AN223: Embryology & Development (Semester:4 Group not available to select online)

Module Details

Title Short:	Embryology & Development APPROVED
Module Code:	AN223
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	5 programme(s)
Module Owner:	FABIO QUONDAMATTEO
Module Discipline:	AN - Anatomy
Module Description:	Study of embryonic and fetal development. The module will cover: fertillization, blastocyst development and implantation, placenta, early embryonic events that accompany the formation of the three germ layer and the folding of the embryo (gastrulation, neurulation, somitogenesis) and provide the basis for the body plan, and finally with the specific development of: CNS, CVS, Respiratory system, GIT, Urogenital tract, neck, and face

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	have acquired knowledge on the early events of embryonic development
LO2	have a clear overview on the initial full process of prenatal development
LO3	have a clear understanding on how the body plans are established early in development
LO4	have acquired knowledge on the basic steps of development of: CNS, heart and major vessels, lungs and airways, gastrointestinal system, uro-genital system, neck, and face
LO5	have clear understandings on basic concepts on causes of occurrence of variations and birth defects and of their importance
LO6	have knowledge on the formation of the placenta and its functions

AN226: Systems Histology (Semester:4 Optional)

Module Details

Title Short:	Systems Histology APPROVED
Language of Instruction:	English

Module Code:	AN226

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	6 programme(s)

Module Owner:	HELEN DODSON

Module Discipline:	AN - Anatomy

Module Description:	Systems histology Students will sit a 2 hour exam at the end of semester 2 based on systems histology. Continuous assessment will be carried out in the form of practical exams.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the histological structure of various body systems by light microscopy
LO2	Know the structure and function of the skin, respiratory system, cardiovascular system, reproductive systems, endocrine system, lymphatic system, genitourinary system, gastrointestinal system and blood.
LO3	Discuss the histological structures with correlation to function of various system of the body

BI207: Metabolism and Cell Signalling (Semester:4 Group not available to select online)

Module Details

Title Short:	Metabolism and Cell Signalling APPROVED				
Module Code:	BI207				
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	10 programme(s)				
Module Owner:	MICHAEL CARTY				
Module Discipline:	BI - Biochemistry				
Module Description:	The course addresses the question of how cells obtain and manage energy. It outlines various pathways for the processing and use of energy in the cell and covers the integration of these pathways in metabolism. Problems in these fundamental processes contribute to human diseases, which are also covered in the course.				

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Outline how cells harvest energy to drive cellular reactions.
LO2	Summarise central concepts in cellular metabolism
LO3	Define anabolic and catabolic pathways including the key intermediates linking these pathways
LO4	Detail the biochemical pathways associated with glycolysis, glycogenolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis and the synthesis and degradation of fatty acids, amino acids and nucleotides.
LO5	Describe molecular mechanisms of cell signalling and control of key metabolic pathways
LO6	Discuss how dysfunction of these processes can be involved in disease.

BI313: Cell Signalling (Semester:6 Optional)

Module Details

Title Short:	Cell Signalling APPROVED
Module Code:	BI313
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 CREIGHTON
Module Discipline:	BI - Biochemistry
Module Description:	This course will provide students an understanding of the biochemical basis of cellular signal transduction pathways, including examples of neurotransmitters and the nervous system, loss of regulation and control of the cell cycle in cancer, and apoptosis. The practical course will introduce students to techniques used to study cell signaling.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Explain the biochemical basis of key signal transduction pathways.
LO2	Describe the role of neurotransmitters in signal transduction in the nervous system.
LO3	Demonstrate how loss of regulation and control of the cell cycle leads to cancer.
LO4	Explain how cells undergo programmed cell death.
LO5	Explain the technique of sub-cellular fractionation.
LO6	Demonstrate the ability to carry out a glucose tolerance test.
LO7	Design and perform scientific experiments.
LO8	Draw scientifically grounded conclusions from observations and explain these in writing.

BI317: Human Molecular Genetics (Semester:6 Optional)

Module Details

Title Short:	Human Molecular Genetics APPROVED
Module Code:	BI317
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	10 programme(s)
Module Owner:	BRIAN MCSTAY
Module Discipline:	BI - Biochemistry
Module Description:	This course will provide a framework for understanding human molecular genetics. Students will develop an understanding of the structure of human chromosomes, the human genome and human genetic variation. They will also learn about chromosomal and genetic alterations associated with disease states, and the techniques used to identify genetic disease associations. Finally, students will develop an appreciation for the future impact of human molecular genetics on human health.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the structure and explain the techniques for studying human chromosomes
LO2	Describe common human chromosomal abnormalities
LO3	Explain fundamental genetic concepts including, Mendelian inheritance, quantitative traits, linkage and linkage disequilibrium
LO4	Describe the organisation of the human genome
LO5	Describe human genetic variability and its consequences
LO6	Explain the techniques used to identify and map genes conferring susceptibility to disease
LO7	Describe genetic changes that result in, or are a consequence of, cancer
LO8	Describe the impact that moleular genetics will have an on human health

BI321: Protein Biochemistry (Semester:6 Optional)

Module Details

Title Short:	Protein Biochemistry APPROVED
Module Code:	BI321
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	9 programme(s)
Module Owner:	PETER CREIGHTON
Module Discipline:	BI - Biochemistry
Module Description:	This course will provide students an understanding of the synthesis and turnover of proteins in the eukaryotic cell, the role of proteins as molecular tools with particular emphasis on enzymes, and the structure and function of key protein glycoconjugates including glycoproteins and proteoglycans. The practical course will include techniques used in the study of proteins and enzymes.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the life cycle of proteins in the cell.
LO2	Explain the role of proteins as molecular tools in cells.
LO3	Describe the structures and functions of glycoconjugates in cells.
LO4	Explain the role of enzymes at the molecular level from studies of kinetics and molecular structure.
LO5	Describe key steps in the purification of proteins.
LO6	Explain how proteins are assayed.
LO7	Perform basic enzyme assays including assays with inhibitors
LO8	Analyse data derived from experiments in enzyme kinetics.

BPS203: Plant Diversity, Physiology & Adaptation (Semester:4 Group not available to select online)

Module Details

Title Short:	Plant Diversity, Physiology & Adaptation APPROVED
Language of Instruction:	English

Module Code:	BPS203

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:	ZOE ADELAIDE POPPER

Module Discipline:	BT - Botany

Module Description:	Land plants evolved ~500 million years ago and have since diversified to inhabit every available niche. This module explores key adaptations and innovations which have allowed plants to adapt to specific environmental stresses including changes in life-cycle, biochemical and anatomical modifications of photosynthesis, water uptake and the evolution of roots and a vascular system, as well as the evolution of seeds and flowers. Plant diversity will be discussed providing an introduction to each of the major groups of land plants and their identifying features; this will be supported by examination of live and prepared materials.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe and understand the breadth of land plant diversity, and how it originated
LO2	Explain the functional biology of plant taxa, and their ecological significance
LO3	Compare the life-cycles and forms of reproduction found in extant land plants and explain their strengths and limitations;
LO4	Identify the distinguishing characteristics of major groups of bryophytes, ferns, gymnosperms and flowering plants
LO5	Discuss the major innovations and adaptations that have enabled plants to diversify and inhabit every available niche
LO6	Discuss Ireland's flora and biogeography

BPS3105: Plant Natural Products (Semester:6 Optional)

Module Details

Title Short:	Plant Natural Products APPROVED
Language of Instruction:	English

Module Code:	BPS3105

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	5 programme(s)

Module Owner:	ZOE ADELAIDE POPPER

Module Discipline:	BT - Botany

Module Description:	This module investigates the use of plant-, algal-, and fungal- derived compounds for their uses including as medicines. The diversity of chemical compounds identified from plants/algae/fungi will be outlined and discussed in the context of their ecological roles as well as their taxonomic distribution and will highlight the importance of identification. The current sources of specific economically important products will be discussed with reference to sustainability and product quality and the role of biotechnology will be investigated. The methods used to identify products of potential pharmacological, and other uses, will be explored including the role of ethnobotany and traditional medicines as well as laboratory-based technologies. Product development will also be discussed.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Appreciate the diversity of plant-, algal-, and fungal-derived chemicals, including secondary metabolites and enzymes, and their range of activities including ecological, pharmaceutical and biotechnological
LO2	Discuss the taxonomic distribution of plant-, algal-, and fungal-derived compounds of economic and/or medicinal value and their role in planta
LO3	Explore potential, and actual, limitations in the production and quality of specific compounds and the role of biotechnology
LO4	Understand the methods used in product discovery including the role of ethnobotany, laboratory-based methods and bioinformatics-based approaches
LO5	Describe the steps involved in product development

CH202: Organic Chemistry (Semester:4 Optional)

Module Details

Title Short:	Organic Chemistry APPROVED
Language of Instruction:	English

Module Code:	CH202

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	11 programme(s)

Module Owner:	PATRICK O'LEARY

Module Discipline:	CH - Chemistry

Module Description:	In this module the students will learn about organic chemical functional groups and their reactions & reactivity, building on the knowledge gained in year one. There will be a theory and practical component. The theory component will deal with mechanism,reactions, reactivity and structure. In the practical component basic synthetic and analytical techniques used in the organic chemistry laboratory will be introduced

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Discuss the reactions, reactivities & properties of organic functional groups as well as draw and describe structures & reaction schemes and apply naming conventions
LO2	Understand and apply chemical principles to describe and discuss the mechanisms of organic chemical reactions, including unseen reactions.
LO3	Discuss factors which effect selectivity most notably chemo, stereo and regioselectivity in organic reactions
LO4	Propose synthetic routes to organic compounds based on the reactions studied in this course, including previously unseen compounds.
LO5	Use standard laboratory techniques such as recrystallisation, distillation, reflux, separation techniques, glassware setup, heating and cooling methods in carrying out preparation of organic compounds in a safe manner.
LO6	Write a formal laboratory report detailing the experimental work carried out and including a clear and consise presentation and analysis of results
LO7	Use spectroscopic techniques (UV, IR and MS) for compound identification and to apply these to unknown compounds. Identify and explain simple reactions that occur in living systems based on organic reactions & mechanism

CH205: Analytical & Environmental Chemistry (Semester:4 Group not available to select online)

Module Details

Title Short:	Analytical & Environmental Chemistry APPROVED
Language of Instruction:	English

Module Code:	CH205

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	14 programme(s)

Module Owner:	ALAN RYDER

Module Discipline:	CH - Chemistry

Module Description:	This is an introductory course to environmental and analytical chemistry. Analytical chemistry is vital in Industry, Environmental Monitoring, and Healthcare. Students need to understand the fundamental principles behind the analytical techniques and get practical, hands-on experience of these methods. The course comprises of lectures/practicals on: Atmospheric & Water Chemistry, Analytical Chemistry, Electrochemistry, Applied Spectroscopy, Separation Science and Bioanalytical techniques.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	To explain the fundamental principles underlying analytical chemistry, sampling, and electrochemical sensors.
LO2	Explain the fundamentals of atmospheric chemistry and structure, chemistry of the polluted troposphere, and how to deal with waste.
LO3	Explain the fundamental issues influencing water chemistry, treatment, and quality.
LO4	Explain the fundamentals of Atomic Absorption, UV-visible, Mid-IR and Near-IR spectroscopies, and their application to the analysis of various materials.
LO5	Explain the fundamentals of chromatographic techniques and their application to the analysis of small molecules.
LO6	Explain the fundamental principles of protein purification and separation.
LO7	Demonstrate competence in analytical chemistry practicals related to the above learning outcomes (except for 2HF students)
LO8	Work safely in the laboratory (except for 2HF students)

CH307: Inorganic Chemistry (Semester:6 Optional)

Module Details

Title Short:	Inorganic Chemistry APPROVED
Language of Instruction:	English

Module Code:	CH307

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	8 programme(s)
Module Owner:	LUCA RONCONI
Module Discipline:	CH - Chemistry
Module Description:	Insights into the specific roles of metals and ligands in the broad field of coordination chemistry are given. Specific areas to be discussed include the coordination and organometallic chemistry of transition metals, inorganic kinetics and principles of nuclear chemistry. Practicals related to the topics discussed in the course are delivered in the CH334 Module "Experimental Chemistry 2".

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Explain structural features and properties of transition metal coordination compounds based on the Crystal Field Theory (CFT) and the Molecular Orbitals (MOs) model.
LO2	Describe the structure, bonding and reactivity of organometallic complexes of d-block elements.
LO3	Understand the types of organometallic complexes along with a detailed knowledge of the various ligands used in their construction.
LO4	Describe the catalytic activity of specific organometallic complexes and the subsequent reaction mechanisms.
LO5	Describe and explain the structure, bonding and chemical reactivity of transition metals in their various oxidation states.
LO6	Discuss in detail the mechanisms of dissociative, associative, interchange, ligand substitution and electron transfer reactions in transition metals chemistry.
LO7	Understand the basics of nuclear chemistry including radioactive decays, interaction of radiations with the matter, nuclear reactions and applications of radioisotopes.

CH313: Physical Chemistry (Semester:6 Optional)

Module Details

Title Short:	Physical Chemistry APPROVED
Language of Instruction:	English

Module Code:	CH313

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	6 programme(s)

Module Owner:	HENRY CURRAN

Module Discipline:	CH - Chemistry

Module Description:	This course comprises lectures and tutorials, and expands upon the fundamentals of physical chemistry covered in years 1 and 2. Chemistry of molecular interactions, gas-solid interactions, thermodynamics of phase transitions, chemical kinetics, basic principles of electrode kinetics, spectroscopy and quantum chemistry are covered.The course emphasizes chemistry of interest to modern day chemists.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Discuss the potential energy of interaction between closed-shell molecules, (i) charge/charge, (ii) charge/dipole, (iii) dipole/dipole, (iv) London (dispersion) interactions.
LO2	Explain the kinetics associated with reactors, understand the dependence of kinetics on thermodynamics of reactants and products and how the rate constant of a reaction varies with temperature.
LO3	Discuss thermodynamics of phase transitions of pure substances, understand from thermodynamics why homogeneous mixing of gases and ideal solutions occurs spontaneously and describe the phase diagrams of simple mixtures, focusing on temperature-composition diagrams, azeotropes and eutectics and their applications.
LO4	Understand the basic principles of electrode kinetics and be able to use the Butler-Volmer and Tafel equations to compute overvoltage values, transfer coefficients and the equilibrium exchange current density.
LO5	Understand the importance of gas-solid interactions and be able to use and manipulate the various isotherms that are used to describe these interactions. The importance of surface tension, surfactants and the Gibbs adsorption isotherm should also be known.
LO6	Understand how the molar mass of polymers influence their properties, in particular their mechanical and thermal properties and be able to describe methods used to measure this mass. The influence of crystallinity on polymer properties should also be understood.
LO7	Explain the selection rules governing and fundamental theory underpinning Rotational and Vibrational (NIR, MIR, & Raman) spectroscopies. Calculate anharmonicity constants, the energies and populations of spectroscopic energy levels.
LO8	Explain the evidence for quantum theory and the De Broglie Relationship. Explain the Schrodinger Wave Equation (SWE), nature of wavefunctions, Born Interpretation, uncertainty principle. Be able to solve SWE for several simple 1D, 2D, and 3D cases related to spectroscopy and materials science. Be able to use the solutions of the SWE to calculate energy levels in simple systems.

CH3103: Validation in the Pharmaceutical and Medical Devices Industry (Semester:6 Optional)

Module Details

Title Short:	Validation in the Pharmaceutical and Medical Devices Industry APPROVED
Language of Instruction:	English

Module Code:	CH3103

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:	CONSTANTINA PAPATRIANTAFYLLOPOULOU
Module Discipline:	CH - Chemistry
Acknowledgment:	This is also to be attached to the new MSc. in Chemistry (new instance to be created). This will be a core module for 3 BPC students and an elective module for 3BS students. BPC = Biopharmaceutical Chemistry. This is an update to CH339 and replaces it.
Module Description:	This module covers pertinent topics concerning validatory requirements within the biopharma-, pharma, medical device and chemical industries and also Chemistry important in Industry.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Explain in detail the concept of Validation and the Validation Masterplan (VMP) and their roles in the pharmaceutical industry.
LO2	Discuss the concept of Good Manufacturing Practice (GMP) and Good Laboratory Practice (GLP) in relation to the pharmaceutical and chemical industries, highlighting the necessity for manufacturers, institutes and governing bodies to exercise and uphold these frameworks
LO3	Explain all pertinent aspects of Cleaning Validation, Qualification (which includes Design, Installation, Process and Performance Qualification).
LO4	Describe many aspects of Medical Devices and the practical aspects of Quality Control, Good Manufacturing Practices and Drug Development in relation to the Medical Device Industry
LO5	Carry out a short research investigation & present the outcome

PH2103: Thermodynamics & Atomic Physics

Module Details

Title Short:	Thermodynamics & Atomic Physics APPROVED
Language of Instruction:	English

Module Code:	PH2103

ECTS Credits:	5

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

Valid From:	2017-18 (01-09-17 – 31-08-18)
Teaching Period:	Semester 2
Module Delivered in	6 programme(s)
Module Owner:	RAY BUTLER
Module Discipline:	EP - Physics
Source:	Merger, and partial reduction, of former PH217 + PH218 lecture content. Suggested new code: PH233
Module Data:	1 - 4 NON LAB
Module Description:	This module builds on content delivered in the general PH101 Physics course, given in First Year, to provide a more in-depth look at: (1) Thermodynamics based on classical physics. It includes topics such as temperature & heat, thermal properties of matter, and first and second laws of thermodynamics. (2) Atomic Physics and Nuclear Physics, with related introductions to quantum mechanics, light emission & propagation, and special relativity. The module will also consider some computational methods with applications to nuclear & thermodynamics problems;

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.

PH2104: Physics Laboratory and Problem Solving II

Module Details

Title Short:	Physics Laboratory and Problem Solving II APPROVED
Language of Instruction:	English
Module Code:	PH2104
ECTS Credits:	5
NFQ Level:	8
EQF Level:	6
EHEA Level:	First Cycle
Valid From:	2017-18 (01-09-17 – 31-08-18)
Teaching Period:	Semester 2
Module Delivered in	6 programme(s)
Module Owner:	RAY BUTLER
Module Discipline:	EP - Physics
Source:	Merger of former PH217 + PH218 practical/continuous assessment content. Suggested new code: PH234
Module Data:	1.7 - 2 LAB
Module Description:	This is a practical and continuous assessment module, consisting of laboratory sessions, problem solving sessions, and homework. It is a companion to, and co-requisite of, the "Thermodynamics and Atomic Physics" lectures module in the same semester.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Analyze physical situations using concepts, laws and techniques learned in the companion module 'Thermodynamics and Atomic Physics'.
LO2	Identify and apply pertinent physics concepts, and appropriate mathematical techniques, to solve physics problems related to the content of the companion module 'Mechanics and Electromagnetism'.
LO3	Work in collaboration with a partner to observe and measure physical phenomena accurately, using appropriate instrumentation.
LO4	Record data, and the manner in which they are obtained, using a working laboratory notebook.
LO5	Interpret measurements in terms of their physical significance and the experimental or computational context in which they are obtained.

PH223: Observational Astronomy (Semester:4 Optional)

Module Details

Title Short:	Observational Astronomy APPROVED
Language of Instruction:	English

Module Code:	PH223

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	4 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This module provides a broad survey of how astronomers make observations of the universe. It addresses the telescopes, optical designs, instruments, detectors, observable quantities, natural limiting factors, and techniques of observational astronomy. It covers the full electromagnetic spectrum of wavelength regimes, from radio waves through to gamma rays, plus neutrino particles. It investigates what can we learn by observation in each of the main information domains – imaging (spatial), spectroscopy (energy), and time-resolved (temporal).

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	evaluate the suitability and limitations of different types and sizes of telescopes and instrumentation, in all wavelength domains, for a given observational goal.
LO7	interpret measurements in terms of their physical significance and the experimental or computational context in which they are obtained

PH329: Physics of the Environment II (Semester:6 Optional)

Module Details

Title Short:	Physics of the Environment II APPROVED
Language of Instruction:	English

Module Code:	PH329

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	18 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This course responds to the need to understand the physics behind environmental challenges such as fossil fuel combustion and its associated atmospheric pollution burden, renewable energy technology, nuclear power, nuclear accidents and radiation protection

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Define thermal comfort and describe the environmental parameters that are required as inputs for the Thermal Comfort Equation.
LO2	Explain the principles of operation of fossil fuel combustion facilities, and estimate the rate of CO2 production associated with given fossil fuel combustion scenarios.
LO3	Explain the principles of operation of various renewable energy technologies, such as wind turbines, wave generators and fuel cells.
LO4	Describe the nuclear fuel cycle, and the sequence of events that resulted in accidents at nuclear installations such as Chernobyl and Fukushima.
LO5	Recognise the location of legislative documentation on environmental and occupational radiation protection.

PH335: Nuclear & Particle Physics (Semester:6 Optional)

Module Details

Title Short:	Nuclear & Particle Physics APPROVED
Language of Instruction:	English

Module Code:	PH335

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	8 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	In this module students learn how subatomic particles form nuclei, study nuclear properties, and radioactive decay, and see how nuclear energy may be released in fission and fusion processes. Students also study fundamental particles, which are the building blocks of nature, and consider the ways in which these particles interact with each other. Prior knowledge is assumed to the level of material covered in PH2X3 Light, Atomic & Nuclear Physics and PH3X3 Quantum Physics.

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	work independently to set up experimental apparatus and evaluate its operation.
LO7	analyze data, interpret results and draw appropriate conclusions.
LO8	prepare formal scientific reports; present and defend scientific data and concepts orally.

PH337: Thermal Physics (Semester:6 Optional)

Module Details

Title Short:	Thermal Physics APPROVED
Language of Instruction:	English

Module Code:	PH337

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	8 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This module provides a comprehensive microscopic interpretation of the laws of thermodynamics based on statistical mechanics and probability theory. Some principles of quantum physics are included.

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	work independently to set up experimental apparatus and evaluate its operation.
LO7	analyze data, interpret results and draw appropriate conclusions.
LO8	prepare formal scientific reports; present and defend scientific data and concepts orally.

PH338: Properties of Materials (Semester:6 Optional)

Module Details

Title Short:	Properties of Materials APPROVED
Language of Instruction:	English

Module Code:	PH338

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:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This course provides a comprehensive introduction to the physics of materials. The mechanical, thermal, electronic, and optical properties of “hard” and “soft” condensed matter are introduced using concepts primarily based on classical physics with some quantum concepts where appropriate.

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	work independently to set up experimental apparatus and evaluate its operation.
LO7	analyze data, interpret results and draw appropriate conclusions.
LO8	prepare formal scientific reports; present and defend scientific data and concepts orally.

PH340: Biomedical Physics (Semester:6 Optional)

Module Details

Title Short:	Biomedical Physics APPROVED
Language of Instruction:	English

Module Code:	PH340

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	5 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This course is designed to demonstrate how imaging methods utilize physical principles to address problems in clinical diagnosis, patient management and biomedical research. This module also covers the physics of radiotherapy and future directions for imaging & therapy.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	identify the major medical imaging methods and methods used in biomedical research.
LO2	describe the physical processes underlying major medical imaging modalities.
LO3	understand the essential mathematical concepts of image formation and reconstruction.
LO4	describe methods for generating 2D and 3D medical images.
LO5	explain the properties of medical images.
LO6	describe a variety of applications of medical imaging techniques.
LO7	understand the role of physics in radiotherapy

PH362: Stellar Astrophysics (Semester:6 Optional)

Module Details

Title Short:	Stellar Astrophysics APPROVED
Language of Instruction:	English

Module Code:	PH362

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	10 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	A comprehensive model for stellar structure and evolution is developed and used to understand star formation, evolution and destruction and the properties of extrasolar planets.

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.

PH424: Electromagnetism and Special Relativity (Semester:7 Optional)

Module Details

Title Short:	Electromagnetism and Special Relativity APPROVED
Language of Instruction:	English

Module Code:	PH424

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	12 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This module will be an in-depth course on Electromagnetism and Relativity, building on previous courses, in particular PH2X1 Electricity, Magnetism & Circuits and PH2X3 Light, Atomic & Nuclear Physics. The course will include continuous assessment (MCQ), with short problems involving basic concepts. Students will also learn to solve advanced problems on both electromagnetism and relativity (homework assignments), featuring more advanced and lengthy problems from David Griffiths' book "Electrodynamics".

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.

PH425: Lasers and Spectroscopy (Semester:8 Optional)

Module Details

Title Short:	Lasers and Spectroscopy APPROVED
Language of Instruction:	English

Module Code:	PH425

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	11 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This module will provide students with an in-depth introduction to several aspects of Photonics. Particular emphasis will be placed on atomic spectroscopy and the interaction of radiation with atoms. The operation of lasers and conditioning of laser radiation will also be developed.

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.

PH429: Nanotechnology (Semester:8 Optional)

Module Details

Title Short:	Nanotechnology APPROVED
Language of Instruction:	English

Module Code:	PH429

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:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This course provides a comprehensive review of the electronic and optical properties of nanostructures. The course describes the physics of low-dimensional structures using concepts based on quantum mechanics. The course also provides a comprehensive review of the bottom-up and top-down processing techniques used to fabricate nanostructures.

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	discuss state-of-the-art applications of physical principles covered by this module's syllabus to contemporary themes in physics research and technology.

PH431: Medical Image Processing

Module Details

Title Short:	Medical Image Processing APPROVED
Language of Instruction:	English

Module Code:	PH431

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	6 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This module will provide students with an in-depth introduction to several aspects of modern Medical Image processing. It will cover modern 3D imaging modalities including Computed Tomography and Magnetic Resonance Imaging. The course will involve students carrying out sample image processing tasks on medical images using relevant software packages.

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	discuss state-of-the-art applications of physical principles covered by this module's syllabus to contemporary themes in biomedical physics and medical physics.

PH432: Project

Module Details

Title Short:	Project APPROVED
Module Code:	PH432
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 2
Module Delivered in	4 programme(s)
Module Owner:	RAY BUTLER
Module Discipline:	EP - Physics
Module Description:	In this module, a student is assigned a research project, and carries out supervised research in the assigned topic over Semester 2. Each student prepares a detailed report, and makes a short presentation, on their project work. The report and presentation should be at a level corresponding to the presentation and publication of results at a scientific conference.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	design and execute a scientific study to investigate a given hypothesis.
LO2	maintain a clear record of a scientific study in a well-kept notebook or portfolio.
LO3	analyse data, or evaluate simulations/models, using appropriate statistical and computational tools.
LO4	interpret scientific results and draw conclusions.
LO5	source relevant reference material and cite it in a manner that unambiguously acknowledges its origin.
LO6	produce scientific reports to a level equivalent to a scientific publication or a professional industrial report.
LO7	prepare and present a professional-level seminar to communicate results.

EOS222: Ancient Earth Environments (Semester:4 Group not available to select online)

Module Details

Title Short:	Ancient Earth Environments APPROVED
Language of Instruction:	English

Module Code:	EOS222

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	9 programme(s)

Module Owner:	SHANE TYRRELL

Module Discipline:	EOS - Earth & Ocean Sciences

Acknowledgment:	Instances: 2EH1; 2BS1, 2MR1, 2EV1, 1SWB1 Core for: 2EH1 Optional for: 2BS1, 2MR1, 2EV1, 1SWB1 Pre-requisites: EOS104 Co-requisites: EOS225 Timing and scheduling: 2 lectures per week for 12 weeks in SEM2 Number Limits (resource based): 90

Module Description:	This course will investigate the generation and behaviour of sediment on the earth's surface and how sedimentary rocks record information about changing environment over geological timescales. Students will learn about processes such as weathering, erosion and sediment transport and how to differentiate and classify sedimentary rocks. Different sedimentary environments, and associated sedimentary structures, will be investigated with reference to the geological history of Ireland.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the principles of stratigraphy
LO2	Discriminate and classify sedimentary rock types on the basis of grain size, texture and composition
LO3	Compare the transport of sand grains by wind and water
LO4	Describe how simple sedimentary structures form
LO5	Contrast shallow and deep marine sedimentation
LO6	Describe terrestrial depositional enviroments
LO7	Identify the key framework components in clastic sedimentary rocks
LO8	Discuss Irish geological history in terms of environmental change

EOS225: Optical Microscopy of Minerals and Rocks (Semester:4 Group not available to select online)

Module Details

Title Short:	Optical Microscopy of Minerals and Rocks APPROVED
Language of Instruction:	English

Module Code:	EOS225

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	9 programme(s)
Module Owner:	JAKE CIBOROWSKI
Module Discipline:	EOS - Earth & Ocean Sciences
Acknowledgment:	Instances: 2EH1; 2BS1, 2MR1, 2EV1, 1SWB1 Core for: 2EH1 Optional for: 2BS1, 2MR1, 2EV1, 1SWB1 Pre-requisites: EOS104 Co-requisites: EOS222. Timing and scheduling: 1 x 1 hour lecture per week for 12 weeks in SEM2 accompanied by 12 x 2 hour lab per week for 12 weeks in SEM2. Number Limits (resource based): 70
Module Description:	This module explains how minerals and rocks can be identified using the transmitted polarising light microscope. The optical classification of crystals is used to explore the optical properties that aid in the identification of the rock forming minerals in thin section e.g. refractive index, relief, pleochroism, interference colours and extinction. This is followed by introductory petrographic studies of typical mineral assemblages and textures in igneous, metamorphic and sedimentary rocks.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe how polarised light interacts with the crystal structure of rock forming minerals
LO2	Identify and record the optical properties: relief, pleochroism, interference colours and extinction
LO3	Demonstrate competency with the petrologic microscope
LO4	Distinguish between isotropism and anisotropism in minerals
LO5	Describe the optical classification of crystals.
LO6	Tabulate the optical properties of the main rock forming minerals
LO7	Recognise, record and illustrate typical textures in thin sections of igneous, metamorphic and sedimentary rocks
LO8	Deliver a cogent thin section description of common igneous, metamorphic and sedimentary rocks.
LO9	Identify the minerals observed in thin section to those observed in equivalent hand samples.

EOS303: Ocean Dynamics (Semester:6 Optional)

Module Details

Title Short:	Ocean Dynamics APPROVED
Language of Instruction:	English

Module Code:	EOS303

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:	MARTIN WHITE
Module Discipline:	EOS - Earth & Ocean Sciences
Acknowledgment:	Instances: 3EH2, 3MR3, 3BS9 Core for: 3MR Optional: 3EH, 3MR, 3BS Co req: Pre requisites: EOS229, EOS230 Timing: 6 week module, Sem 2, weeks 1-6 Limit: 70 (resource capacity)
Module Description:	This module introduces the basics of dynamical oceanography and the study of forces that control ocean processes and the resulting interaction with large scale bio-geochemical cycling. Students will learn how to assess what forces and interactions are important for a particular scenario relating to an ocean feature/process

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Explain how the forces that drive ocean circulation arise and interact.
LO2	Compare the importance of each force for a particular situation under consideration
LO3	Describe the processes underlying the wind and density driven circulation
LO4	Recognise the major differences between coastal and deep ocean dynamics
LO5	Describe the relationship between the ocean dynamics and biogeochemical processes
LO6	Interpret data collected from a case studies and explain results found

EOS304: Aquatic Geochemistry (Semester:6 Optional)

Module Details

Title Short:	Aquatic Geochemistry APPROVED
Language of Instruction:	English

Module Code:	EOS304

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	9 programme(s)

Module Owner:	PETER CROOT

Module Discipline:	EOS - Earth & Ocean Sciences

Module Description:	This course introduces students to the quantitative treatment of chemical processes in aquatic systems. It includes a brief review of chemical thermodynamics and photochemistry as it applies to natural waters. Specific topics covered include acid-base chemistry, precipitation-dissolution, coordination, and redox reactions. Emphasis is on equilibrium calculations as a tool for understanding the variables that govern the chemical composition of aquatic systems and the fate of pollutants.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	construct and balance chemical equations for reactions in aquatic systems
LO2	use thermodynamic data to calculate the solubility of minerals and construct stability diagrams
LO3	use geochemical analyses of rocks and waters to determine and quantify weathering reactions
LO4	describe the most important factors that control weathering rates
LO5	know the main chemical elements and compounds of river water and sea water and explain why
LO6	know the main chemical elements and compounds of river water and sea water and explain why
LO7	describe the behaviour of light in aquatic systems

MI203: Laboratory Skills in Microbiology II (Semester:4 Group not available to select online)

Module Details

Title Short:	Laboratory Skills in Microbiology II APPROVED
Module Code:	MI203
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	10 programme(s)
Module Owner:	CONOR O'BYRNE
Module Discipline:	MI - Microbiology
Module Description:	This module aims to further develop the basic laboratory techniques that students would need to study microorganisms in practice. Students will learn how to identify bacterial isolates using basic biochemical tests, to perform a genetic conjugation between two bacterial strains and how to perform an MIC test. The module will consist of 18 h of practical work, supplemented by 6 one-hour lectures that aim to provide students with a theoretical understanding of the methodologies being used.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Perform biochemical tests on isolated cultures to aid identification
LO2	Isolate and enumerate coliforms using membrane filtration
LO3	Set up a bacterial conjugation reaction
LO4	Enumerate coliforms using the Most Probable Number method
LO5	Establish the MIC of a bacterial culture in relation to an antibiotic
LO6	Determine whether plasmid DNA has been transferred in a conjugation reaction
LO7	Describe the metabolic reactions that underpin the use of biocehmical tests in microbiological identification tests
LO8	Discuss the processes involved in bacterial conjugation

MI204: Microbes and the Environment (Semester:4 Group not available to select online)

Module Details

Title Short:	Microbes and the Environment APPROVED
Module Code:	MI204
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	13 programme(s)
Module Owner:	CONOR O'BYRNE
Module Discipline:	MI - Microbiology
Module Description:	This module aims to give students an understanding of the key medical and environmental impacts of microorganisms. The unit will be delivered as a series of 24 lectures covering background on microbial classification, microbial genetics and metabolic diveristy, biogeochemical cycling, waste treatement systems, the role of microbes and viruses in human and animal diseases. The role of the host immune system and commensal microflora in protecting against infection will also be covered.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Identify the main domain of life on a phylogetic tree based on ribosomal RNA sequences.
LO2	Describe the main systems used to classify microorganisms
LO3	Differentiate between the main metabolic strategies used by microorganisms in the biosphere
LO4	describe the harnessing of microbial metabolisms for environmental biotechnologies, 5. discuss linking ecology (identity) & physiology (activity) using labelled substrates;
LO5	Discuss the different microbe-based strategies used for waste management and biofuel production
LO6	Describe the basic elements of the human immune system
LO7	Describe the role of specific microbes in human an animal diseases
LO8	Describe the life cycle of a typical animal virus

MI322: Environmental Microbiology (Semester:6 Optional)

Module Details

Title Short:	Environmental Microbiology APPROVED
Language of Instruction:	English

Module Code:	MI322

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	9 programme(s)

Module Owner:	GAVIN COLLINS

Module Discipline:	MI - Microbiology

Module Description:	This module aims to provide an understanding of the phylogenetic, and metabolic diversity, as well as the energy conservation strategies and metabolic flexibility, of microorganisms in the Environment. Students will contextualise this in terms of the major biogeochemical cycles in Nature, as well as the industrial exploitation of element cycling for waste treatment and other aspects of environmental management. Students will consider how molecular microbial ecology is applied to understand metabolic interactions between microbes in the environment. It will comprise 18 h of lectures (combining traditional lectures, tutorials & Twitter sessions). It will also include 6 h of practical sessions focused on detecting microbes in environmental samples.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	explain the basis for microbial energy conservation and metabolic diversity
LO2	identify microbial roles in productivity and degradation;
LO3	explain the roles microbes play in carbon and nitrogen cycling;
LO4	describe the harnessing of microbial metabolisms for environmental biotechnologies, 5. discuss linking ecology (identity) & physiology (activity) using labelled substrates;
LO5	critically discuss '[eco]systems [micro]biology' based on combining 'omics.

MI324: Immunology and Recombinant Techniques (Semester:6 Optional)

Module Details

Title Short:	Immunology and Recombinant Techniques APPROVED
Module Code:	MI324
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	12 programme(s)
Module Owner:	GERARD WALL
Module Discipline:	MI - Microbiology
Module Description:	To describe the principles and mechanisms of prokaryotic genetic engineering and its impact on modern molecular biotechnology. To provide an overview of the use of molecular prokaryotic biotechnology to engineer cell factories for the production of recombinant biomolecules. To provide detailed information on the fundamentals of the immune system and its response to microbial infection.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the most common techniques that underpin recombinant DNA technology and genomics.
LO2	Discuss and detail DNA technologies for the production of genetically modified (micro-)organisms and recombinant proteins of industrial importance.
LO3	Outline in detail the components and reactions of the innate and adaptive immune systems.
LO4	Discuss the importance of host surveillance/pathogen recognition and the basis of immune memory.
LO5	Detail applications of recombinant DNA technologies in immunomodulation and biotechnology.

MI325: Microbial Infectious Diseases (Semester:6 Optional)

Module Details

Title Short:	Microbial Infectious Diseases APPROVED
Language of Instruction:	English

Module Code:	MI325

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:	JAMES P O'GARA

Module Discipline:	MI - Microbiology

Module Description:	This module will introduce how bacterial and viral pathogens cause disease. Important virulence mechanisms in representative pathogens will be discussed. The clinical implications of microbial infections will be addressed. Host responses to infection, immunization, vaccines, antibiotics and antibiotic resistance will be described.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Define the terms virulence and pathogenesis in microbial pathogens.
LO2	Describe, with examples, the key virulence mechanisms used by microbial and viral pathogens.
LO3	Describe the major classes of antibiotics
LO4	Describe the general mechanisms of antibiotic resistance found in bacteria
LO5	Discuss the immune response to microbial pathogens.
LO6	Discuss the role of vaccine in preventing infectious diseases.

MP232: Mathematical Methods II (Semester:4 Group not available to select online)

Module Details

Title Short:	Mathematical Methods II APPROVED
Language of Instruction:	English

Module Code:	MP232

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	17 programme(s)

Module Owner:	MARTIN MEERE

Module Discipline:	AM - Applied Mathematics

Module Description:	This is a mathematical methods course that considers the following topics: Laplace transforms, vector calculus, multiple integration and integral theorems.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	calculate the Laplace transforms of some elementary functions;
LO2	calculate the inverse Laplace transform of some elementary functions using standard techniques;
LO3	solve various initial value problems for ordinary differential equations using Laplace transforms;
LO4	calculate the gradient and directional derivative of a scalar field and be able to interpret these quantities;
LO5	calculate the divergence and curl of a vector field and be able to interpret these quantities;
LO6	find the normal of a surface, find the tangent plane to a surface, and calculate surface integrals;
LO7	calculate volume integrals and be able to verify the divergence theorem for elementary volumes and vector fields.

MP237: Mechanics II (Semester:4 Group not available to select online)

Module Details

Title Short:	Mechanics II APPROVED
Language of Instruction:	English

Module Code:	MP237

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	14 programme(s)

Module Owner:	MARTIN MEERE

Module Discipline:	AM - Applied Mathematics

Module Description:	This course consists principally of an introduction to the theory and applications of partial differential equations. Topics covered include the heat equation, the wave equation, Laplace's equation, and a brief introduction to the special theory of relativity.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	formulate a well-posed problem for the heat equation;
LO2	solve some initial boundary value problems for the heat equation using the method of separation of variables;
LO3	find the general solution to the one-dimensional wave equation using characteristic variables;
LO4	construct solutions to the one-dimensional wave equation on an infinite and semi-infinite domain using characteristic variables;
LO5	construct separable variable solutions to the wave equation;
LO6	construct separable variable solutions to Laplace's equation;
LO7	state Einstein's two postulates of special relativity;
LO8	perform simple calculations in special relativity involving time dilation, length contraction, velocity transformations, energy and momentum.

MP307: Modelling II
(Semester:6 Optional)

Module Details

Title Short:	Modelling II APPROVED
Module Code:	MP307
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	20 programme(s)
Module Owner:	PETRI TOMAS PIIROINEN
Module Discipline:	AM - Applied Mathematics
Module Description:	This course introduces the student to modelling techniques for three different real-world problem areas. The problems cover the topics queueing theory, population dynamics and control theory.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Set up and solve basic queueing theory problems.
LO2	Set up and solve basic population dynamics problems.
LO3	Set up and solve basic control theory problems.
LO4	Be able to use the software MAPLE to analyse problems from queueing theory and population dynamics.

MP346: Mathematical Methods II (Semester:6 Optional)

Module Details

Title Short:	Mathematical Methods II APPROVED
Language of Instruction:	English

Module Code:	MP346

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	17 programme(s)

Module Owner:	MARTIN MEERE

Module Discipline:	AM - Applied Mathematics

Module Description:	This is a mathematical methods course, and amongst the topics considered are the heat equation, Laplace's equation, Sturm-Liouville theory, the Fourier transform, and the numerical solution of partial differential equations using finite difference techniques.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Solve the 1-dimensional heat equation subject to different boundary conditions and initial conditions
LO2	Prove orthogonality of eigensolutions and reality of eigenvalues of a Sturm-Liouville system
LO3	Calculate eigenvalues and construct corresponding eigenfunctions for some simple Sturm-Liouville problems
LO4	Solve the 2-dimensional Laplace equation subject to different boundary conditions in a rectangular or a rotationally symmetric region
LO5	Solve the 1-dimensional heat equation on an infinite region by use of the Fourier transform
LO6	Solve the 1-d heat equation numerically by use of the finite difference method

MP365: Fluid Mechanics (Semester:6 Optional)

Module Details

Title Short:	Fluid Mechanics APPROVED
Language of Instruction:	English

Module Code:	MP365

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	12 programme(s)

Module Owner:	MICHEL DESTRADE

Module Discipline:	AM - Applied Mathematics

Module Description:	(This course will be run every other year.) This course consists of an introduction to the theory of fluid mechanics. Topics covered include: a review of vector calculus and differential operators, ideal fluids, Bernoulli's equation, irrotational flow, stream functions, potential theory, the Navier-Stokes equations, elementary viscous flow with examples, very viscous flows.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	become familiar with vector calculus, index notation, differential operators;
LO2	mathematically model the behaviour of an ideal fluid;
LO3	superpose elementary stream solutions to construct the solution of a flow past an obstacle;
LO4	understand the assumptions made in deriving the Navier-Stokes equations for fluid motion;
LO5	construct some analytical solutions for some elementary viscous fluid flows.

MP403: Cosmology And General Relativity (Semester:8 Optional)

Module Details

Title Short:	Cosmology And General Relativity APPROVED				
Module Code:	MP403				
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	12 programme(s)				
Module Owner:	MICHAEL TUITE				
Module Discipline:	AM - Applied Mathematics				
Module Level:	Honours				
Module Description:	In the study of cosmology where gravitation is the dominant force over the large scales considered, general relativity is the basic component. This course introduces general relativity. Topics covered include geometry, geodesics, black holes, different model universes and cosmogony.				

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Find the Gaussian curvature of a 2-dimensional space;
LO2	Use the Euler-Lagrange equations to find the geodesics of a space-time;
LO3	Derive of the Schwarzschild solution of Einstein's field equations using physical arguments;
LO4	Find the event horizon of a spherically symmetric black hole;
LO5	Use the concepts of general relativity to derive the Robertson-Walker line element;
LO6	Use dimensional analysis to derive the Friedmann equation;
LO7	Classify the solutions of the Friedman equation and the model universes they describe.

MP491: Non Linear Systems (Semester:6 Optional)

Module Details

Title Short:	Non Linear Systems APPROVED
Module Code:	MP491
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	19 programme(s)
Module Owner:	PETRI TOMAS PIIROINEN
Module Discipline:	AM - Applied Mathematics
Module Level:	Honours
Module Description:	This course is an introductuion to the analysis of systems of nonlinear Ordinary Differential Equations (ODEs) and Maps.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Locate and calculate the stability for equilibria in 1-dim ODEs;
LO2	Locate and classify bifurcations for equilibria in 1-dim ODEs;
LO3	Locate, classify and calculate the stability for equilibria in linear 2-dim systems of ODEs;
LO4	Sketch phase-plane portraits about equilibria in linear 2-dim systems of ODEs;
LO5	Locate equilibria in nonlinear 2-dim systems of ODEs;
LO6	Linearise nonlinear 2-dim systems of ODEs, calculate the linear stability of equilibria and classify equilibria;
LO7	Sketch phase-plane portraits of nonlinear 2-dim systems of ODEs using iso-curves;
LO8	Analyse 2-dim Hamiltonian systems and sketch their phase-plane portraits;
LO9	Locate and classify Hopf bifurcations in nonlinear 2-dim systems of ODEs, and determine the stability of the corresponding limit cycles;
LO10	Locate and calculate the stability for fixed points and periodic orbits in 1-dim nonlinear maps;
LO11	Locate bifurcations in 1-dim nonlinear maps;
LO12	Describe period-doubling cascades to chaos in 1-dim nonlinear maps.

PAB2101: AgriBiosciences (Semester:4 Group not available to select online)

Module Details

Title Short:	AgriBiosciences APPROVED
Language of Instruction:	English

Module Code:	PAB2101

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	6 programme(s)

Module Owner:	SARA FARRONA

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	Since the origin of agriculture ten thousand years ago, innovations in genetics and agricultural (plant & livestock) biosciences have continued to play a critical role in ensuring future food security and sustainable development on our planet. This module provides cutting-edge training in agricultural biosciences (plants, animals), using case studies of major scientific advances and bio-challenges.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand the genetic and biological origins of agriculture, domestication and human civilisation
LO2	Describe and appreciate how conventional and molecular genetics plays a role in provision of food, fibre, feed, fuel and other bio-derived resources supporting humanity
LO3	Understand at the molecular level the types of genetic variation and biochemical processes that artificial selection and breeding processes act on for improvement of crops and livestock
LO4	Understand how crop and livestock improvement is conducted and the role that current advances in genetics, biochemistry and biosciences are playing in developing improved varieties, breeds and genotypes.
LO5	Describe and critically evaluate the major challenges for sustainable agricultural intensification over the decades ahead to meet growing demand.

PAB3103: Plant and Agricultural Genetics (Semester:6 Optional)

Module Details

Title Short:	Plant and Agricultural Genetics APPROVED
Language of Instruction:	English

Module Code:	PAB3103

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	5 programme(s)

Module Owner:	SARA FARRONA

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module provides training in fundamental and applied genetics in relation to plants (crops) and animals (livestock), including molecular agricultural biotechnologies. Conventional, molecular, population and quantitative genetics aspects will be covered, including the latest advances in genetics, genomics, genetic modifications and applied systems biology as applied to crops and livestock.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand the role that agricultural plant and animal research has played and continues to play in the emergence of our current level of understanding of genetics
LO2	Describe and discuss different genetic techniques and approaches for the improvement of crops and livestock
LO3	Critically appraise the contribution that genetics has made to agricultural productivity compared to other innovations
LO4	Use scientific evidence to appraise benefits or risks associated with new varieties (genotypes) of crops or livestock
LO5	Understand the distinctions, relationships and synergies between different branches of genetics (e.g. mendelian, population, quantitative, epigenetics etc)
LO6	Developed their abilities to read, interpret, appraise and present the results in genetics research papers from leading-edge scientific journals.
LO7	Have gained an understanding of multiple traits of relevance to agriculture that have been improved through past and current advances in genetics.
LO8	Be proficient in science communication, and understand how policy and media interfaces with the field of plant and livestock genetics

PAB3104: Systems Biology of Plant-Environment Interactions (Semester:6 Optional)

Module Details

Title Short:	Systems Biology of Plant-Environment Interactions APPROVED
Language of Instruction:	English

Module Code:	PAB3104

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	4 programme(s)

Module Owner:	RONAN SULPICE

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module examines plant growth, development and interactions with the biotic and abiotic environment in a holistic manner taking into account regulation at the levels of gene expression, enzyme activities, and the role of specific metabolites. The course is taught through lectures and practicals enabling students to appreciate how plants can adapt in various environments.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Develop an appreciation of how plant systems biology research is designed, performed and presented
LO2	Outline the mechanisms of cellular development at meristems and vascular tissue
LO3	Discuss the importance of interactions with the environment that control plant growth and flowering time
LO4	Critique the importance of secondary metabolites for interactions between plants and their environment
LO5	Explain how and why plants can sense changes in their nutrient status and adjust their growth and metabolism over different time-scales accordingly
LO6	Describe the role of the circadian clock in plant metabolism

PAB4104: Plant and Agri-Biotechnologies (Semester:8 Optional)

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	4 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.

SI208: Cardiovascular Physiology (Semester:4 Group not available to select online)

Module Details

Title Short:	Cardiovascular Physiology APPROVED
Language of Instruction:	English

Module Code:	SI208

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	4 programme(s)

Module Owner:	KARL MCCULLAGH

Module Discipline:	SI - Physiology

Module Description:	The course develops fundemental understanding of human cardiovascular function. The heart and blood vessels are described and their function discussed. The principles of the circulatory system are detailed, as well as some of the control mechanisms in health and disease.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the structure and function of the components of the systemic circulation.
LO2	Describe the structure and function of the components of the systemic circulation.
LO3	Describe the mechanism involved in blood flow management and blood pressure control.
LO4	Perform and interpret key practical experiments to generate evidence relating to the cardiovascular

SI212: Respiratory Physiology (Semester:4 Group not available to select online)

Module Details

Title Short:	Respiratory Physiology APPROVED
Module Code:	SI212
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	5 programme(s)
Module Owner:	AILISH HYNES
Module Discipline:	SI - Physiology
Module Description:	The course develops fundemental understanding of human respiratory physiology. The lung organs are described and their function discussed respectively. The principles of the respiratory system are detailed, as well as some of the control mechanisms in health and disease.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the structure of the human lung system, and explain how oxygen and carbon dioxide are exchanges within the alveoli and transported in the blood.
LO2	Understand the key mechanisms involved in regulation of some of the above processes
LO3	Perform and interpret key practical experiments to generate evidence relating to the respiratory system and renal system.

SI328: Exercise Physiology (Semester:6 Optional)

Module Details

Title Short:	Exercise Physiology APPROVED
Module Code:	SI328
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:	BRENDAN HIGGINS
Module Discipline:	SI - Physiology
Module Description:	The Exercise Physiology module provides knowledge on the key cardiovascular, respiratory, and muscular systems responses to acute and chronic exercise. Students will appreciate the key changes that occur in the various physiological systems at rest and during exercise. The module will also investigate the measurement techniques used to assess the physiological and metabolic responses to exercise.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe acute and chronic responses of respiratory and cardiovascular systems to exercise
LO2	Describe neuromuscular responses to exercise and the interaction between the muscular & nervous systems
LO3	Explain the contribution of the neuroendocrine system during exercise
LO4	Describe metabolism and energy expenditure during exercise
LO5	Describe the principle of how training improves health & sport performance
LO6	Demonstrate problem solving skills and assessment of biomedical data
LO7	Demonstrate skills and tools necessary to promote life-long learning

SI331: Renal Physiology (Semester:6 Optional)

Module Details

Title Short:	Renal Physiology APPROVED
Module Code:	SI331
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	5 programme(s)
Module Owner:	LEO QUINLAN
Module Discipline:	SI - Physiology
Module Description:	The Renal Physiology module will provide students with a knowledge of the normal physiology of the mammalian renal system. Topics covered will include nephron organisation, clearance, filtration, reabsorption, secretion, salt, water and acid base balance and micturitation. Theoretical learning and understanding of will be aided by laboratory practicals investigating the physiology of osmoregulation and clearance

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	The Renal Physiology module will provide students with a knowledge of the normal physiology of the mammalian renal system. Topics covered will include nephron organisation, clearance, filtration, reabsorption, secretion, salt, water and acid base balance and micturitation. Theoretical learning and understanding of will be aided by laboratory practicals investigating the physiology of osmoregulation and clearance
LO2	Describe and explain in detail the processess behind the control of filtration
LO3	Explain the physiological processes underlying salt, water and acid base balance.
LO4	Integrate knowledge of the renal function so as to understand symptoms associated with pathophysiology of renal disease
LO5	Appreciate the integrative nature of the renal systems particularly in relation to fluid balance and blood pressure.
LO6	Competence in the practical assessment of the physiology of the renal system
LO7	Integrate practical information with theoretical knowledge

ZO318: Geographic Information Systems and Biostatistics (Semester:6 Optional)

Module Details

Title Short:	Geographic Information Systems and Biostatistics APPROVED
Module Code:	ZO318
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	12 programme(s)
Module Owner:	MARK PETER JOHNSON
Module Discipline:	ZO - Zoology
Module Description:	This module is focused on using data analysis to understand the environment. It includes an introduction to statistical analyses using examples from field ecology. There is also an introduction to mapping ecological data using geographic information systems (GIS).

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate an understanding of the different types of data used in ecology and geographic analyses
LO2	Explore data using descriptive statistics and apply inferential statistics
LO3	Understand the role of statistics in planning, validating and communicating the findings of ecological research
LO4	Describe different habitat classification schemes in use
LO5	Be able to create, edit and analyse spatial data using geographic information systems
LO6	Produce maps for visualisation and interpretation of ecological data