific procedures.
LO3	. Work independently, responsibly and safely in the laboratory.
LO4	Generate, analyse, depict and critically interpret scientific data.
LO5	Critically review relevant historical and state-of-the-art scientific literature.
LO6	Communicate scientific findings through appropriate verbal, written and visual means.

SI209: Neurophysiology (Semester:1 Core)

Module Details

Title Short:	Neurophysiology APPROVED
Language of Instruction:	English

Module Code:	SI209

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	6 programme(s)

Module Owner:	Fiona Byrne

Module Discipline:	SI - Physiology

Module Level:	Common

Module Description:	The module in Neurophysiology will provide students with a knowledge of the function of the brain and spinal cord. Topics covered will include organisation and function of cell of the central nervous system, motor and somatosensory processing, physiology underlying vision, hearing, sleep, learning, emotion, language, hunger, and thermoregulation. Theoretical learning and understanding of will be aided by laboratory practicals investigating the physiology of vision and hearing.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the principals of somatosensory processing and perception and apply this knowledge to explain acute pain processing
LO2	Describe in detail the processes behind spinal reflexes and central control of movement
LO3	Describe the physiological processes underlying vision, hearing, sleep, learning, emotion, language, hunger, and thermoregulation
LO4	Compare knowledge of the normal CNS function and symptoms associated with pathophysiology
LO5	Appreciate of the integrative nature of the CNS
LO6	Competence in the practical assessment of aspects of the physiology of vision and hearing
LO7	Integrate practical information with theoretical knowledge

SI317: Human Body Function

(Semester:1 Optional)

Module Details

Title Short:	Human Body Function APPROVED
Language of Instruction:	English

Module Code:	SI317

ECTS Credits:	10

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2016-17 (01-09-16 – 31-08-17)

Teaching Period:	Semester 1

Module Delivered in	24 programme(s)

Module Owner:	Fiona Byrne

Module Discipline:	SI - Physiology

Module Description:	The 'Human Body Function' module teaches students the complex nature of how the mammalian body functions through the study of its component organ systems. Specifically, the following areas are covered: Body fluids and fluid compartments, haematology, nerve and muscle physiology, cardiovascular physiology, respiratory physiology, immunology and endocrinology.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Know the distribution of water between the body fluid compartements and understand the role of body water in cell and system function.
LO2	Know the components of blood, understand the process of blood clotting and understand the principles of the ABO and rhesus blood groups.
LO3	Know the structure and function of nerve and muscle cells.
LO4	Understand how a nerve impulse is generated and propagated.
LO5	Understand the process of muscle contraction, and how nerves can stimulate muscle cells.
LO6	Understand the autonomic nervous system.
LO7	Know the structure and function of the heart and its electrophysiology, focusing on the electrical and mechanical events at each stage of the cardiac cycle.
LO8	Know the importance of blood pressure, and understand the basic principles of regulation.
LO9	Understand how breathing is performed and know the volumes and capacities associated with respiration.
LO10	Understand how oxygen and carbon dioxide are transported, and how oxygen delivery is regulated and controlled.
LO11	Understand the basics of hormone function, with a focus on glucose metabolism and the functions of growth hormone.
LO12	Understand the basics of immune defense.
LO13	Know the divisions of the central nervous system and have a basic knowledge of how the different areas function.

ST311: Applied Statistics I (Semester:1 Optional)

Module Details

Title Short:	Applied Statistics I APPROVED
Module Code:	ST311
ECTS Credits:	5
NFQ Level:	8
EQF Level:	6
EHEA Level:	First Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	38 programme(s)
Module Owner:	EMMA HOLIAN
Module Discipline:	MA - Mathematics
Module Description:	An introduction to methods and applications in applied statistical inference. This module is offered as an optional module, building on the statistical inferential methods demonstrated in pre-requisite module ST238 or similar modules. Various non-parametric hypothesis tests are demonstrated and a comparison of suitability of applying non-parametric and parametric methods is discussed. The module also builds on regression modelling, where topics covered include model estimation, model checking and inference for simple linear regression and multiple linear regression models, and procedures in variable selection. Models discussed are applicable for a single quantitative response with quantitative and/or qualitative predictors.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	demonstrate various non-parametric testing procedures, identify suitability of parametric methods and the their non-parametric alternative test method, discuss the advantages and disadvantages of parametric and non-parametric testing, define the the power of a test and intrepret its meaning in applications, formulate the power function and sketch power curves;
LO2	carry out parametric and non-parametric testing procedures with the use of software, Minitab;
LO3	calculate and interpret correlations between variables and make inferences about relationships;
LO4	formulate a linear regression model, calculate and interpret estimated coefficients and make statistical inferences on the fitted model by carrying out statistical tests using parameter estimates and using the ANOVA table. Regression models discussed include a single quantitative response explained by a single explanatory variable or mutliple explanatory variables which include quantitative and/or categorical explanatory variables and interactions between variables;
LO5	obtain fitted values and predictions at new data points, together with associated prediction and confidence intervals;
LO6	by calculating regression diagnostics and producing relevant plots check the adequacy of the model specification for the data presented and to check model assumptions, including linearity, normality, constant variance, independence and the presence of outliers and influential points;explore the need for transformations of response and explanatory variables;
LO7	interpret and use output from variable selection procedures to choose adequate models, including the best subsets procedure and step-wise;
LO8	carry out the regression analysis with the use of software, Minitab;
LO9	compile a statistical report, i.e. prepare a typed document which introduces the statistical research question being explored, describes the data collection method applicable to the research, describes relevant features of the sample data obtained, and outlines conclusions from inferential statistical analysis carried out using the sample data, incorporating output and plots from statistical software.

ST312: Applied Statistics II (Semester:2 Optional)

Module Details

Title Short:	Applied Statistics II APPROVED
Language of Instruction:	English

Module Code:	ST312

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)

Teaching Period:	Semester 2

Module Delivered in	35 programme(s)

Module Owner:	HAIXUAN YANG

Module Discipline:	MA - Mathematics

Module Description:	Methods and applications in applied statistical inference. This module discusses factors for consideration in experiment design and demonstrates methods in the analysis of data emerging from designed experiments. Topics covered include confounding, blocking, a completely randomized design and a randomized block design, two-way ANOVA. The module also demonstrates regression modelling for a qualitative response, i.e. methods in logistic regression and generalized linear models.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	discuss topics in experiment design and carry out analysis for data collected from a completely randomized design, a randomized block design, and two-factor studies with interaction effects, interpret the results with reference to the data application;
LO2	formulate a logistic regression model and generalized linear model for a qualitative response, calculate and interpret estimated coefficients and make statistical inferences on the fitted model by carrying out statistical tests using parameter estimates, obtain fitted values and predictions at new data points, together with associated prediction and confidence intervals;
LO3	apply various techniques in analysis of a multivariate response, including topics from, principal components analysis, cluster analysis, time series analysis.
LO4	carry out analysis and testing procedures discussed with the use of software, Minitab;
LO5	compile a statistical report, i.e. prepare a typed document which introduces the statistical research question being explored, describes the data collection method applicable to the research, describes relevant features of the sample data obtained, and outlines conclusions from inferential statistical analysis carried out using the sample data, incorporating output and plots from statistical software.

ST313: Applied Regression Models (Semester:1 Optional)

Module Details

Title Short:	Applied Regression Models APPROVED
Language of Instruction:	English

Module Code:	ST313

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 1
Module Delivered in	32 programme(s)
Module Owner:	HAIXUAN YANG
Module Discipline:	MA - Mathematics
Acknowledgment:	This module is developed from Prof. John Hinde's work. Also thanks Dr Jerome N. Sheahan for his help.
Module Description:	An introduction to the theory and application of regression models. Topics covered include the simple linear model, least-squares estimation, multiple linear regression, inference, model checking, model choice and variable selection, and the use of Minitab for practical applications.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	1 calculate and interpret correlations between variables and make inferences about relationships; 2 formulate a linear regression model, calculate estimated coefficients and make statistical inferences on the fitted model using both parameter estimates and the ANOVA table; 3 obtain fitted values and predictions at new data points, together with associated confidence intervals; 4 calculate regression diagnostics and use these to check model assumptions, including linearity, normality, constant variance, independence and the presence of outliers and influential points; 5 formulate a multiple regression model and specify this in matrix form; 6 derive least-squares estimates for

ST412: Stochastic Processes

(Semester:2 Optional)

Module Details

Title Short:	Stochastic Processes APPROVED
Module Code:	ST412
ECTS Credits:	5
NFQ Level:	8
EQF Level:	6
EHEA Level:	First Cycle
Valid From:	2016-17 (01-09-16 – 31-08-17)
Teaching Period:	Semester 2
Module Delivered in	17 programme(s)
Module Owner:	JEROME SHEAHAN
Module Discipline:	MA - Mathematics
Module Description:	The goal of the course is to introduce the main ideas and methods of stochastic processes with the focus on Markov chains (processes with discrete time index and finite state space). Branching processes and Poisson process (continuous time and discrete state space) will also be included in the study.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Use probability and moment generating functions to calculate corresponding distributional properties.
LO2	Derive properties of branching processes such as expectation, variance, and probability of extinction.
LO3	Calculate relevant probabilities in random walks with and without barriers
LO4	Use Markov property to prove various probabilistic statements about Markov chain
LO5	Classify states of Markov chains and determine stationarity properties
LO6	Calculate limiting and statitonary distributions
LO7	Prove and calculate various properties of Poisson process
LO8	Build and describe Markov chains to represent simplified real world problems, for example, such as those those used to model credit mobility

ST417: Introduction to Bayesian Modelling (Semester:2 Optional)

Module Details

Title Short:	Introduction to Bayesian Modelling APPROVED
Language of Instruction:	English

Module Code:	ST417

ECTS Credits:	5

NFQ Level:	8	**EQF Level:**	6	**EHEA Level:**	First Cycle

Valid From:	2015-16 (01-09-15 – 31-08-16)

Teaching Period:	Semester 2

Module Delivered in	26 programme(s)

Module Owner:	JOHN PHILIP HINDE

Module Discipline:	MA_ST_AM - School of Mathematics, Statistics and Applied Mathematics

Module Description:	An introductory course to Bayesian statistical modelling and analysis. Covers basic theory and methods of Bayesian model development and focuses on inference which is based on simulations (computations done in R). A prerequisite is a calculus based course in probability (at the level of ST2x3/MA235, for example). Prior experience studying statistics or regression analysis is helpful but not necessary.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Determine likelihood and prior distributions as parts of a basic Bayesian model specification.
LO2	Apply Bayes theorem to obtain posterior distribution of unknown random variables in the model.
LO3	Derive posterior predictive distribution.
LO4	Write simple R scripts implementing basic random sampling methods.
LO5	Apply the basics of Markov chain theory to implement simulation algorithms for inference.
LO6	Implement Gibbs sampler and Metropolis algorithm to obtain samples from posterior distributions.
LO7	Compare and contrast basic Bayesian methods with classical statistics and realize advanatges and disadvantages of both.
LO8	Develop simple Bayesian models for analysis of real world data sets.

UL_ER6003: Research Project (UL) (Semester:2 Core)

Module Details

Title Short:	Research Project (UL) APPROVED
Module Code:	UL_ER6003
ECTS Credits:	30
NFQ Level:	9
EQF Level:	7
EHEA Level:	Second Cycle
Valid From:	2015-16 (01-09-15 – 31-08-16)
Teaching Period:	Semester 2
Module Delivered in	1 programme(s)
Module Owner:	CAITRIONA CARLIN
Module Discipline:	XXXEV - XXX ENVIRONMENTAL SCIENCE
Module Level:	Externally Hosted Module
Module Description:	This module is undertaken by the student during the summer (trimester 3). The student carries out an individual research project from a list provided by co-ordinators. The student will write up the research according to the requirements of an appropriate journal or as a manual.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Apply appropriate laboratory and field methodologies skills to the project
LO2	Develop expertise in experimental design and planning skills
LO3	Acquire good practice in data recording skills
LO4	Become skilled at suitable scientific data analyses evaluate, examine and understand research area
LO5	Synthesise current thinking and apply it to the research project
LO6	Write a scientific paper based on research project according to appropriate journal
LO7	Present oral and written scientific presentations.