AN2101: Cells and Tissues (Semester:3 Group not available to select online)

Module Details

Title Short:	Cells and Tissues APPROVED
Language of Instruction:	English

Module Code:	AN2101

ECTS Credits:	10

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	2 programme(s)

Module Owner:	HELEN DODSON

Module Discipline:	AN - Anatomy

Module Description:	This module describes the basic organisation and function of a eukaryotic cell and its major organelles. Communication and signalling between cells will be covered, as well as the cell cytoskeleton, cell cycle, cell differentiation and cell death. The module will also explore the histological structure and functional relationships of the fundamental tissues, including the microvascular system. There is a strong emphasis on the common principles of tissue architecture that underly the structure of the fundamental tissues. How these common principles are modified to provide unique tissue specific structures and functions is also emphasized. Tissue turnover and dynamics are also considered, especially in the context of the response to injury and cancer development. The role of stem cells in tissue maintenance and the potential for tissue engineering in vitro are also addressed. The lectures are complemented by practicals using virtual microscopy in which the student will learn to recognize and classify all of the fundamental tissues and their cellular and non-cellular components.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Synthesize, integrate and critically assess the factual content of the module.
LO2	Describe the basic organisation of a eukaryotic cell including the organelles and cytoskeleton. Describe the cell cycle and cell death and appreciate how changes in normal cellular activities can lead to cancer development and progression.
LO3	Describe the ways in which cells interact with one another to form tissues and organs and how they interact with their surrounding environment.
LO4	For each of the fundamental tissues you will: a. Describe the types of cells and extracellular matrix that make up the tissue b. Explain how different types of the tissue are classified and the basis of this classification c. List and describe any special features of the cells which make up the tissue and relate this to overall tissue function d. Where relevant, describe the tissue dynamics of growth and repair
LO5	Explain turnover and tissue dynamics in respect of each of the fundamental tissues a. Compare and contrast these factors between different tissues b. Explain the role of stem cells in each of the above processes c. Relate these concepts to tissue healing and the development of cancer

AN230: Human Body Structure

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	15 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

BI208: Protein Structure and Function (Semester:3 Group not available to select online)

Module Details

Title Short:	Protein Structure and Function APPROVED
Module Code:	BI208
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	11 programme(s)
Module Owner:	MARIA TUOHY
Module Discipline:	BI - Biochemistry
Module Description:	This course will provide a comprehensive understanding of the fundamental concepts of the biochemistry of proteins and their vital role as the molecular tools of living cells. Using examples, the relationship between structure on biochemical function will be discussed. Students will be introduced to the essential role of Enzymes as biocatalyts in living cells. The practical course will introduce students to the main concepts and methodologies for biomolecule measurement in biochemistry.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe fully the general molecular structure and function of proteins
LO2	Demonstrate the role of enzymes as nature's own biocatalysis at the molecular level from studies of kinetics and molecular structure
LO3	Develop an understanding of the main experimental approaches and concepts for biomolecule analysis
LO4	Manipulate biochemical reagents and perform biochemical assays
LO5	Perform core techniques for measuring properties and quantities of the four main classes of biomolecules, including proteins
LO6	Demonstrate an ability to present and interpret scientific results
LO7	Draw scientifically grounded conclusions from observations and explain these in writing
LO8	Explain the main units of biochemical measurements and perform the basic calculations used in biochemistry

BI318: Human Nutrition (Semester:5 Optional)

Module Details

Title Short:	Human Nutrition APPROVED
Module Code:	BI318
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	6 programme(s)
Module Owner:	GERALDINE NOLAN
Module Discipline:	BI - Biochemistry
Module Description:	The Human Nutrition module covers a) Basic principles of healthy eating, historical aspects of the Irish Diet, aspects of food safety, food technology, food labelling. b)The relationship between diet and disease - heart disease, diabetes, obesity, eating disorders. c)Specific nutritional needs of different population subgroups - infants, children,teenagers, older people, ethnic groups, and sports people. d) Clinical nutrition includes enteral and parenteral nutrition e) Food Policy

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Demonstrate knowledge of the basic nutrients in food
LO2	Describe the relationship between diet and both prevention and treatment of disease
LO3	Explain the special nutritional needs of different population subgroups
LO4	Explain the importance of nutrition in a clinical setting
LO5	Describe nutrition poilicy both in Ireland and Internationally

BI319: Molecular Biology (Semester:5 Optional)

Module Details

Title Short:	Molecular Biology APPROVED
Module Code:	BI319
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	10 programme(s)
Module Owner:	PETER CREIGHTON
Module Discipline:	BI - Biochemistry
Module Description:	This course will provide students with an understanding of the eukaryotic cell cycle and DNA replication, the genomes of eukaryotic cells, regulation of eukrayotic gene expression, and viruses. Practical aspects of the course will give experience of key techniques used in molecular biology.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the eukaryotic cell cycle and DNA replication.
LO2	Explain cellular genomes and their organisation.
LO3	Elucidate how genes expression is regulated.
LO4	Describe the nature and replication of viruses.
LO5	Perform key techniques in molecular biology including polymerase chain reaction, plasmid preparation, restriction enzyme digest and agarose gel electrophoresis.
LO6	Demonstrate an ability to present and interpret scientific results
LO7	Draw scientifically grounded conclusions from observations and explain these in writing
LO8	Describe the main units used and perform basic calculations in molecular biology.

BO201: Molecular and Cellular Biology (Semester:3 Group not available to select online)

Module Details

Title Short:	Molecular and Cellular Biology APPROVED
Module Code:	BO201
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	15 programme(s)
Module Owner:	MARIA TUOHY
Module Discipline:	BI - Biochemistry
Module Description:	This course aims to provide students with the key molecular concepts of the biology of living cells. The basic structure and organisation of prokaryotic and eukaryotic cells will be described, with an emphasis on understanding the similarities and differences between cells from these main domains of life. The composition, structure and importance of the four major groups of biomolecules will be reviewed. Fundamental topics on genomes and genome organization will also be covered.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the main structural and organizational similarities and differences between Prokaryotic and Eukaryotic cells
LO2	Discuss the key features of different types of Eukaryotic cells, e.g. fungal, plant and animal cells
LO3	Identify the functions of the major subcellular structures and organelles
LO4	Describe the role of water and the importance of pH in living cells
LO5	Explain the basic chemical bonds and interactions that underpin the chemistry of biologically important reactions
LO6	Detail the general molecular structure and (bio)chemical features of the main biomolecules in living cells and explain their cellular functions
LO7	Compare and contrast genome structure and organization in prokaryotes and eukaryotes

BPS202: Fundamentals in Aquatic Plant Science (Semester:3 Optional)

Module Details

Title Short:	Fundamentals in Aquatic Plant Science APPROVED
Language of Instruction:	English

Module Code:	BPS202

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:	DAGMAR BRIGITTE STENGEL

Module Discipline:	BT - Botany

Module Description:	This module will introduce key aspects of the biology of aquatic photosynthetic organisms including seaweeds, microalgae and aquatic plants. In particular it explores the aquatic environments including lakes and marine systems as habitats for aquatic plant and algal growth and provides fundamentals of algal diversity, functionality and ecology, and plant/algal environment interactions.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe and characterise environments (terrestrial, freshwater, marine) suitable for algal growth, with particular detail on growth requirements and controlling factors regarding seaweeds and phytoplankton
LO2	Provide an overview of different algal reproductive strategies and life cycles
LO3	Outline and appreciate the importance of different algal groups (including both microalgae and macroalgae) in ecology and their applications in biotechnology
LO4	Appreciate the diversity of different algal groups, their distinguishing biological features including morphological growth forms
LO5	Identify common representatives of native Irish algal groups
LO6	Describe and appreciate the different interactions between algae and their abiotic (physical, chemical) and biotic (living) environments

BPS3102: Plant Resources and Ecosystems (Semester:6 Optional)

Module Details

Title Short:	Plant Resources and Ecosystems APPROVED
Language of Instruction:	English

Module Code:	BPS3102

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:	DAGMAR BRIGITTE STENGEL

Module Discipline:	BT - Botany

Module Description:	As primary producers, plants (and algae) are essential components of all global ecosystems. Throughout the world, there is a wide range ecosystems, providing the habitats for plant life on earth and the associated ecosystem services they provide. In this module, we will provide and introduction to the different global biomes, and what drives their distribution. We will also focus on the main habitat types in Ireland, and discuss their status and ecology. This module explores the key features of global biomes in marine, aquatic and terrestrial systems, and the ecology of the plant communities (and resources) within these. Specifically it addresses key components of rocky shore ecology, distribution, mapping and sustainable utilisation of seaweed bioresources. It further covers important global ecosystems, and in particular the ecology of Irish natural habitats such as grassland, woodlands, bogs, hedgerows etc.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the main terrestrial habitat types in Ireland and discuss their current status
LO2	Understand global terrestrial biomes and ecosystems, and their distribution
LO3	Be familiar with features of seaweeds on rocky shore ecology and zonation patterns and factors driving temporal and spatial variability
LO4	Give an overview of the ecology of important local Irish and global seaweed habitats
LO5	Give an overview of important marine/coastal vascular plant communities (seagrasses, saltmarshes)
LO6	Appreciate the processes and methods involved in the assessment of algal bioresources for sustainable utilisation

BPS3103: Plant Function (Semester:5 Optional)

Module Details

Title Short:	Plant Function APPROVED
Language of Instruction:	English

Module Code:	BPS3103

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:	ZOE ADELAIDE POPPER

Module Discipline:	BT - Botany

Module Level:	Pass

Module Description:	This module will explore the physiology and biochemistry of plants and algae. It will investigate: (1) plant and algal biochemistry and metabolism specifically focusing on carbon-fixation as well as the synthesis of primary and secondary metabolites, allelopathy and plant defence, and (2) plant and algal growth and development in which the role of hormones in fundamental processes including flowering, germination, expansive cell growth and the responses of plants to light and gravity will be explored. It will also investigate the role of aspects of plant function in conservation and its biotechnological applications.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Appreciate how plant and algal function is modified in response to the environment
LO2	Understand the role of secondary metabolites in plants and evaluate how they are used by humans
LO3	Describe the role of the five classical plant hormones (auxins, cytokinins, ethylene, abscisic acid, and gibberellins) in plant growth and development
LO4	Discuss how plant metabolic processes may be harnessed for conservation and biotechnology
LO5	Describe carbon acquisition by plants and algae

CH203: Physical Chemistry (Semester:3 Group not available to select online)

Module Details

Title Short:	Physical Chemistry APPROVED
Language of Instruction:	English

Module Code:	CH203

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:	HENRY CURRAN

Module Discipline:	CH - Chemistry

Module Description:	This course comprises lectures and tutorials and a practical component, expanding upon the fundamentals of chemistry covered in year 1. The course provides an introduction to the physical principles that underlie chemistry with a focus on the properties of gaseous matter, laws of thermodynamics, chemical equilibrium and kinetics and introduction to spectroscopy

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Discuss a range of models for predicting the behaviour of gases, and understand how and why real gas behaviour can deviate from such models
LO2	Understand how the laws of thermodynamics (0-3) can be used to describe the direction of spontaneous change for chemical processes, with emphasis on how enthalpy and entropy changes contribute to changes in Gibbs energy and understand and use calorimetry and bond energy data to estimate enthalpies of reactions
LO3	Describe how vibrational and electronic spectroscopic transitions arise and how to relate the amount of radiation absorbed during a transition to concentration
LO4	Derive rate laws and equations, and evaluate rate constants for simple chemical process, and understand how this relates to reaction mechanism
LO5	Describe the migration of ions, understand its importance in how electrolytes conduct electricity
LO6	Discuss the factors that affect the cell potential, understand how it relates to Gibbs energy changes and how electrical potential differences indicate capacity to generate electricity or how electricity can drive chemical change
LO7	Describe how the equilibrium constant is related to changes in Gibbs energy, and how it is affected by temperature, pressure and composition of gaseous species
LO8	Demonstrate competence and work safetly in practical aspects of physical chemistry which is related to the theory components of the course

CH204: Inorganic Chemistry (Semester:3 Group not available to select online)

Module Details

Title Short:	Inorganic Chemistry APPROVED
Language of Instruction:	English

Module Code:	CH204

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:	ANDREA ERXLEBEN

Module Discipline:	CH - Chemistry

Module Description:	This course comprises lectures and practicals, and expands upon the fundamentals of inorganic chemistry covered in year 1. Topics include molecular structure & bonding, ionic and metal lattices, co-ordination chemistry and properties and reactions of the main group elements.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	apply VB and MO theories to describe bonding in diatomic molecules and to predict bond orders and magnetic properties of diatomic molecules.
LO2	apply valence-shell electron-pair repulsion theory to derive the geometry of molecules.
LO3	describe common types of packing in metal lattices (cubic and hexagonal close-packing, simple cubic, body-centred cubic) and the most important ionic lattices.
LO4	apply the Born-Haber cycle to calculate lattice energies, ΔfH°, ΔaH°, dissociation energies, ionization energies or electron affinities.
LO5	give valence shell electron configurations for coordination compounds of the transition metals and their ions
LO6	draw molecular structures for common ligands and the coordination compounds they form with the transition metals, to include isomers
LO7	use crystal field theory to explain the origin of colour and magnetism in transition metal compounds and to account for measured magnetic moments and maximal wavelengths of absorption & discuss the physical and chemical properties of selected main group elements.
LO8	Demonstrate competence in an inorganic chemistry laboratory and work safely in such an environment

CH311: Organic Chemistry (Semester:5 Optional)

Module Details

Title Short:	Organic Chemistry APPROVED
Language of Instruction:	English

Module Code:	CH311

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:	FAWAZ ALDABBAGH
Module Discipline:	CH - Chemistry
Acknowledgment:	This is an update to CH311 where the continuous assessment component (formerly 10%) is now removed.
Module Description:	This course comprises lectures and tutorials, and expands upon the fundamentals of organic chemistry covered in years 1 and 2. Heterocyclic chemistry, chemistry of biomolecules, structure and reactivity, determination of reaction mechanism, retrosynthesis and stereochemistry are introduced and studied in detail. The course emphasizes chemistry of relevance to modern industry, including the (bio)pharmaceutical industry.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand the structure, bonding and the influence of the heteroatom(s) of pyridine, pyrrole, indole, thiophene, furan, diazoles, triazoles and tetrazoles, and the affect on reactivity.
LO2	Write reaction schemes and give curly arrow mechanisms for aromatic substitutions on the above heterocycles, as well as Diels-Alder and 1,3-dipolar cycloaddition reactions.
LO3	Understand the chemistry of peptide synthesis
LO4	Understand how organic structure and reactivity are related quantitatively & approaches to determining organic reaction mechanism
LO5	Use a retrosynthetic approach to design a multistep synthesis for a carbon based molecule
LO6	Apply basic stereochemical principles to the structure and reactions of carbon based molecules
LO7	Demonstrate knowledge of the structure and function of biomolecules
LO8	Demonstrate an understanding of protein structure in the context of the properties of amino acid residues, the peptide backbone and environmental factors

CH326: Analytical Chemistry & Molecular Structure (Semester:5 Optional)

Module Details

Title Short:	Analytical Chemistry & Molecular Structure APPROVED
Language of Instruction:	English

Module Code:	CH326

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	7 programme(s)

Module Owner:	NIALL GERAGHTY

Module Discipline:	CH - Chemistry

Module Description:	A variety of analytical techniques and their application will be covered. Also included will be methods (e.g. NMR, IR, MS, X-ray crystallography) which are used in structure determination of chemical compounds. This is a theory based module. A practical component related to this module will run parallel with this course (Experimental Chemistry I).

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand the basic principles and main components of important surface analytical techniques such as SEM-EDX, SIMS and XPS and be able to interpret the chemical and structural data obtained using these techniques.
LO2	Understand the basic concepts of crystallography such as crystal systems and Bravis lattices and have the ability to index simple X-ray powder diffraction patterns and to calculate unit cell parameters and densities from X-ray powder data.
LO3	Relate their knowledge of the theory and instrumentation of gas-liquid chromatography to the design of a variety of seprations.
LO4	Explain the theory of X-ray Fluorescence spectroscopy and the origin of the spectral lines.
LO5	Describe the basic experimental and theoretical issues involved in obtaining an NMR spectrum and to deduce the structure of a molecule on the basis of information obtained from its 1H- and 13C- NMR spectra.
LO6	Understand the theoretical principles, instrumentation, operation and data interpretation of thermogravimetry and differerential scanning calorimetry. They will also understand the theoretical principles and applications of gas sensors based on electrochemical and combustion methods.
LO7	Explain the machinery and chemical basis behind mass spectrometry including ion generation, separation, detection and the fragmentation mechanisms and be able to apply mass spectra to the analysis of known and unknown compounds.
LO8	Describe the operation of analytical HPLC instruments in relation to pumping systems, injection valves, columns and detectors and to identify the key features in HPLC applications relating to the analysis of pharmaceuticals and related materials.

CH332: Drug Design & Drug Discovery (Semester:5 Optional)

Module Details

Title Short:	Drug Design & Drug Discovery APPROVED
Module Code:	CH332
ECTS Credits:	10
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	7 programme(s)
Module Owner:	DAVID CHEUNG
Module Discipline:	CH - Chemistry
Module Description:	This module deals with how basic concepts regarding molecular structure and function relate to drug design & discovery. The module will have a theory and practical component. The theory component will deal with thermodynamics, molecular modeling, protein structure, natural products, heterocycles and how these related to drug design & drug discovery. The practical component will focus on computational methods and how they are appied in drug design.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Relate concepts in molecular mechanics to thermodynamic properties of ligand-protein interactions (enthalpy, entropy, the role of solvent)
LO2	Understand classical mechanical force fields and molecular dynamics simulations
LO3	Be competent in accessing and retreiving data from structure databases, and in using computational software to analyze and vizualize molecular complexes
LO4	Define the issues associated with computational conformational sampling, automated docking, and binding energy calculations
LO5	Understand the historical and current importance of natural products as drugs and drug leads and identify the most important natural sources for drug discovery
LO6	Describe the advantages, challenges as well as concepts and methods used in natural product drug discovery
LO7	Describe the role of heterocyclic molecules in drug discovery, including the mechanism of action of anticancer and antiviral agents (e.g. mitomycin C and AZT)
LO8	Understand biosynthetic and drug activation reactions involving DNA, RNA, ATP, cAMP, S-adenosyl methionine and NQO1.

CS209: Algorithms And Scientific Computing (Semester:3 Group not available to select online)

Module Details

Title Short:	Algorithms And Scientific Computing APPROVED
Language of Instruction:	English

Module Code:	CS209

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 and Semester 2

Module Delivered in	9 programme(s)

Module Owner:	MICHAEL MC GETTRICK

Module Discipline:	MA - Mathematics

Module Description:	This course covers algorithm design, analysis and implementation. The programming language used is PYTHON.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	calculate the computational complexity of simple algorithms;
LO2	construct algorithms and corresponding code) for a number of sorting problems;
LO3	given a number of solutions to a problem, determine which is computationally more efficient;
LO4	write programs using both iteration and recursion;
LO5	apply the technique of Dynamic Programming to solving particular problems.

CS211: Programming and Operating Systems (Semester:3 Group not available to select online)

Module Details

Title Short:	Programming and Operating Systems APPROVED
Module Code:	CS211
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:	EMIL SKOLDBERG
Module Discipline:	MA - Mathematics
Module Description:	This course introduces operating systems, the most fundatmental piece of software running on any computer.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Name and describe the main tasks of an operating system;
LO2	Explain the concept and purpose of a process in an operating system;
LO3	Represent the life cycle of a process in a diagrammatical fashion;
LO4	Describe and compare various scheduling strategies;
LO5	Explain and implement a queue data structure;
LO6	Apply a semaphore as a tool in concurrent programming;
LO7	Explain the necessary conditions for deadlock;
LO8	Describe and apply an algorithmic strategy for deadlock detection.

PAB3101: Soil Science
(Semester:5 Optional)

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	6 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.

PAB3102: AgriBiosciences for Sustainable Global Development (Semester:5 Optional)

Module Details

Title Short:	AgriBiosciences for Sustainable Global Development APPROVED
Language of Instruction:	English

Module Code:	PAB3102

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:	CHARLES SPILLANE

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	BPS304:Life forms arose on earth 3.5 billion years ago, yet human civilisation emerged ~10,000 years due to domestication of plants & animals (the advent of agriculture). By 2050, the human population will be 9 billion (9000 million) people with requirements for food, feed, fuel (energy), fibre, fuel, chemicals & medicines to sustain their health & livelihoods. Agribiosciences innovations are required to ensure future food security & sustainable development, particularly in developing countries

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand what is meant by sustainable global development and food security
LO2	Describe the evidence-base for the emerging mega-challenges for sustainable development and food security
LO3	Critically appraise the relative role that science and technology (in particular agribiosciences) can play in meeting current and future needs of humanity
LO4	Identify and detail the key sectors, issues and areas where innovations are necessary in order to transition humanity to a more sustainable development trajectory
LO5	Gain an understanding of agribiosciences research and development underway at present to meet urgent needs regarding food security and sustainable development in developing countries
LO6	Have developed critical thinking skills for appraising and identifying different pathways that can be taken towards sustainable development and food security.
LO7	Have developed foresight and horizon-scanning capabilities for identification of key areas where innovations are necessary for sustainable development and food security
LO8	Be proficient in science communication, and understand how policy and media interfaces with science and technology.

PAB4102: Plant Genetics & Systems Biology (Semester:7 Optional)

Module Details

Title Short:	Plant Genetics & Systems Biology APPROVED
Language of Instruction:	English

Module Code:	PAB4102

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:	RONAN SULPICE
Module Discipline:	NAT_SCI - School of Natural Sciences
Module Description:	Module provides advanced training in plant molecular genetics and systems biology. Fundamental aspects covered including nuclear and extranuclear inheritance, meiosis, genomes and comparative genetics, organellar genetics, epigenetics, transposons, cell and tissue biology, plant developmental and reproductive genetics, plant cell wall, plant model organisms, genetic and metabolic engineering, chromosomes & polyploidy, synthetic biology, and systems biology.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Have developed a solid understanding of plant genetics and systems biology
LO2	Understand relationships between genes, genomes, genotypes, phenotypes and environmental interactions in the contex of plant biology
LO3	Describe the developmental biology and genetics of key organs that define a plant
LO4	Define what is meant by a metabolic pathway or network and the factors that can influence the functioning of metabolism in plants
LO5	Have an appreciation of basic principles and techniques of genetic modifications, systems biology and synthetic biology
LO6	Explain the relationship between genetics and epigenetics, in the context of fundamental and applied plant biology
LO7	Have developed a capability to read, interpret and discuss the evidence presented in reviews and primary research papers.

PAB4103: Climate Change, Plants & Agriculture (Semester:7 Optional)

Module Details

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

Module Code:	PAB4103

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	5 programme(s)

Module Owner:	PETER MC KEOWN

Module Discipline:	NAT_SCI - School of Natural Sciences

Module Description:	This module provides students with an advanced introduction to challenges regarding climate change, crop production and agriculture. The module will present the latest findings regarding climate change models, crop yield modelling and approaches underway to develop climate smart agricultural processes.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand the links between plant evolution and changing atmospheric composition
LO2	Have an understanding of impacts of climate change on crop and agricultural production.
LO3	Relate current issues in plant biology to ongoing climate change challenges to agriculture, ecosystems and sustainable development

PH101: Physics
(Semester:1 Optional)

Module Details

Title Short:	Physics APPROVED
Language of Instruction:	English

Module Code:	PH101

ECTS Credits:	15

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

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

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	16 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This module lays a broad foundation in physics, both for students who will continue to study physics in subsequent years of their degree programme and for those who will continue to study other subjects. No prior knowledge of physics is assumed, though a significant minority of students (perhaps 33%) will have a Leaving Certificate qualification in physics. The level of mathematics required is simple algebra and trigonometry.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand and explain basic physical principles related to topics such as motion, forces, energy, heat, waves, electricity, light, atoms and radiation.
LO2	Identify basic physical principles governing the behaviour of simple systems.
LO3	Describe physical processes using simple equations and solve numerical problems.
LO4	Make measurements in the physics laboratory.
LO5	Record and analyze experimental data and draw conclusions based on these data.

PH1101: Mechanics and Thermal Physics

Module Details

Title Short:	Mechanics and Thermal Physics APPROVED
Language of Instruction:	English

Module Code:	PH1101

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	3 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This module lays a broad foundation in several topics of physics, both for students who will continue to study physics in subsequent years of their degree programme and for those who will instead continue to study other subjects. No prior knowledge of physics is assumed, though a significant minority of students (perhaps 33%) will have a Leaving Certificate qualification in physics. The level of mathematics required is simple algebra and trigonometry.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Understand and explain basic physical principles related to topics such as motion, forces, energy, heat, waves, electricity, light, atoms and radiation.
LO2	Identify basic physical principles governing the behaviour of simple systems.
LO3	Describe physical processes using simple equations and solve numerical problems.
LO4	Make measurements in the physics laboratory.
LO5	Record and analyze experimental data and draw conclusions based on these data.

PH2101: Mechanics & Electromagnetism (Semester:3 Group not available to select online)

Module Details

Title Short:	Mechanics & Electromagnetism APPROVED
Language of Instruction:	English

Module Code:	PH2101

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 1
Module Delivered in	6 programme(s)
Module Owner:	RAY BUTLER
Module Discipline:	EP - Physics
Source:	Merger, and partial reduction, of former PH215 + PH216 lecture content. Suggested new code: PH231
Module Data:	1 - 4 NON LAB
Module Description:	In this module, calculus and vector techniques are used to provide an in-depth study of: (1) Electric and magnetic fields and forces. The principles developed will be applied to dc and ac circuit analysis; (2) The motion of objects and how forces affect this motion. Linear motion and rotational motion are both considered. Energy-based methods are applied to study problems involving non-uniform forces. This module also includes a short introduction to the use of computational methods and computers to solve physics 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.

PH2102: Physics Laboratory and Problem Solving I (Semester:3 Group not available to select online)

Module Details

Title Short:	Physics Laboratory and Problem Solving I APPROVED
Language of Instruction:	English

Module Code:	PH2102

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 1
Module Delivered in	6 programme(s)
Module Owner:	RAY BUTLER
Module Discipline:	EP - Physics
Source:	Merger of former PH215 + PH216 practical/continuous assessment content. Suggested new code: PH232
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 "Mechanics & Electromagnetism" 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 'Mechanics and Electromagnetism'.
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.

PH222: Astrophysical Concepts (Semester:5 Optional)

Module Details

Title Short:	Astrophysical Concepts APPROVED
Language of Instruction:	English

Module Code:	PH222

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	10 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	Major astrophysical concepts and processes such as radiation, dynamics and gravity are presented. These concepts are illustrated by wide ranging examples from stars and planets to nebulae, galaxies and black holes

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.

PH331: Wave Optics
(Semester:5 Optional)

Module Details

Title Short:	Wave Optics APPROVED
Language of Instruction:	English

Module Code:	PH331

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:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This module provides an in-depth introduction to wave optics and its applications. It will cover topics required for the understanding of modern imaging and photonics, including polarisation, diffraction and interference. The course involves developing skills in solving practical problems, and students will perform relevant optics experiments in the laboratory (Michelson interferometer, Fourier Optics, Scanning monochromator, ray tracing).

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 in collaboration with a partner to observe and measure physical phenomena accurately, using appropriate instrumentation.
LO7	record data, and the manner in which they are obtained, using a working laboratory notebook.
LO8	interpret measurements in terms of their physical significance and the experimental or computational context in which they are obtained.

PH333: Quantum Physics (Semester:5 Optional)

Module Details

Title Short:	Quantum Physics APPROVED
Language of Instruction:	English

Module Code:	PH333

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:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This module provides an introduction to quantum physics. It describes the origin of quantum physics using the theories of Planck for blackbody radiation and Einstein for specific heat. The course then progresses to describe matter using wave functions. The Schrodinger equation is introduced and solved for a number of model problems. The development of operators to extract information from matter waves is considered next. The formal structure of quantum mechanics is then introduced. The course finally considers a two identical particle problem and introduces the concept of the Pauli Exclusion Principle.

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.

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.

PH339: Radiation and Medical Physics (Semester:5 Optional)

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	9 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.

PH422: Solid State Physics (Semester:7 Optional)

Module Details

Title Short:	Solid State Physics APPROVED
Language of Instruction:	English

Module Code:	PH422

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 provides students with an advanced understanding of the fundamental properties of solids due to the regular arrangement of atoms in crystalline structures. Simple models are developed using quantum-mechanical and semi-classical principles to explain electronic, thermal, magnetic and optical properties of solids.

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.

PH3101: Experimental and Computational Physics (Semester:5 Optional)

Module Details

Title Short:	Experimental and Computational Physics APPROVED
Language of Instruction:	English

Module Code:	PH3101

ECTS Credits:	15

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

Valid From:	2017-18 (01-09-17 – 31-08-18)
Teaching Period:	Semester 1 and Semester 2
Module Delivered in	4 programme(s)
Module Owner:	RAY BUTLER
Module Discipline:	EP - Physics
Source:	Merger and extension of former 8 "core Physics" modules' practical/continuous assessment content. Suggested new code: PH345
Module Data:	1.7 - 2 LAB
Module Description:	This is a year-long practical and continuous assessment module, consisting of laboratory sessions and associated teaching. It is a companion to, and co-requisite of, the 5 "core Physics" 3rd year lecture modules PH331, PH333, PH335, PH337, and PH338

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 modules PH331, PH333, PH335, PH337, and PH338.
LO2	Identify and apply pertinent physics concepts, and appropriate mathematical techniques, to solve physics problems related to the content of the companion modules PH331, PH333, PH335, PH337, and PH338.
LO3	Work singly and in group collaborations 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.
LO6	Produce a professional CV, write a well-crafted job application, and perform well at an interview for a job or a postgraduate research position.

PH3102: Experimental and Computational Physics for Theoretical Physics (Semester:5 Optional)

Module Details

Title Short:	Experimental and Computational Physics for Theoretical Physics APPROVED
Language of Instruction:	English

Module Code:	PH3102

ECTS Credits:	10

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

Valid From:	2017-18 (01-09-17 – 31-08-18)

Teaching Period:	Semester 1 and Semester 2

Module Delivered in	3 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Source:	Merger and extension (in teaching delivery) but also reduction (in number of labs) of the former 8 "core Physics" modules' practical/continuous assessment content. Suggested new code: PH346

Module Data:	1.7 - 2 LAB

Module Description:	This is a year-long practical and continuous assessment module, consisting of laboratory sessions and associated teaching. It is a companion to, and co-requisite of, the 4 "core Physics" 3rd year lecture modules taken by the Physics with Theoretical Physics stream - PH331, PH335, PH337, and either PH333 or PH338 [the latter alternate between years]

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 modules PH331, PH333, PH335, PH337, and PH338.
LO2	Identify and apply pertinent physics concepts, and appropriate mathematical techniques, to solve physics problems related to the content of the companion modules PH331, PH333, PH335, PH337, and PH338.
LO3	Work singly and in group collaborations 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.
LO6	Produce a professional CV, write a well-crafted job application, and perform well at an interview for a job or a postgraduate research position.

PH341: Measurement of Health Hazards at Work (Semester:5 Optional)

Module Details

Title Short:	Measurement of Health Hazards at Work APPROVED
Language of Instruction:	English

Module Code:	PH341

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:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This course outlines the general approach for the assessment of the health risks associated with exposure to hazardous substances in a workplace environment. It addresses the theory and practice of sampling many of the chemical and biological workplace hazards for example, particulates, bioaerosols, gases, vapours. Students will cover the following subjects; Introduction to Occupational Hygiene, Thermal environment, workplace gases and vapours, workplace dusts, workplace case studies

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	understand the role of the occupational hygiene professional within the health and safety function
LO2	identify, locate and interpret sources of occupational hygiene information, relevant legislation, standards and guidance which influence occupational hygiene practice
LO3	identify, locate and interpret sources of occupational hygiene information, relevant legislation, standards and guidance which influence occupational hygiene practice ??
LO4	perform occupational hygiene surveys to evaluate risk from heat and cold stress, biological and chemical hazards in a wide variety of workplaces.
LO5	interpret and communicate occupational exposure data
LO6	will appreciate the need for continuous professional development and role of professional ethics in practice.

PH421: Quantum Mechanics (Semester:7 Optional)

Module Details

Title Short:	Quantum Mechanics APPROVED
Language of Instruction:	English

Module Code:	PH421

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:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This module will provide students with an in-depth understanding of the principles of Quantum Mechanics. The principles will be used to analyse simple physical systems and to approximate more complex problems successfully.

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.

PH423: Applied Optics and Imaging (Semester:8 Optional)

Module Details

Title Short:	Applied Optics and Imaging APPROVED
Language of Instruction:	English

Module Code:	PH423

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 be an in-depth course on Applied Optics and Imaging, building on previous courses, in particular PH3X1 Wave Optics. Students will learn to solve advanced problems on both geometrical and wave optics, and will carry out assignments using ray tracing software and Matlab or similar. The course will include an introduction to modern imaging techniques, including adaptive optics, as applied to imaging through turbulence.

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.

PH426: Problem Solving and Physics Research Skills (Semester:8 Optional)

Module Details

Title Short:	Problem Solving and Physics Research Skills APPROVED
Module Code:	PH426
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	9 programme(s)
Module Owner:	RAY BUTLER
Module Discipline:	EP - Physics
Module Description:	Researched essay on an assigned Physics topic: Each student will be mentored by a supervisor, who will provide feedback to the student. Skills developed will include literature searching and structuring evidence-based scientific arguments to support viewpoints. Students will learn how to cite reference material correctly. Students will also be instructed on plagiarism and the ethics of scientific writing. 2. Problem solving: A lecture-based course will develop problem-solving skills including problem definition, solution searching, dimensional analysis and application of physics skills learned in the first three years of the programme. In particular, topics from different courses will be combined to widen students' appreciation of problem solving away from the tightly-defined context of lecture courses.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	scrutinize problems from diverse areas of physics and identify the physical concepts required to facilitate solution of such problems.
LO2	consult appropriate reference sources to locate formulae required to assist in the solution of physics problems outside the tightly-defined contexts of standard lecture modules.
LO3	apply physics learned in lecture modules, along with appropriate mathematical tools, to solve problems outside the tightly-defined contexts of the syllabi of such modules.
LO4	author an essay that addresses an assigned topic in a manner that demonstrates that the student has developed an appreciation of the relevance of physics, and its past and present applications, to contemporary society.
LO5	explain clearly what are meant by plagiarism and scientific ethical writing and, accordingly, cite sourced reference material in a manner that unambiguously acknowledges the origin of the material.

PH428: Atmospheric Physics and Climate Change (Semester:7 Optional)

Module Details

Title Short:	Atmospheric Physics and Climate Change APPROVED
Language of Instruction:	English

Module Code:	PH428

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	7 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	This course provides a thorough introduction to atmospheric processes and their relevance to current topics of interest such as climate change, ozone depletion, and air pollution.

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.

PH430: Biophotonics
(Semester:7 Optional)

Module Details

Title Short:	Biophotonics APPROVED
Language of Instruction:	English

Module Code:	PH430

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:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	The module provides a broad introduction to light interaction with biological materials (including human tissue, both in vivo and ex-vivo) and how it can be harnessed for sensing, imaging and therapy.

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.

PH466: Astrophysics
(Semester:7 Optional)

Module Details

Title Short:	Astrophysics APPROVED
Language of Instruction:	English

Module Code:	PH466

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	9 programme(s)

Module Owner:	RAY BUTLER

Module Discipline:	EP - Physics

Module Description:	In this course, we look at a number a number of astrophysics problems that have not been examined in detail in other modules in the programme. The course begins with an analysis of non-thermal radiation processes including synchrotron radiation, Compton scattering and inverse Compton scattering. We then examine these processes in different astrophysical environments – pulsars, active galactic nuclei, shocks in the interstellar medium, accretion disks and supernovae.

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 astrophysics.

EOS213: Introduction to Ocean Science (Semester:3 Group not available to select online)

Module Details

Title Short:	Introduction to Ocean Science APPROVED
Language of Instruction:	English

Module Code:	EOS213

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	3 programme(s)
Module Owner:	RACHEL CAVE
Module Discipline:	EOS - Earth & Ocean Sciences
Acknowledgment:	Compulsory for 2EH, 2MR. Open to 2BS if taking another 10 ECTS of EOS modules. Max of 120 students.
Module Level:	Common
Module Description:	An introduction to ocean properties and processes

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Explain the processes that exchange energy and water within the Earth system
LO2	Describe the main sources, sinks and pathways of material (sediment, nutrients, gases, trace elements) in the oceans
LO3	Explain how the temperature, salinity and density structure in the ocean arises and be able to distinguish different water masses on a temperature-salinity diagram
LO4	Explain how waves and tides are generated in the oceans and how these in turn generate currents
LO5	Recognise the difference between Eulerian and Lagrangian co-ordinate systems and measurement techniques and be able to represent them graphically
LO6	Describe the process of hydrothermal circulation of seawater through the seabed and resulting transformations in the chemistry of seawater
LO7	Describe the biogeochemical cycling of oxygen, carbon dioxide and nutrients in the oceans
LO8	Discuss the formation and global distribution of biogenic sediments on the seafloor
LO9	Carry out simple calculations of volume transport and fluxes of material to and within the oceans
LO10	Grasp the breadth of instrumentation used in oceanography and understand how a subset of these work and how they are used in oceanographic research

EOS305: Introduction to Applied Field Hydrology (Semester:5 Optional)

Module Details

Title Short:	Introduction to Applied Field Hydrology APPROVED
Language of Instruction:	English
Module Code:	EOS305
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	9 programme(s)
Module Owner:	TIERNAN HENRY
Module Discipline:	EOS - Earth & Ocean Sciences
Acknowledgment:	Instances: 3EH2, 3BS9, 3EV2, SWB, 1OS1, 1OA1 Core for: 3EH2 Optional for: 3BS9, 3EV2, SWB, 1OS1, 1OA1 Timing: Six week module, Semester 1, Weeks 1-6
Module Description:	Hydrology is the term that broadly describes the study of water on, in and above the Earth's surface. This introductory course is designed to introduce the students to the theories and concepts underpinning the discipline and to allow them to learn how to measure, estimate and calculate river and groundwater flows in the field and in the lab.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Have an appreciation of the nature of the relationships that exist between water the land
LO2	Prepare and produce water balances at local and regional scales
LO3	Use the tools acquired in the class to break down complex water management issues into negotiable sub-units
LO4	Compare and differentiate between methods for measuring, estimating and calculating hydrological data sets
LO5	Assess past hydrological events and future (predicted) events and contextualise these in terms of the frequency with which they are likely to occur, and the risks associated with their occurence
LO6	Incorporate field data, published data and interpreted data to make reasonable inferences about water and the land
LO7	Frame research questions about water resource management and water resource allocation

EOS323: Sediments and the Sedimentary Record (Semester:5 Optional)

Module Details

Title Short:	Sediments and the Sedimentary Record APPROVED
Language of Instruction:	English

Module Code:	EOS323

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:	SHANE TYRRELL

Module Discipline:	EOS - Earth & Ocean Sciences

Acknowledgment:	Instances: 3EH2, 3BS9, 3MR3, 1SWB1 Core for: n/a Optional for: 3EH2, 3BS9, 3MR3, 1SWB1 Pre-requisites: EOS222 Co-requisites: EOS324 Timing and scheduling: 3 lectures and 1 2 hour practical per week, weeks 1-6, SEM1 Number Limits (resource based): 70

Module Description:	This course will take a detailed look at the characteristics of clastic, chemical, biogenic and volcaniclastic sediments and sedimentary rocks. Students will investigate how the sediments and rocks originate, learn about the range of depositional environments in which they accumulate and/or form, and examine their potential importance as an economic resource.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Interpret a broad range of sedimentary structures in rocks
LO2	Construct sedimentary logs
LO3	Measure, analyse and interpret palaeocurrent data
LO4	Describe the principles behind basic fluid mechanics
LO5	Assess the petrography of a range of sedimentary rock types
LO6	Interpret simple geochemical analyses of sedimentary rocks
LO7	Describe the processes that sediment undergoes during lithification (diagenesis)
LO8	Reconstruct ancient depositional environments from observations made in the field

EOS3103: Palaeontology and Evolution (Semester:5 Optional)

Module Details

Title Short:	Palaeontology and Evolution APPROVED
Language of Instruction:	English

Module Code:	EOS3103

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:	JOHN MURRAY
Module Discipline:	EOS - Earth & Ocean Sciences
Acknowledgment:	Instances: 3EH2, 3BS9, 3MR1, 3EV1, 1SWB1 Core for: 3EH2 Optional for: 3BS9, 3MR1, 3EV1, 1SWB1. Pre-requisites: EOS222 Co-requisites: EOS323 Timing: six week module (4 lectures and one 2-hour practical per week), running in weeks 7-12, Semester 1. Number Limits (resource based): 100.
Module Description:	This module will introduce students to palaeontology (the study of fossils). All of the major animal groups, who have left their mark in the fossil record, will be examined. Emphasis will be placed firmly on understanding form and function in organisms and how it has related to their habitat over time. The course will finish with the topic of human evolution. Students will be trained to think both logically and critically; they will be shown how to develop arguments and answer questions based on the data available to them (or indeed collected by them in class). The background theme of the entire course will be to provide students with an appreciation for the story of evolution of life on Earth over the past c.541 million years.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Label and describe the basic body plans of a wide range of invertebrate and vertebrate groups.
LO2	Explain some of the physical principles governing the body construction of organisms.
LO3	Recognise the link between form and function in organisms and to then apply that insight to understanding how various creatures interact with their physical living environments (both at present and also in the past).
LO4	Describe and appraise the history of life on planet earth.
LO5	Collect, record and appraise scientific data.
LO6	Apply biological data/information not just qualitatively, but also quantitatively.

EOS3105: The Crystalline Crust (Semester:5 Optional)

Module Details

Title Short:	The Crystalline Crust APPROVED
Language of Instruction:	English

Module Code:	EOS3105

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	3 programme(s)

Module Owner:	SADHBH BAXTER

Module Discipline:	EOS - Earth & Ocean Sciences

Acknowledgment:	Instances: 3EH2, 3BS9 Core for: 3EH2 Optional for: 3BS9 Pre-requisites: EOS225 Timing: 12 week module, running in Semester 1

Module Description:	This module looks at the crystalline (igneous & metamorphic) rocks of the Earth's crust. The mineralogy, tectonic setting, and origin of these rocks will be examined. The practical component of the course will build on the skills learned in EOS225 in the study of rocks and minerals in thin section.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe & identify (in hand specimen & thin section) the main igneous & metamorphic rocks
LO2	Interpret (in hand specimen & thin section) textural & mineralogical features of the main igneous & metamorphic rocks
LO3	Classify global igneous & metamorphic processes & products and their links with plate tectonics
LO4	Describe how the chemistry of an igneous rock determines its mineralogy
LO5	Describe how the chemistry of the protolith & the agents of metamorphism determine the mineralogy of the resultant metamorphic rock

MI202: Laboratory Skills in Microbiology I (Semester:3 Optional)

Module Details

Title Short:	Laboratory Skills in Microbiology I APPROVED
Module Code:	MI202
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:	CONOR O'BYRNE
Module Discipline:	MI - Microbiology
Module Description:	This module aims to give students the basic lab skills that they will need to study microorganisms in a laboratory. In this module they will learn how to culture bacteria on agar-based media. They will learn how to stain bacteria and how to differentiate the major groups groups using a microscope. They will be trained in the preparation and use of different culture media to isolate the major groups of bacteria. The module will consist of 6 three hour laboratory sessions supplemented by 6 lects.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Perform a simple streak plate
LO2	Perform a Gram stain and differentiate between Gram positive and Gram negative bacteria
LO3	Use a basic light microscope
LO4	Prepare culture medium and perform a pour plate
LO5	Prepare culture medium and perform a pour plate
LO6	Prepare culture medium and perform a pour plate
LO7	Describe the thoery behind the basic methodologies used during the laboartory sessions
LO8	Discuss the nutrient and environmental parameters that influence microbial growth

MI306: Marine Microbiology (Semester:5 Optional)

Module Details

Title Short:	Marine Microbiology APPROVED
Module Code:	MI306
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	10 programme(s)
Module Owner:	CINDY SMITH
Module Discipline:	MI - Microbiology
Module Description:	To provide an understanding of marine microorganisms and the roles they play in marine ecosystems. Emphasis on primary productivity and fate of carbon, trophic interactions and flows of material and energy in marine food webs, biogeochemical cycles, microbial diversity and ecology.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	outline the major groups of marine microorganisms
LO2	describe the role of marine microorganisms in primary production and understand the implications of this for ecosystem functioning.
LO3	discuss the fate of primary productivity and the role of microorganism in marine food webs.
LO4	outline marine carbon and nitrogen cycles and
LO5	be able to discuss the biogeochemical and ecological roles of marine microbes
LO6	describe culture-independent molecular techniques used in molecular microbial ecology
LO7	to discuss microbial biodiversity in marine ecosystems.

MI323: Food and Industrial Microbiology (Semester:5 Optional)

Module Details

Title Short:	Food and Industrial Microbiology APPROVED
Language of Instruction:	English

Module Code:	MI323

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	7 programme(s)

Module Owner:	CONOR O'BYRNE

Module Discipline:	MI - Microbiology

Module Description:	This module will discuss the fermentations and processes involved in cheese, beer and wine production. The causative agents of food-borne disease will also be discussed. It will present and explore the diversity of scientific disciplines/technologies underpinning food and industrial fermentations. To present examples of applied industrial fermentations, producing products of significance. To provide an understanding of the importance that the organism, medium and process manipulation plays in Bioprocessing. To provide students with teaching of bioreactor design, operation, monitoring and scale up.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the process involved in the production of cheese, beer and wine.
LO2	Outline the fermentation reactions relevant to these processes.
LO3	Describe the main types of food-borne disease and identify the key organisms responsible for each type.
LO4	Identify important aspects of laboratory-scale and production bioreactor design/construction.
LO5	Describe the characteristics of key microbial species commonly used in industrial fermentations.
LO6	Outline and discuss critical operational variables (medium, organism, process manipulation and productivity) of industrial fermentations.

MI326: Microbial Metabolic and Molecular Systems (Semester:5 Optional)

Module Details

Title Short:	Microbial Metabolic and Molecular Systems APPROVED				
Module Code:	MI326				
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:	THOMAS BARRY				
Module Discipline:	MI - Microbiology				
Module Description:	This Module has two areas of focus in defining the bacterial cell as a factory in terms of its metabolic and genetic processes. At a metabolic level, the course describes and explains the relevance of metabolism in the context of microbial structure and growth. Focusing on nutrition, metabolism and other factors influencing microbial growth will be presented. At a genetic level, the course looks at DNA by way of its structure, mutagenesis and recombination as well as gene regulation and explores the use of mutant cells in the analysis and function of bacterial genes.				

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the mechanisms of cellular metabolism in microbes. With emphasis on catabolism of nutrients other than sugars.
LO2	Describe the more important metabolic mechanisms of anabolic reactions of microbial cells.
LO3	Understand the causes of mutation and significance of mutation with regard to bacterial gene mapping.
LO4	Describe how bacteria exchange genetic information within and between cells
LO5	Discuss the molecular mechanisms of the regulation of gene expression in microbes

MP231: Mathematical Methods I (Semester:3 Group not available to select online)

Module Details

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

Module Code:	MP231

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	19 programme(s)

Module Owner:	MICHAEL TUITE

Module Discipline:	AM - Applied Mathematics

Module Description:	This course covers mathematical methods (principally from Calculus) that are important in applications. Included are differentiation and integration of functions of multiple variables and associated applications such as optimization (Lagrange Multipliers), critical points, Fourier series, and area/volume calculations.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Calculate partial differentials of a function of two or three variables, and determine the critical points of functions of two variables, including constrained systems using Lagrange multipliers.
LO2	Determine Fourier series for periodic functions; utilize even/odd properties of functions to optimize Fourier series calculations; define the periodic extension of a function defined in an interval.
LO3	Carry out multiple integrals of a function; interpret results in terms of area and/or volume; calculate the area bounded by multiple curves.
LO4	Exhibit Green's theorem by calculating the relevant double integral and single (line) integrals.

MP236: Mechanics I (Semester:3 Group not available to select online)

Module Details

Title Short:	Mechanics I APPROVED
Language of Instruction:	English

Module Code:	MP236

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	15 programme(s)

Module Owner:	MARTIN MEERE

Module Discipline:	AM - Applied Mathematics

Module Description:	This is a mechanics course for students who have already been exposed to an elementary mechanics course. Topics covered include dimensional analysis, variational calculus, Lagrangian mechanics and rigid body motion.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	re-write a law expressed in dimensional quantities in an equivalent dimensionless form using the Buckingham pi theorem;
LO2	analyse some simple systems using dimensional analysis and appropriate experimental data;
LO3	use the concept of similarity in conjunction with dimensional analysis to aid in the design of scale models;
LO4	solve some simple optimisation problems in the calculus of variations using the Euler Lagrange equations;
LO5	obtain the equations of motion of mechanical systems using the Lagrangian formulation of mechanics;
LO6	mathematically model the motion of a rigid body, and solve some simple problems involving rigid bodies.

MP305: Modelling I
(Semester:5 Optional)

Module Details

Title Short:	Modelling I APPROVED
Language of Instruction:	English

Module Code:	MP305

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:	PETRI TOMAS PIIROINEN

Module Discipline:	AM - Applied Mathematics

Module Description:	This course introduces the student to modelling techniques for four different real-world problems. The problems cover the topics network-flow optimisation, activity networks, network analysis and game theory.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Set up and solve basic network flow problems.
LO2	Set up and solve basic activity network problems.
LO3	Use adjacency matrices to represent different types of networks.
LO4	Use degrees measures to describe different features of networks.
LO5	Describe what network centrality and PageRank are.
LO6	Describe what a matrix game is.
LO7	Analyse any 2 by N matrix game and find the optimal game.
LO8	Use the software Maple in to analyse problems from the topics taught in the course.

MP345: Mathematical Methods I (Semester:5 Optional)

Module Details

Title Short:	Mathematical Methods I APPROVED
Language of Instruction:	English
Module Code:	MP345
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	18 programme(s)
Module Owner:	MICHEL DESTRADE
Module Discipline:	AM - Applied Mathematics
Module Description:	This course introduces some advanced methods of mathematical physics for solving ordinary differential equations, and presents some applications of complex analysis.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Find the general solution to a second-order linear differential equation with constant coefficients when it is homogeneous, and a particular solution when it is inhomogeneous;
LO2	Find a second, linearly independent, solution to a second-order differential equation when one is known;
LO3	Compute the first few terms of a power series or Frobenius series solution to a second-order linear equation with variable coefficients, when it exists;
LO4	Derive orthogonality relations for trigonometric, Legendre and Bessel functions;
LO5	Compute real integrals using the theorems of complex contour integration.

MP410: Non-Linear Elasticity (Semester:5 Optional)

Module Details

Title Short:	Non-Linear Elasticity APPROVED
Language of Instruction:	English

Module Code:	MP410

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	21 programme(s)

Module Owner:	MICHEL DESTRADE

Module Discipline:	AM - Applied Mathematics

Module Description:	(This course will be run every other year.) Description: This course is concerned with continuum mechanics applied to the behaviour of elastic solids. Topics covered include Tensor algebra, Kinematics of continuum deformation and motion, Balance laws and equations of motion, Constitutive equations for soft elastic materials.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	go from a field in material (reference) form to its expression in spatial (current) form, and vice-versa;
LO2	compute the principal stretch ratios and principal strain directions for a homogeneous deformation
LO3	be familiar with some simple constitutive equations used for soft solids and their corresponding stress-strain relations;
LO4	solve some simple boundary value problems corresponding to simple states of stress;
LO5	interpret the results of mechanical testing protocols for soft materials.

MP494: Partial Differential Equations (Semester:5 Optional)

Module Details

Title Short:	Partial Differential Equations APPROVED
Language of Instruction:	English

Module Code:	MP494

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	11 programme(s)

Module Owner:	MARTIN MEERE

Module Discipline:	AM - Applied Mathematics

Module Description:	(This course will run every other year.) This course introduces the theory of partial differential equations (PDEs).Topics covered include first order PDEs, linear second order PDEs in two variables, maximum principles and well-posedness of problems, separable variable and similarity solutions.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	solve a first order linear partial differential equation using the method of characteristics;
LO2	solve some nonlinear first order partial differential equations using Charpit's method;
LO3	classify second order linear partial differential equations in two variables and reduce them to canonical form;
LO4	calculate the general solution to some second order linear partial differential equations;
LO5	prove the maximum principle for Laplace's equation in a planar domain and be able to apply it to prove that some problems have unique solutions;
LO6	rigorously justify the validity of some separable variable solutions to Laplace's equation;
LO7	prove a maximum principle for the heat equation;
LO8	construct simple similarity solutions to some parabolic equations.

SI206: Introduction to Physiology and Gastrointestinal (Semester:3 Group not available to select online)

Module Details

Title Short:	Introduction to Physiology and Gastrointestinal APPROVED
Language of Instruction:	English

Module Code:	SI206

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	5 programme(s)

Module Owner:	AMIR SHAFAT

Module Discipline:	SI - Physiology

Module Description:	The course develops fundemental understanding of human body function. Starting with concepts in cellular physiology, body compartments and basic biochemical concepts such as diffusion, osmosis and electrochemical gradient. The different blood types, cells in the blood compartment and immune function are describe. The processes governing the gastrointestinal system are described in detail, including digestion absorption motility and secretion.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe body compartments, water distribution and the effects of changes in solute concentration on blood volume and cell volume
LO2	Understand the principles immunity and the cell types involved
LO3	Describe the different cells in the blood and their function
LO4	Understand the structure and function of the gastrointestinal tract
LO5	Discuss the different organs of the gastrointestinal system, and explain the key processes of digestion, absorption, secretion and motility
LO6	Understand the key mechanisms involved in regulation of some of the above processes
LO7	Perform and interpret key practical experiments to generate evidence relating to the cardiovascular, gastrointestinal, muscle and nervous systems

SI207: Nerve and Muscle (Semester:3 Group not available to select online)

Module Details

Title Short:	Nerve and Muscle APPROVED
Module Code:	SI207
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	5 programme(s)
Module Owner:	AMIR SHAFAT
Module Discipline:	SI - Physiology
Module Description:	The course develops fundemental understanding of human body function. Students develop their understanding of how the nervous system works, how cells communicate electrically and chemically. Next, the function of muscle tissue is decribed and the control of muscle contrcution discussed.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the cellular structure of nerve cells and muscle cells
LO2	Understand how nerve impulses are generated and propagated and the role of synapses and neurotransmitters in neural transmission
LO3	Understand the structure and function of skeletal and smooth muscle,
LO4	Discuss how these muscle types contract and the role of calcium, ATP and electrical stimulation
LO5	Describe the function of the autonomic nervous system
LO6	Understand the key mechanisms involved in regulation of some of the above processes
LO7	Perform and interpret key practical experiments to generate evidence relating to the cardiovascular, gastrointestinal, muscle and nervous systems

SI311: Neurophysiology (Semester:5 Optional)

Module Details

Title Short:	Neurophysiology APPROVED
Module Code:	SI311
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	7 programme(s)
Module Owner:	MICHELLE ROCHE
Module Discipline:	SI - Physiology
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 cells of the central nervous system, motor and somatosensoty 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 knowleadge to explain acute pain processing
LO2	Describe in detail the processess 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

SI312: Endocrinology (Semester:5 Optional)

Module Details

Title Short:	Endocrinology APPROVED
Module Code:	SI312
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	7 programme(s)
Module Owner:	AILISH HYNES
Module Discipline:	SI - Physiology
Module Description:	This module will provide students with a comprehensive introduction to the function of the endocrine system with an emphasis on human endocrinology. It will include an introduction hormonal classification and the molecular mechanisms of hormone action, hormone receptors and their signal transduction pathways. The structure and function of classical endocrine glands will be discussed and the pathophysiology of endocrine disorders will be discussed.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Discuss the role played by hormones in the maintenance of homeostasis.
LO2	Describe the importance of endocrine system in intra cellular communication
LO3	To compare and contrast hormones in terms of their structure, synthesis, transport, mechanism by which they elicit a receptor-mediated response in target tissues.
LO4	Describe mechanisms that regulate hormone synthesis and secretion
LO5	Discuss the physiological actions of specific hormones
LO6	Integrate and then apply their knowledge of the normal endocrine system to identify some common endocrine disorders and explain the mechanistic basis of the disorder
LO7	Demonstrate problem solving skills and assessment of biomedical data
LO8	Demonstrate skills and tools necessary to promote life-long learning

SI317: Human Body Function

(Semester:5 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	21 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.

PM208: Fundamental Concepts in Pharmacology (Semester:3 Optional)

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	21 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:3 Optional)

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	17 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:5 Optional)

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	7 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

BO201: Molecular and Cellular Biology (Semester:3 Group not available to select online)

Module Details

Title Short:	Molecular and Cellular Biology APPROVED
Module Code:	BO201
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	15 programme(s)
Module Owner:	MARIA TUOHY
Module Discipline:	BI - Biochemistry
Module Description:	This course aims to provide students with the key molecular concepts of the biology of living cells. The basic structure and organisation of prokaryotic and eukaryotic cells will be described, with an emphasis on understanding the similarities and differences between cells from these main domains of life. The composition, structure and importance of the four major groups of biomolecules will be reviewed. Fundamental topics on genomes and genome organization will also be covered.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the main structural and organizational similarities and differences between Prokaryotic and Eukaryotic cells
LO2	Discuss the key features of different types of Eukaryotic cells, e.g. fungal, plant and animal cells
LO3	Identify the functions of the major subcellular structures and organelles
LO4	Describe the role of water and the importance of pH in living cells
LO5	Explain the basic chemical bonds and interactions that underpin the chemistry of biologically important reactions
LO6	Detail the general molecular structure and (bio)chemical features of the main biomolecules in living cells and explain their cellular functions
LO7	Compare and contrast genome structure and organization in prokaryotes and eukaryotes

ZO317: Evolutionary Biology (Semester:5 Optional)

Module Details

Title Short:	Evolutionary Biology APPROVED
Module Code:	ZO317
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:	GRACE PATRICIA MCCORMACK
Module Discipline:	ZO - Zoology
Module Description:	This module is focused on key concepts in evolutionary biology including the mechanisms operating on molecules, on populations and those involved in the formation of new species. It will also include topics such as evolutioary repatterning of development, evolutionary constraint and bias and evolutionary innovation.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Describe the evolutionary forces acting on alleles and genotypes.
LO2	Describe the methods used to study genetic variation in natural populations.
LO3	Describe in detail different types of speciation, including detailed discussion on the degree and type of isolation, selection and genetic mechanisms at play.
LO4	Describe the evolutionary origin of development and of metazoans
LO5	Explain the different modes in which development can be repatterned during evolution
LO6	Discuss how developmental processes can affect the direction of evolution
LO7	Display enhanced skills in writing essays on selected key concepts of evolutionary biology

ZO319: Marine Zoology (Semester:5 Optional)

Module Details

Title Short:	Marine Zoology APPROVED
Language of Instruction:	English

Module Code:	ZO319

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	7 programme(s)

Module Owner:	ANNE MARIE POWER

Module Discipline:	ZO - Zoology

Module Description:	This module studies deep-sea environments and explores marine diversity patterns and explanations for these patterns.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Identify the major groups of cnidarians commonly associated with seamounts and submarine canyons.
LO2	Describe the biology of seamount and submarine canyon communities.
LO3	Review the importance of designated deep-water marine protected areas.
LO4	Define a community and community structure.
LO5	Quantify species diversity.
LO6	Identify trends in marine community structure (i.e., species diversity and trophic structure), hypotheses to explain these trends, and arguments that weigh up the relative merits of these hypotheses.
LO7	Define an ecological niche.
LO8	Define the relationship between area and species richness and apply this relationship to real conservation problems.