UNIVERSITY of LIMERICK

OLLSCOIL LUIMNIGH

SPRING 2018
CLASS/COURSE BOOKLET

Introduction

The University of Limerick operates a modular system with continuous assessment. A module is a self-contained package of education taught during a single academic semester. Visiting students may choose from a wide range of modules and may cross register between faculties and departments. Acceptance on these modules is subject to academic prerequisites, timetabling constraints and ceilings on enrolments. The module descriptions that follow present an outline of the salient topics covered in each module.

Normal course load is 5 modules per semester.

Module Key

The module code is the key in most cases to find out when the class is running.

Example CU4051

CU is the subject area

4 is the type of study – only modules beginning in 4 are offered to study abroad students.
5 and 6 are postgraduate modules and modules beginning in 2 are certificate courses/access courses.
05 is just the departmental way to distinguish between classes

The final digit is the only way to determine which semester it will run in.
1, 3, 5, 7 are fall semester classes
2, 4, 6, 8 are spring semester classes

1 and 2 are first year classes
3 and 4 are second year classes
5 and 6 are third year classes
7 and 8 are fourth year classes.

This is the usual key for classes but there are always exceptions…

Modules featured in this Booklet

All modules are in alphabetical order by module code.

Module	Faculty	Department
AC	BUS	ACF
AR	SEN	ARC
BC	SEN	CES
BY	SEN	LSC
CE	SEN	CEM
CG	SEN	CES
CH	SEN	CES
CM	BUS	MMA
CS	SEN	CSI
CU	AHS	MLA
DM	SEN	DMT
EC	BUS	ECO
ED	SEN	ECE
EE	SEN	ECE
EH	AHS	CCO
EN	EHS	EPS
EP	BUS	MMA
EQ	SEN	LSC
ER	SEN	CES
ET	SEN	ECE
EV	SEN	LSC
FI	BUS	ACF
FR	AHS	MLA
FT	SEN	LSC
GA	AHS	CCO
GE	AHS	MLA
HI	AHS	HIS
HS	SEN	CES
IN	BUS	ACF
JA	AHS	MLA
JM*	AHS	CCO
LA	AHS	LAW
LI	AHS	MLA
LP	AHS	LAW
LS	SEN	LSC
MA	SEN	MAS
MB	SEN	MAS
MD	HUM	HUM
ME	SEN	MAB
MF	SEN	DMT
MG	BUS	MMA
MN	BUS	MMA
MS	SEN	MAS
MT	SEN	CEM
MU	HUM	HUM
NS	EHS	NMI
PA	AHS	PPA
PD	SEN	DMT
PH	SEN	PHE
PM	BUS	PER
PO	AHS	PPA
PS	EHS	PSY
PT	SEN	DMT
PY	EHS	PES
RM	AHS	CCO
SN	EHS	NMI
SO	AHS	SOC
SP	AHS	MLA
SS	EHS	PES
TE	AHS	MLA
TW	AHS	CCO
TX	BUS	ACF
WT	SEN	CEM

*Only open to Journalism Majors

Faculty Key

BUS	Kemmy Business School
SEN	Science & Engineering
AHS	Arts, Humanities & Social Sciences
EHS	Education & Health Sciences
HUM	Irish World Academy of Music & Dance

Disclaimer
The content of this booklet is for information purposes only and should not be viewed as the basis of a contract between the student and the University of Limerick. No guarantee is given that modules may not be altered, cancelled or otherwise amended at any time.

AC4002 - MANAGERIAL ACCOUNTING
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module: *The aim of the module is to introduce students to the basic techniques, language and principles of management accounting. The module provides students with an insight into the role of management accounting as a provider of information supporting the financial decision making process of an organisation.*

Syllabus: The syllabus covers fundamental issues including basic cost terms, concepts, and definitions before introducing costing systems such as full costing and Activity Based Costing. In addition to preparing basic budgets, the difficulties that are inherent within any budgeting system are presented. Students learn to analyse and explain the major causes of differences between budget and actual performance, including basic standard costs and variances. The relationship between accounting information and managers decisions in a competitive environment is demonstrated. Students learn to conduct a financial analysis to support a range of business decisions such as pricing, make v buy, limiting factor of production, discontinuation of product line, customer or market etc. Strategic management accounting is introduced. Techniques such as target costing, value chain analysis and total life-cycle costing are discussed in addition to tools for measuring performance such as the balanced scorecard.

AC4004 - ACCOUNTING FOR AUDITING AND FRAMEWORKS
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module: The purpose of this module is to present the regulatory, legislative and governance requirements for financial reporting. The assertions contained in the resulting financial statements are challenged by the student availing of the principles of auditing to determine the adequacy of accompanying disclosures. In this way, the student comprehends the audit process led by an accounting professional as underpinning the credibility of the financial reporting process. As business transactions, be it local or global, rely hugely on this credibility, the role of the accountant as a responsible and ethical professional is emphasised.

Syllabus: Knowledge is imparted through lectures and tutorials and the completion of a case study requiring an analysis of the annual report of an assigned publicly traded company. The first series of lectures covers accounting regulation and its conceptual underpinning of accrual basis, going concern and accounting policies relating to revenue recognition and fair value. This is followed by lectures covering auditing principles and concepts, the internal control system (ICS) and auditing procedures that examine the ICS and finally the auditor's opinion. A third series of lectures introduces corporate governance, its key functions of accountability, responsibility and transparency and the governance mechanisms that deliver corporate transparency. Study of the audit-performance expectations gap with an emphasis on professional and ethical responsibilities of the auditor completes the module.

Prerequisites: AC4001, AC4002

AC4018 - CORPORATE TRANSPARENCY AND BUSINESS ETHICS
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module: *1. Understand the control mechanisms of governance and financial transparency that infer the credibility of financial reporting.*
2. Acquire an overview of ethical theories and their potential for engagement with business.
3. Explore the elements of a professional judgement as an approach to making ethical decisions in business.
4. Understand that corporate compliance is fundamental to corporate social responsibility.

Syllabus: Corporate governance functions of responsibility, accountability and transparency. The role of the corporate board. Corporate architecture and mechanisms for governance and financial transparency. Understanding transparency mechanisms as instrumental in providing credibility to corporate reporting. Framing business ethics: Corporate responsibility, ethical decision-making. Normative ethical theories: utilitarianism, ethics of duty, rights and justice, virtue ethics, feminist ethics, discourse ethics and postmodernism. Professional independence and professional judgement and the distinction between the terms truth and truthful. Governance role of financial accounting information: impact on economic performance: project selection, information asymmetry. Threat of moral hazard: Agency theory, resource dependence, stakeholder theory. International and cultural dimensions to business ethical behaviour. Recognise business ethics as an element of corporate citizenship and sustainability; appreciating that corporate compliance is a cornerstone for corporate social responsibility. Bushman on corporate transparency, Bentham and Kant on utilitarianism, Lonergan on professional judgement, Roarty on language, Blackburn on truth.

Prerequisites: AC4001, AC4004, AC4305

AC4024 - FINANCIAL ACCOUNTING AND REPORTING
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module: *The aim of this module is to develop a student's understanding of the theoretical framework of accounting. It introduces the student to the translation of accounting theory, concepts and principles into accounting regulation and practice. It encourages the student to evaluate selected international accounting standards.*

Syllabus: The module will consider the theory and practice of selected international accounting standards and issues. Focus will be on the preparation and reporting to external users of financial information, especially, but not exclusively, equity investors. The accounting standards and issues are examined in light of their historical development and discussions will not be solely around the actual content but what the regulations ought to be or might be.

AC4034 - AUDITING AND ACCOUNTING FRAMEWORKS
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module: *The purpose of this module is to present the regulatory, legislative and governance requirements for financial reporting. The assertions contained in the resulting financial statements are challenged by the student availing of the principles of auditing to determine the adequacy of accompanying disclosures. In this way, the student comprehends the audit process led by a accounting professional as underpinning the credibility of the financial reporting process. As business transactions, be it local or global, rely hugely on this credibility, the role of the accountant as a responsible and ethical professional is emphasised.*

Syllabus: Knowledge is imparted through lectures and tutorials and the completion of a case study requiring an analysis of the annual report of an assigned publicly traded company. The first series of lectures covers accounting regulation and its conceptual underpinning of accrual basis, going concern and accounting policies relating to revenue recognition and fair value. This is followed by lectures covering auditing principles and concepts, the internal control system (ICS) and auditing procedures that examine the ICS and finally the auditor's opinion. A third series of lectures introduces corporate governance, its key functions of accountability, responsibility and transparency and the governance mechanisms that deliver corporate transparency. Study of the audit-performance expectations gap with an emphasis on professional and ethical responsibilities of the auditor completes the module.

Prerequisites: AC4001, AC4002

AC4214 - ACCOUNTING FOR FINANCIAL DECISION MAKING
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module: *This module introduces non-business students to the fundamental concepts and practices of management accounting and finance. It provides students with the skills and knowledge necessary to identify the relevant financial information required to manage the financial and operating resources of a business.*

Syllabus: This module is structured to provide non-business students with a basic understanding of both management accounting and finance. Management accounting provides information for product/service costing and profit determination in addition to information for planning, control and decision-making. Finance is concerned with the ways in which funds for a business are raised and invested. The topics covered include the relationship between financial and management accounting, costing, budgeting, short-term decision making, strategic management accounting, sources of finance, investment appraisal and management of working capital. This module is designed to be a prerequisite for the module AC4417 Management Accounting 1.

AC4418 - MANAGEMENT ACCOUNTING 2
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module: *This module further enhances students understanding of the role and purposes of management accounting in the management process. It deals with the applications and systems of management accounting that serve the information needs of contemporary organisations. It aims to give students an appreciation of the frontiers of management accounting and the associated theoretical and empirical research activity.*

Syllabus: This module will cover inventory costing; information and the decision process; cost accumulation information for decision-making; relevant costs and revenues for decision-making; Process costing; Cost allocation and customer profitability analysis; Performance measurement; Transfer pricing and multinational considerations; Pricing; Balanced scorecard.

Prerequisites: AC4417

AR2001 - FAB LEARNING PORTFOLIO
ECTS Credits: 12

School of Design

Rationale and Purpose of the Module: *The central objective of this module is to promote both the understanding and development of a range of skills on digital fabrication in different design areas, adding value to the corporate environment and to their careers.*

The module aims to inform and facilitate the development of specific skills, which will be utilised in the workplace, through the application of theory encountered throughout the programme.

This module also aims to provide an opportunity for students to reflect on the development these key skills in an open and supportive learning environment.

The module supports the work of students in translating their study of their own practice into a portfolio of work reflecting their development and achievements in the programme

Syllabus: Personal Portfolio Development, Constructing a portfolio of experiences in projects using a combination of different digital fabrication technologies.

Use a combination of general and specialist knowledge and understanding the use of existing and emerging digital fabrication technologies.

Apply appropriate theoretical and practical methods to the analysis, design and fabrication of solutions based on digital fabrication technologies.

Use effective communication and interpersonal skills.

AR4002 - DESIGN STUDIO 1B
ECTS Credits: 15

School of Design

Rationale and Purpose of the Module: *The aim of First year Design Studio is to enable the student to become an active participant in the architectural design process. The field of architecture is broad and the methodologies used to work within it varied. In addition, architecture interacts closely with a number of related disciplines.*
First year Design Studio exposes the student to the types of thinking and acting inherent in this process with the objective of helping the student become conversant with the process and capable of developing initial architectural projects.

Syllabus: Design Studio is the backbone of study in Architecture. Study is organised around design problems or projects, a number of which are given each term.

By working through the project, the student will become exposed to the architectural design process, a new and complex process for most first year students. Each project introduces a different aspect of the architectural design process in order to help the student develop a range of methods of working.

Each project also introduces a new programmatic theme so that students understand and become conversant with the many fields of operation of an architect. Themes include space and light explorations through model making, understanding the process of abstraction and transformation through model making/two dimensional work, building full scale structures in timber to explore architectural concepts such as scale, framing, section and thresholds, developing observational skills through sketching on site, learning how to make a site plan by developing a pattern of occupation on an open site, learning how to develop a building design grounded in this context.

Studio work is organised so that close contact is maintained with the student. Work is analysed and discussed with the student on an individual basis and within the group. The student is taught to recognise the design process and to value and catalogue their own work. As the year progresses the student is encouraged to become increasingly responsible for organising and developing their own work process.

The studio is co-ordinated with the content of parallel course modules and integration between studio work and course module work is a vital and innovative component of the studio structure.

Prerequisites: AR4001

AR4004 - DESIGN STUDIO 2B
ECTS Credits: 15

School of Design

The focus of this term is housing: through analysis, research, visits, lectures, and project work students will explore the problem of housing conceptually, functionally, and spatially, as a basic human need, as a social construct, as an economic system, and as a physical thing.
-* Spatial model study of housing in a specific cultural context.
-* Aspects to be studied: spatial relation to land, territory, climate, privacy, social interaction, interior spatial organisations
* Means of study: intuitive and structured modelling in mix, studies in situ and sketching
* Histories, characteristics, contemporary situations, investigations trough site visits, lectures, mapping, free sketching, birds eye perspectives*
* Land, structure, climate and materials:
* a. Spatial logistics and spatial politics. Geometry and human occasion. Types, patterns, and spatial logistics: The maisonette, the dwelling unit, patterns of repetition, link to Irish house and housing traditions.
* b. Reconstructing Space. Parallel to first year program: Drawing of works by various architects
-The essence of the detail and its influence and relation to character of the whole.

The design studio is co-ordinated with the content of parallel course modules and integration between studio work and course module work is a vital and innovative component of the studio structure.

Prerequisites: AR4003

AR4006 - DESIGN STUDIO 3B
ECTS Credits: 15

School of Design

Rationale and Purpose of the Module: *The principal aim of Third-Year Design Studio is to enable the student to demonstrate a first synthesis of the disparate influences that go to make up an architectural project using the range of skills and tools an architect is required to use. The emphasis in the second term is on developing a project to a high level of detailed design. The pedagogical focus is on developing, in each student, a capacity to interrogate the project through different inputs and to push the project ahead. At the end of the semester the student should have developed an architectural project by interrogating a range of inputs through disparate means and successfully resolved these.*

Syllabus: An agenda will be set in Design Studio. The basis for all propositions will have stated intent relative to societal ideas of place, collectivity and socio economic (or political) meaning. The architectural project brief will have inherent complexity, embodying personal space together with public space.
Through the detailed study of architectural references, a concept of 'now' relative to the past history of societal and architectural ideas will inform each student's proposition since both will be researched and presented in parallel. The material realisation of these social and cultural concepts is capable of conveying meaning in a contribution that the strictly functional provision of buildings does not make.
The architectural proposition will move through a series of studies where the student is taught to use different scales, modes of operation and reference points. The emphasis will be on the mastery of investigative skills through a range of media on an ongoing basis.

Prerequisites: AR4005

AR4008 - DESIGN STUDIO 4B
ECTS Credits: 18

School of Design

Rationale and Purpose of the Module: *In order to facilitate more extensive and, at the same time, more focused design projects and adequately comprehensive thesis projects, credits awarded to Design Studio 4a and 4b increase to 18 credits while the number of parallel modules is reduced.*

Syllabus: In Y4 students start a personal pursuit; they must - through their design projects and their research work - relate to the world of architecture in their own personal way. Students are expected and asked to voice their position in architecture, to find their direction through architectural design. Students will develop a method of research and allocate significant time to the research part of the curriculum. The architectural project will be tightly allied to construction and the physicality of building; construction technology will be an important part of the years' work.
In the spring semester students are expected to measure their design ability against tightly drawn demands and complex programmatic issues within a sophisticated cultural and architectural framework - to create a complex architectural object. Design Studio will facilitate more inventive/experimental work, leveraging the knowledge of what students are already able to do. Design projects require an integrated technological proposition in terms of structure, construction, materials, and environment at an advanced level.

AR4012 - GRAVITY AND REACTION 2
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *Give students an understanding of a small number of useful structural concepts using experiment, intuition and formal learning. Give students a strong conceptual and formal grasp of these concepts that are applicable to actual conditions.*

Syllabus: Continued Introduction to structural concepts. Topics covered will be Pin jointed frames, Parallel chord cantilever truss multiple point load. Parallel chord cantilever truss: uniformly distributed load Pitched roof truss, Internal Forces in Beams, Axial, shear bending definitions, corresponding internal stress states, simplified models of stress states. End load cantilever with uniformly distributed load, Simply Supported Beam: mid-span point load with deflection, Simply Supported Beam: 2 point loads, Simply Supported Beam: uniformly distributed load with deflection, Supported Beam: partial uniformly distributed load, 3 Pin frame with vertical point load, 3 Pin frame with horizontal point load., 3 Pin frame with uniformly distributed load, Qualitative analysis: Frames, deflected shapes, tension zones in bending, axial force, shear force. Students will construct:
(a)* A cantilever truss with 1.0kg point load and a slender braced bottom chord. 1.0m long 200mm deep (2 groups).
(b)* A simply supported beam and a fixed ended beam (same section) with mid span point loads 1.0kg approx.
* Measure deflections (2 groups).
(c)* A cantilever beam 1.0m long with a 1.0kg end point load. A cantilever beam (same section) 2.0m long with a 1.0kg end point load measure deflections (1 group).

Prerequisites: AR4011

AR4014 - GRAVITY AND REACTION 4
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *Give students an understanding of structural models using experiment, project work and formal learning. Give students a strong conceptual and formal grasp of materials used in structural design, which are applicable to actual conditions.*

Syllabus: Continued Introduction to structural concepts. Topics covered will be portal frames, crane structure; RC beam design; timber truss design in qualitative process; shells, membranes. Introduction to materials used in structural design; concrete, reinforced concrete; timber; laminated timber; glulaminated timber; steel; models to describe failure modes in structures.
Students will research:
* Materials in the studio and in a site context.
* Materials used in structural design and their relevant components
* Design and build in model form a bridge with calculated design loads and span.

Prerequisites: AR4013

AR4016 - GRAVITY AND REACTION 6
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *Give students an understanding of structural models using experiment, project work and formal learning. Give students a strong conceptual and formal grasp of materials used in structural design, which are applicable to actual conditions.*

Syllabus: Continued Introduction to structural concepts. Topics will be studied directly in the laboratory will be portal frames, crane structure; Introduction to materials used in structural design; concrete, reinforced concrete; timber; laminated timber; glulaminated timber; steel; models to describe failure modes in structures.
Students will research:
(d) Materials in the studio and in a site context.
(e) Materials used in structural design and their relevant components
(f) Design and build in model form a bridge with calculated design loads and span.

Prerequisites: AR4015

AR4022 - REPRESENTATION / DRAWING 2
ECTS Credits: 3

School of Design

To establish drawing as a tool of observation, a tool of thinking and a tool of representation, this course consists of three different types of drawing exercises:

Studio based exercises will, by degrees shift their focus from training the craft of technique in drawing toward using drawing as an analytical and representation technique. Colour, composition, documentation of different sites - with some visits to specific sites - , typography and basics of graphic design will be subjects of the course. Ink and pastels will be introduced as drawing materials, wood, plexiglas and metals as model making materials.

The idea of transformation introduced in the first semester of the course will be extended to include digital media. Learning how digital media operates and is distinct and different from activities of drawing and model making Photoshop and PowerPoint will be the first

steps into digital representation.

Architectural drawing, line-drawings of floor plans, sections and details, will become more concrete, will develop from freehand to hard line drawings following the convention of architectural drawing in respect of line types, hatching, representing materials, dimensioning, lettering and grade of detailing depending on scale.

AR4024 - REPRESENTATION / DRAWING 4
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *In this module students hone skills in drawing through practising, and form an understanding through application.*

Syllabus: To establish drawing as a tool of observation, a tool of thinking and a tool of representation, this course consists of three different types of drawing exercises:
Surveying using the sketchbook, pencil and the body to observe and record buildings, proportions, scale, and distances of objects.
Surveying using careful notation of dimensions through careful observation, and detailed measuring using a tape measure and triangulation.
Drawing, with pencil, the results of the survey carefully bringing all information to the same level of detail and consistency on a well organised composed drawn document.

Prerequisites: AR4023

AR4026 - REPRESENTATION / DRAWING 6
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *In this module students develop skills in 3-dimesnional modelling using the computer, in conjunction with continuing studies in physical modelling. Switching between digital and analogue modes of representation, e.g. models, drawings, digital photography, FormZ, Rhino, and SketchUP, programmes will be explored as tools of transformation and spatial, logical, and structural exploration.*

Syllabus:
Widening the pallet of modes of representation that the student must master, 3-dimensional modelling is taught as a tool of spatial investigation and representation, this course consists of three different types of drawing exercises:
Moving actively between analogue and digital modes of representation, students will develop their ideas between media, exploiting the most powerful aspects of each in terms of their design. Students will develop in parallel their model making skills.

Prerequisites: AR4025

AR4032 - HISTORY AND THEORY OF ARCHITECTURE 2
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *to expand student horizons of knowledge about architecture while teaching the foundational skills in reading and writing in the discipline. Even though students at the School of Architecture are expected to be literate and articulate, entering into a new field, such as architecture, is a difficult intellectual transition to make. Students will need to develop specific cognitive skills to address the new territories they will have to map. The first year program sets out to help students attain a basic literacy in the discipline while introducing contemporary ways of thinking about the field.*

Syllabus: The theme for the spring workshop is Building. Just as students need to learn to describe a site and objectify their reactions to it, as architects it is essential that they also learn to discuss buildings at a high level. Seminars will address Skin, Program, Circulation, Structure, and Codes, introducing both historical and contemporary material to challenge students. Throughout, students will explore architecture's intersection with the material and social realms. As in the first semester, students will undertake close readings of the most significant works in modern and contemporary architecture. Projects likely to be discussed will include Joseph Paxton's Crystal Palace, Otto Wagner's Postparkasse, Mies van der Rohe's 860-880 Lake Shore Drive and Seagram Buildings, Le Corbusier's La Tourette, Eero Saarinen's IBM Headquarters, Bernard Tschumi's Parc de la Villette, FOA's Yokohama Terminal, MVRDV's WoZoCos Housing Project. Readings by authors such as Robin Evans, Colin Rowe, Anthony Vidler, Otto Wagner, Alan Colquhoun, Le Corbusier, and Walter Gropius will explore the diverse ways by which buildings can be discussed.
We will visit nearby sites first-hand in order to learn how to read buildings. Afternoon workshops will focus on describing these sites. The writing projects introduced in the fall semester will be built upon in order to ensure that students have a high degree of skill in thinking about architecture through writing by the end of the term.
This course will be teamed with a series of workshops by Elizabeth Hatz that will introduce students to ways of attaining close readings of buildings through drawing.

Prerequisites: AR4031

AR4034 - HISTORY AND THEORY OF ARCHITECTURE 4
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *The second year program in Architectural Research provides students with a comprehensive survey of the history of architecture and urbanism. In the second semester students will continue to hone the specific cognitive skills required to address the field, deepening their knowledge of the local and global built domain while reading, writing, and researching architecture. The second year program revolves around intensive workshops and seminars.*

Syllabus: Continuing the survey from the first term, the period covered will be from 1945 to the present day, course will survey not simply the history of modern architecture, but the history of environmental, structural, and social systems in such terms. The course is composed of Lectures, seminars, writing workshops, together with research papers.

Prerequisites: AR4033

AR4036 - HISTORY AND THEORY OF ARCHITECTURE 6
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *The third year program in Architectural Research continues the comprehensive survey of the history of architecture and urbanism in the programme curriculum. This module exposes students to urban history.*

Syllabus: Through lectures, discussion seminars, field trips, and writing the course will survey urban history from prehistory to the present day. The course is a broad introduction to urbanism throughout the ages, from the Paleolithic to the present day both in critical texts and first hand. Students will be exposed to the complexity of collective human inhabitations throughout the ages, both in Ireland and abroad.

Prerequisites: AR4032

AR4042 - ASSEMBLY AND TECHNIQUES 2
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *Study of building elements and their design origins. Introduction to constructional detail in drawings and models*

Syllabus: This course will consider the physical realisation of design aspirations through the detailed study of various building elements; structure roof window, entrance etc. This study will be formed by a combination of case study seminars, site visits, as well as the individual students detailed developed of some aspects of their design studio project. The students will be introduced to methods of describing and analysing constructional assembly through drawings and model at scales 1:10 to 1:1.

AR4044 - MATERIALS 1
ECTS Credits: 3

School of Design
Rationale and Purpose of the Module: *The aim is to introduce students to the properties and uses of groups of materials, such as timber, glass, plastics, mineral materials, stone, metals, fabrics, others in architecture, to give students a physical, technological, and analytical basis from which to approach materials in architecture.*

Syllabus: The content of the course is focused on material research, practical tests, experimentation with built works, and lectures/seminars by renowned individuals. A wide-ranging collection for students use and inspiration will be built in the studio, working together to develop a system to show and organize this collection in the studio.

Studio exercises are construction based project work, build a skin for 1m space out of different materials, one from each group, understanding the characteristics by touching and assembling different materials, analysing the models.
There is a lecture series from external architects and artists known for dealing with one specific material, fabrics and wooden constructions.
Second block: Lectures with focus on the physical characteristics of materials, together with a review of the research results of the students so far.
Exercise: Material tests of samples in respect of light, heat, and other physical stresses
Third block: Lectures with focus on assembling techniques of different materials

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AR4046 - ASSEMBLY AND TECHNIQUES 5
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *The aims of this class are:*
- To introduce students to making a comprehensive set of working drawings of a third year design studio project.
- To develop further the students' own intuitive skills in technique alongside knowledge of available construction technology today.
- To introduce students to the Irish Building Regulations
- To carry out a dissertation on a construction system of personal interest.

Syllabus: Developed principles of assembly and techniques will be further studied concurrently with the production of a full set of working drawings.

DRAWING EXERCISE: Each weekly exercise will concentrate on developing one technical aspect of a building. The culmination of the term will be that each student would have completed a comprehensive set of working drawings.

LECTURE COURSE: A weekly lecture will introduce students to developed construction principles, systems and methods. Students will be asked to choose a construction system/method at the start of the year. Each student will complete a short dissertation on the chosen topic for the end of the module.

DIARY OF A BUILDING: Students will be assigned a building of appropriate complexity at the start of the year. Fortnightly supervised visits will be made to the building site.

Prerequisites: AR4043

AR4052 - ENVIRONMENTAL SYSTEMS AND FORCES 2
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *Continuation of first term's work, to give students a basic understanding of physical backgrounds and interconnections for a sustainable development*

Syllabus: Sustainable development is a base for the future of human society on our planet. Architects as the designer for the built environment have a key position in this approach. Therefore a basic understanding of the physical backgrounds and interconnections is necessary. This lecture content spans from global to local and micro climate, to energy and its different forms and sources towards materials and their properties. Parallel and interconnected to the teaching of design basics like space, light, boundaries students will learn the physical backgrounds and properties by handling and personal experiences. Burning your finger at a hot stainless steel surface while missing the heat radiation and understand why this happened - is a much deeper experience, than just calculating heat conductivity on a piece of paper.

Prerequisites: AR4051

AR4054 - ENVIRONMENTAL SYSTEMS AND FORCES 4
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *Development of sustainable principles in design with particular emphasis placed on the house, and achieving balanced solutions in relation to energy and sustainability. Understanding comfort in terms of the cultural and social relations that influence its affect.*

Syllabus: Study of all environmental systems required to create a built environment that is in-balance with nature, with particular emphasis placed on the energy and sustainability needs of housing. Students will conduct experiments, research, and learn methods to analyse, design, and text the environmental aspects of the built environment including, U-Values, building envelope integrity tests, daylight tests. Students will construct from actual data (weather data, etc.) models realistic assessments of a buildings environmental performance.

Prerequisites: AR4053

AR4055 - CULTURE, PLACE AND ENVIRONMENT 1
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *In most cases nowadays, one cannot simply go out and start building. Things must be planned, consents sought, materials organised. The overall architectural project will take time, and will move through a series of modes, and a series of technological, regulatory and economic inputs. The module offers a critique of this parts-based approach, which, it seems, interferes with and determines our capacity to generate spatial, or pictorial, order through a greater understanding of visual world as operated upon by artists, with a particular focus on their means of engagement.*

Syllabus: In the history of art and architecture, there are moments when a new order emerges. This module, through an examination of drawings, built work and work practices, traces the links between the emergence of a new order and the practice of the person who brings it into being. This module investigates in some detail the work of several practitioners through time, and as a specific example, will also examine the relationship of three practitioners, the painter Bridget Riley, the sculptor Donald Judd and the architect Kazuyo Sejima, to the progress of their work and situates this in the context of the work of Ludwig Mies van der Rohe.

Prerequisites: AR4032

AR4058 - PROFESSION AND SOCIETY
ECTS Credits: 3

School of Design

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

AR4068 - ADVANCED CONSTRUCTION 2
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *An extended and clearly structured curriculum in construction design to induce a more innovative and imaginary approach to materials and details. In order to ensure the expected high level of competency in advanced building construction (at an industrial scale and with respect to contemporary and innovative technologies) SAUL introduces a set of Advanced Construction modules throughout Y4 and Y5 in close relation to and in support of the Design Studio projects.*

Syllabus: Architecture students learn best by imagining, developing and realising (full-scale) prototype structures through which ideas can be tested, documented and communicated.
Through actual engagement in all the stages of making and building, students have a unique opportunity to develop a rich phenomenal understanding of architecture. Closely related to Design Studio, Advanced Construction informs and supports the students' individual design studio projects; directed and independent research on advanced construction is applied to these projects.
Students test radical and experimental alternatives to the conventional processes of building because architecture is facing unprecedented pressure to reinvent itself in response to a new set of economic and environmental realities. The responsibility to pre-empt the needs of future built environments demands new approaches. The modules provide an overview of advanced building construction at an industrial scale and with respect to contemporary, emerging and innovative technologies. Students study the design implications of new construction technologies, and investigate precedents and potential applications.

AR4310 - ADVANCED CONSTRUCTION 4
ECTS Credits: 3

School of Design

Rationale and Purpose of the Module: *An extended and clearly structured curriculum in construction design to induce a more innovative and imaginary approach to materials and details.*
In order to ensure the expected high level of competency in advanced building construction (at an industrial scale and with respect to contemporary and innovative technologies) SAUL introduces a set of Advanced Construction modules throughout Y4 and Y5 in close relation to and in support of the Design Studio projects.

Syllabus: The series of modules in Advanced Construction expands the scope of students' competencies in building technologies and construction beyond traditional methods and their related familiar scale. In the final year, students engage in a tested dialogue with concerns of design, structure, environment, history and theory, representation, digital media, and other related areas and interests.
Students undertake a Technical Design Thesis, contextualised as part of a broader dialogue in which the technical and architectural agendas that arise within the year are synthesised. The constructional or technological proposition is pursued critically and developed imaginatively through case studies, material experiments, extensive research and consultation.

AR4367 - Digital Technology
ECTS Credits: 6

School of Design

Rationale and Purpose of the Module: *Students are offered the opportunity to tailor their education to a larger degree in fourth and fifth year, with the invitation to make choices of modules beside the core Design Studio and adjacent modules. The introduction of architecture electives is intended to provide a flexible framework to accommodate the diverse field of interests and (short term) research projects within architecture, and to allow students to pursue their own personal interests within architecture. Smaller classes allow for in-depth interrogation of the subject at an advanced level.*

The elective modules have been conceived and created to give venue to research, to permit the students particular (and varying) interests to diversify and develop - apart from the Design Studio. This is markedly different from the lower three years of the course, where integration is the focus of the course, coordination between modules and Design Studio is essential, and particular student interests are less relevant than developing competence as an architect. Therefore the content of the elective modules cannot be specifically related to the Design Studio this is to allow the student the space to start making their own decisions and setting their own direction.

Syllabus: Architecture electives provide a flexible framework to accommodate (short-term) research projects on a wide spectrum of issues, and to allow students to pursue their own personal interests within architecture. Focusing on case studies, the elective module will be delivered through a programme of lectures, workshops and applied technology laboratories. The subject matter can change depending on the interest and availability of academic staff.

This elective provides the theoretical framework, tool expertise and technical skills required to analyse, understand and represent three-dimensional complex forms (curves, surfaces and volumes) using digital tools. NURBS-based modelling tools and physically correct rendering tools are taught and applied in the process, specifically Rhino and Maxwell Render. The course will also present a number of techniques for sketching complex surfaces using pencil. The course also analyses prototyping and fabrication processes related to these complex forms, and students will study outstanding references of their application in contemporary design.

AS2402 - INTRODUCTION TO ENGINEERING
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To understand the role of engineers in society and the different types of engineering.*
To understand the basic techniques of problem solving in engineering.
To understand the basis of forces and moments in analysing structures
To understand the basics of linear and angular motion when analysing dynamic problems

Syllabus: Overview of the engineering disciplines currently being offered by the Mechanical and Aeronautical Engineering department: The profession (Mechanical, Aeronautical, Biomedical and Design), real-life engineering examples, skills required, career opportunities and career progression.
Using a calculator correctly, Introduction to Engineering Units, Conversion Factors, Dimensional Consistency, Significant Numbers, Newtonian Mechanics, Forces, Vectors, Resolution of Forces, Moments of Forces, Free Body Diagrams, Reaction Forces, Linear Motion, Angular Motion, Mass, Weight, Momentum, Conservation of Energy

Prerequisites: AS2391

AW4006 - PEER-TUTORING IN ACADEMIC WRITING
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *This module recognises the centrality of writing in higher education and the importance of writing as a means of learning. Writing fosters metacognitive thinking about writing leading to the development of transferable generic and complex-thinking skills for students in all disciplines, which in turn generates better writers in both academic and professional settings. Better writers, critical thinkers and researchers are better equipped to sustain the knowledge economy. In this context, the module responds to the University's ongoing need to create better writers in all disciplines. Peer-tutoring is a step towards providing a coordinated and systematic approach to writing development that is sustainable and cost effective as it will produce a cohort of fully trained, confident graduate and postgraduate student-tutors from a wide variety of disciplines.*

Syllabus: Students will develop an awareness and command of the metalanguage to discuss their own writing process. This will be developed through reflecting on existing and past writing assignments. Through small group discussion and writing-focused workshops, students will be engaged in activities to develop themselves as writers and writing tutors, including critical and reflective evaluation of their own writing; familiarity with the conventions honoured and the criteria used by other disciplines for the evaluation of writing therein; development of tutoring strategies; observations of experienced peer-tutors; engagement in regular peer-tutoring activity; managing diverse tutoring situations; and professional development. Students will read, write and talk about argumentation, arrangement of ideas, coherence, discipline-specific style conventions and values, grammar, and ethical concerns.

BC4002 - INTRODUCTORY BIOCHEMISTRY
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module:
** To provide an understanding of the structure and function of the major biological molecules*
** To provide an understanding of the principles of metabolism*
** To provide an understanding of the biochemistry of blood and basic immunology*

Syllabus: The structure and biological function of proteins: Amino acids, peptides and the peptide bond. Polypeptides. Overview of protein function; catalysis, transport, structural, regulatory and defence functions. Case study; structure and function of muscle proteins; myosin, actin and muscle contraction. The structure and biological functions of carbohydrates: Monosaccharides, disaccharides, polysaccharides. Storage and structural functions. The structure and biological functions of lipids: Fatty acids. Storage and structural lipids. Biological membranes. Nucleic acids: DNA and RNA. Genome structure. Transcription and gene regulation. Translation. Basic metabolic principles; metabolic pathways, catabolism versus anabolism. Overview of stage I, II and III catabolic pathways. Summary overview of carbohydrate catabolism; glycolysis and the TCA cycle. The generation and uses of ATP; oxidative

phosphorylation and electron transport. The biochemistry of blood: Blood; composition and major functions. Haemoglobin and gas transport. Blood and pH regulation.
Introductory immunology: Humoral immunity; antigens and antibodies. Cellular immunity. Cytokine based regulation of immune function.

BC4008 - IMMUNO AND DNA DIAGNOSTIC TECHNIQUES
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To provide an overview of the immune system, structure and function of antibodies and usage of Immune and DNA diagnostics.*

Syllabus: Overview of the immune system. Development and diversity of the system. Cellular and humoral responses. Passive vs. active immunity, vaccination. Complement system. T cell structure and differentiation. Memory.
Antibody structure and function. Polyclonal vs. monoclonal bacterial, insect and eukaryotic expression system used for protein production, especially those applied for antibodies production.
Crystallisation of proteins.
Usage of monoclonal antibodies for membrane proteins crystallisation.
Introduction to crystal structure determination.
Interpretation of 3D structure of antibodies.
Immuno- and nucleic acids diagnostics (diagnosis for infectious and genetic diseases), for instance PCR and PCR variants, Real-time PCR, RAPDs, RFLPs, DNA profiling and DNA fingerprinting.

BC4705 - INDUSTRIAL BIOCHEMISTRY 1
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To present an overview of major practical aspects of pharmaceutical manufacture, quality systems and pertinent environmental regulation. To present an overview of industrial enzymes/proteins and their uses. To facilitate critical analysis of issues/topics pertaining to these themes and to provide scope for a measure of student self-directed learning.*

Syllabus: Practical Aspects of Pharmaceutical Manufacture: International Pharmacopoeia. GMP in the Pharmaceutical Industry. The Pharmaceutical Facility; Clean Rooms, Cleaning Decontamination and Sanitation. Generation of Water for Pharmaceutical/ Biopharmaceutical Processing. Product Flow Through the Facility and Associated Documentation. The ISO series of quality standards. Laboratory accreditation. Validation of methodology and industrial processes in biotechnology. Environment and Industry, the Environmental Protection Agency (EPA) and IPPC Licensing for biotechnology. Industrial enzymes and proteins; range, applications and selected case studies. Stabilizing proteins for industrial use.

Prerequisites: BC4903, BC4803

BC4718 - INDUSTRIAL BIOCHEMISTRY 2
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To present an overview of (a) animal cell culture and (b) pharmaceutical biotechnology in the context of underlining science and industrial/medical applications.*

To present an overview of patenting as applied to biotechnology.

To provide the scope for a measure of student self-directed learning and problem-based learning.

Syllabus: Animal cell culture; Overview and introduction to animal cell culture. Animal cell culture, media, methods and apparatus. Animal cell culture; production of industrially useful products. The drug development process; Regulatory route for new drugs in USA & EU. Biopharmaceutical manufacture; Patenting and biotechnology. Principles of patentability. The patent application process. Sources of biopharmaceuticals. Upstream processing. Downstream processing. Post translational modifications and their significance. Product QC and the range and significance of potential product impurities. Nucleic acid-based biopharmaceuticals; the theory underpinning gene therapy, antisense based products and aptamers. Specific biopharmaceuticals; Students will be provided with 2-3 specific biopharmaceutical products/product families, along with bibliographic details of at least 1 reference source material for each. Students will be expected to source the references, along with any additional pertinent references and undertake self-directed study of the biochemistry and biotechnology of the representative biopharmaceuticals.

Prerequisites: BC4904, BC4905, BC4903

BC4904 - PROTEINS AND DNA
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To develop themes in protein chemistry and enzymology. To develop a fundamental understanding of enzyme kinetics, catalysis and purification. To understand the relationship between nucleic acids and proteins leading to gene structure and expression. To back these concepts up with practical skills.*

Syllabus: The structure of DNA and other nucleic acids. The molecular concept of a gene. DNA sequencing. The central dogma - DNA makes RNA makes Protein. Processing of DNA -Replication, transcription and translation. The relationship between DNA and Protein - the genetic code. Eukaryotic and prokaryotic systems. Control sites and elements within DNA. Gene expression - the lac operon. Review of Protein structure, amino acids peptides primary, secondary and tertiary structure of proteins. 3D structures and their representation. Functionality of proteins, Strategies of protein purification and assay. Protein sequencing and analysis. Enzymology, the nature of enzymes, their classification and activities. Enzyme kinetics and catalysis, enzyme inhibitors. Mode of action of enzymes -lysozyme on peptidoglycan.

Prerequisites: BC4903

BR4001 - BROADENING: SOCIAL AND CIVIC ENGAGEMENT
ECTS Credits: 6

Centre for Teaching and Learning

Rationale and Purpose of the Module: *This is a new, innovative and unique module in how it approaches student engagement at a local, regional and national level. It challenges students to critically engage with the graduate attributes in a non-traditional manner through the development of leadership skills and investment in championing real issues through personal and social responsibility. It focuses on the personal development of the student through 'reflection in action' prioritising their personal and academic development. The module will be an elective open to students from all programmes (year 1-3) and initially the aspiration would be to pilot it as an elective in the BBS with a maximum of 50 students.*

Syllabus: This module focusses on self-development and the key graduate attributes through a process of self-directed learning and collaborative projects in key issues of regional and national importance. Students will develop personal and academic curiosity through live projects both within UL and in the community with opportunities to demonstrate strong links with the Civic Engagement Office. Students will develop skills in leadership and critical analysis in relation to how they can impact on their community in a regional and national level.

The campaign element of the module would involve research in an area of social importance (with a focus on students) such as Road safety, mental health, sexual health, social responsibility, alcohol awareness, drug abuse, equality and many more working with the Students Union on the many issues and campaigns they take on. The campaign will have to have an online element and a visible element on campus, a public speech and talk is encouraged and as much engagement with UL and or external bodies is also envisaged.

BR4022 - BROADENING MODULE: "THE EUROPEAN UNION: BROADENING THE PERSPECTIVE"
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *The module will offer students who would otherwise not engage in European*
Studies an opportunity to engage in European Union Studies. While imparting factual information to key aspects of the history, institutions and politics of the European Union will be most prominent in the first half of the module, the second half aims to actively engage students in discussions about topical issues, such as Migration, climate change and Brexit, but also, and perhaps more importantly, in reflections about the future of the European Union, which the students themselves will help to shape in their later careers. The module is interdisciplinary in nature and include and integrate the areas of politics, cultural studies and language studies. It aims to counteract the perception of the European Union as a top-down political enterprise by encouraging students to see it as one dependent on the active engagement of citizens. The module will also address the role of ERASMUS, in which many students will participate, in shaping a sense of EU citizenship.

By reserving one-quarter of the places on this module to ERASMUS students from as wide a range of member states as possible the module will bring the multilingual and multi-cultural European experience into the classroom and make the different national perspectives an integral part of the debate. It will consist of an academic part and - as part of the UL Engage initiative - an off-campus element in which students engage both Limerick schools and the general public in Limerick City in discussions about what it means to be an EU citizen today.

A European element will increase the career prospects of graduates from any discipline in a future Europe, in which after Brexit, Ireland is likely to be even more closely interlinked with other member states.

Syllabus: Part I (weeks 1-6)
Week 1 Introduction; History of the European Idea; What Makes an EU citizen? (Fischer)
Week 2 History of the EU; Institutions and their Functions: Democracy in the EU (Costello)
Week 3 The Four Freedoms (Costello)
Week 4 Social Europe (Moxon-Browne)
Week 5 Ireland in the European Union (Moxon-Browne)
Week 6 EU Languages and Language Policy (Atkinson)

Part II (Weeks 7-9)
(Topics may change depending on political developments)
Weeks 7/8 Year 1: Brexit, Migration;
Year 2: The Euro, "Austerity"/"Fiscal Discipline";
Year 3: External Relations, Climate Change (Scully)
Week 9 Student presentations: mixed groups of 6-7 students (Irish/ERASMUS) will present summaries of debates on the above issues in the media of selected member states in comparison to the representation of these debates in the Anglophone media of Britain and Ireland. (Scully)

Part III
Week 10 The ERASMUS Experience: Auberge Espagnol (Fischer)
Week 11 Preparation for Part IV Community Engagement (Schools: Mannix McNamara / City: Scully)
Week 12 The Future of the European Union (Fischer)

Part IV: One full day in week 12 (Friday/Saturday) will be dedicated to Community Engagement: four groups will engage with pupils in one secondary and one primary school and two with passers-by in selected locations in Limerick city centre (Schools: Mannix McNamara / City: Scully).

BR4081 - BROADENING: ACTIVE BODY, ACTIVE MIND
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *This module is part of the Broadening the Curriculum Agenda here in UL for creating interdisciplinary modules as part of the UL Strategic plan and specifically is designed to enable students to evaluate the importance of health for optimal learning, educational achievement and personal development and appreciate the relationship between an active body and active mind. Through engaging in diverse learning strategies that include practical learning as well as the more traditional lecture and tutorial format, students will experience first-hand the interplay of physical, mental, social and emotional dimensions of learning for health. It will encourage students to integrate the important concepts of an active lifestyle for physical and mental health, well-being and academic achievement. In addition, the module aims to take students beyond traditional understandings of health and learning and to apply their new knowledge to create sustained cognitive, emotional and behavioural change for improved learning and health gains.*

Syllabus: Students will be provided with content and opportunities that allow them to engage in physical activity and learning in a fun, creative, challenging and social context. Through the introduction of different physical activities using the UL campus environment (e.g., team challenges, orienteering, walking, aquatics, sports and dance) students will become aware of the common currency of physical activity not only from a group perspective but also with respect to the level of autonomy individuals have in determining their own active lifestyles. The module provides students with an opportunity learn from an interdisciplinary and intradisciplinary perspectives how to make decisions from a collective group perspective as regards the determinants of being physically active and also accommodate space for students to identify their own motives/ motivational climate in considering and maintaining an active lifestyle. Behavioural change models (e.g., the transtheoretical model/ stages of change model) provide the framework for students to conceptualise and measure active lifestyles of the student population as well as their own. Additionally, this framework can facilitate promotion strategies for individuals and groups. Attention will also be given to the environment in which activity occurs focusing on aspects of contextual intelligence. In addition to enhancing their physical health, the module will also challenge students to become critically aware of their learning styles, their personal study habits and the link between physical activity and improved motivation and learning success.

BR4091 - BROADENING THROUGH SUSTAINABLE DEVELOPMENT
ECTS Credits: 6

School of Design

Rationale and Purpose of the Module: *This interdisciplinary module facilitates the Broadening Agenda and the University of Limerick's Strategic Plan as it seeks to introduce students to sustainable development and equip them with the knowledge, skills, values and literacy for assuming a responsible and informed position as ethically-minded citizens. By addressing the three principal strands of sustainable development - economic, environmental and social - the module will build awareness and coherency around questions of global and local connectedness and interdependency, equity and the fragility of eco-systems. Pedagogically, the module will enhance analytical and critical thinking skills by applying theory to practice and cultivate a community of learners able to develop community led solutions for a sustainable future.*
The module is taught by an interdisciplinary team from across all University Faculties to ensure multiple and often conflicting perspectives on Sustainable Development are presented to the students.

Syllabus: Definitions and contexts for understanding social and human aspects of sustainable development, critical thinking, challenging assumptions, examination of knowledge creation and semiotics.

Climate change, the physical science and international politics, energy, energy use in everyday living, transport, sources of energy and GHG emissions for different sources, energy dependence, renewable energy (wind, biofuel, solar, wave), efficiency and conservation, peak oil.

The economics of sustainability, does sustainable innovation enable sustainable growth? Consumption and production, environmental impact of everyday things, how marketing influences behaviours, life cycle thinking, behavioural thinking, systems change and intervention, creativity and innovation, corporate social responsibility, ethical investment and economic .

Food, sustainable food production, energetics of food production, sustainability of the food chain.

Sustainability and public policy, sustainable development in the national context, the public policy making process, horizontal policy issues, regional and local, European Community and the environment. Sustainability metrics, using scientific analysis to quantify sustainability as guidance for policy makers, environmental taxes, non-environmental subsidies.

Sustainable communities, building sustainable community action, bottom up approaches, role of local democracy and environmental and social movements, local agenda 21.

BR4101 - BROADENING THROUGH PLACEMAKING
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *The aim of this module is to introduce students from a range of disciplines to ideas and issues in placemaking. Placemaking is a collaborative and interdisciplinary way of thinking about place and sustainable development. It is among the emerging methods of thinking and working in social and regional development and regeneration, community building and urban and rural planning. It includes connected and collaborative working and thinking around what makes successful places for living and working. Given that placemaking is based on bringing together several different perspectives on place and development, it is an ideal subject for a broadening module, and will appeal to students from a broad range of disciplinary perspectives.*
The module will be offered to both undergraduate and postgraduate students, as a 6-credit module to undergraduates and as a 3-credit module for postgraduates, with appropriate learning outcomes, teaching and research and assessments for each level. This teaching structure for the module is outlined below. The proposed module will be taught by staff from the contributing faculties. Innovative models of teaching, learning and assessment will be built into the module structure.

The overall module assessment will be based on the creation of group portfolios and presentations on a key issue relating to placemaking in a specific identified location of their choice, demonstrating collaborative a research approach, relevant research and creative proposals for solutions and ideas for change.

This module is designed to be delivered through a number of teaching modes. The module can be delivered as a fully online module, as a module delivered in the classroom on a 12-week or 1 week intensive/lab model, or via a blended approach, utilising both online and classroom delivery. These modes of delivery have been approved by the advisory board for Placemaking.
The module will consist of a series of seminars (provided online or in the classroom) providing students with key information and perspectives on thinking about placemaking and sustainable development from a range of relevant viewpoints, including sociology, urban design, festival and cultural participation, linguistics, geography, economic growth and sustainable community development. These seminars will be provided together with labs (again, either online or in the classroom) that will provide students with skills and perspectives to work collaboratively and proactively, to identify and articulate key issues regarding placemaking, and to creatively and knowledgably propose solutions. The module also promotes social and civic responsibility as it stresses a collaborative and connected approach to creating

successful and sustainable places for life and work, rather than devolving responsibility to one particular group or agency.

The core seminar areas will include (but are not limited to):

- Understanding public space
- Building strong communities through participation
- Urban design
- Language, landscape and public space
- Transportation, public space and quality of life
-Regeneration and community organising
- Cultural participation
- Soundscapes and the public environment
- Festival, parade and protest in public spaces
- Rural public spaces - design and development
- Economic development within urban and rural environments
- Sustainable development
- Building strong relationships between stakeholders in public places
- Policy for strong and connected places
- Public art, amenities and parks - design and management
- Ritual studies and place

The core labs will include:

- Design thinking - introduction and methodology
- Project development and management
- Market research
- Strategic uses of social media
- Project pitching and articulation
- Team working and creative project development within teams
- Key ideas in social entrepreneurship
- Presentation skills (visual, verbal, use of IT resources etc.)

Syllabus: The proposed module is a 6-credit module taught by staff from the contributing faculties. Innovative models of teaching, learning and assessment will be built into the module structure.

The overall project assessment will be based on the creation of group portfolios and presentations on a key issue relating to placemaking in a specific identified location of their choice, demonstrating collaborative a research approach, relevant research and creative proposals for solutions and ideas for change.

The module will consist of a series of seminars, providing students with key information and perspectives on thinking about placemaking and sustainable development from a range of relevant viewpoints, including sociology, urban design, festival and cultural participation, linguistics, geography, economic growth and sustainable community development. These seminars will be provided together with labs that will provide students with skills and perspectives to work collaboratively and proactively, to identify and articulate key issues regarding placemaking, and to creatively and knowledgably propose solutions. The module also promotes social and civic responsibility as it stresses a collaborative and connected approach to creating successful and sustainable places for life and work, rather than devolving responsibility to one particular group or agency.

Within the undergraduate module there will be a strong emphasis on developing skills for working in interdisciplinary teams, and in presentation skills and portfolio development and articulation.

The core seminar areas will include (but are not limited to):

-Understanding public space
-Building strong communities through participation
-Urban design
-Language, landscape and public space
-Transportation, public space and quality of life
-Regeneration and community organising
-Cultural participation
-Soundscapes and the public environment
-Festival, parade and protest in public spaces
-Rural public spaces - design and development
-Economic development within urban and rural environments
-Sustainable development
-Building strong relationships between stakeholders in public places
-Policy for strong and connected places
-Public art, amenities and parks - design and management
-Ritual Studies and Place

The core labs will include:

-Design thinking - introduction and methodology
-Project development and management
-Market research
-Strategic uses of social media
-Project pitching and articulation
-Team working and creative project development within teams
-Key ideas in social entrepreneurship
-Presentation skills (visual, verbal, use of IT resources etc.)

BR4901 - BROADENING: BEGINNERS JAPANESE
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *In line with the UL strategy to broaden the curriculum, this module will offer students in a range of different disciplines an opportunity to engage in learning Japanese. In our increasingly multicultural and multilingual society, it is crucial that students have opportunities to learn about and appreciate other languages and cultures. To this end, the module aims at developing students' competence in Japanese and is targeted at those who have not studied Japanese previously. The emphasis is on achieving a basic level of communication in all four skills (listening, speaking, reading and writing) while developing confidence and a degree of accuracy when using the language in a limited range of situations. The module also aims to stimulate students' interest in Japan and deepen their knowledge and understanding of Japanese society and culture.*

Syllabus: This module aims to introduce students to Japanese and gradually develop their ability to function at beginners' level. Students should develop a basic understanding of everyday vocabulary, understand the rules of pronunciation and have a basic grasp of the relevant grammar for that level. The module will allow students gain sufficient proficiency in Japanese to:
-recognize numbers, times, days, dates, where things are, greetings and questions;
-speak using greetings, expressions of time, price, number, place, talk about themselves, their likes, dislikes, pastimes and schedules, and ask basic questions;
-read words written in the hiragana, katakana and kanji writing systems, grasp information from signs, posters, notices, self-introductions, and descriptions;
-write, using the writing systems studied, short passages about themselves, their lives and their pastimes; in particular, passages introducing themselves and their schedules;
-be able to read and write using hiragana, katakana and about 50 kanji;
-discuss and analyse aspects of Japanese history, culture and society in English.

BR4911 - BROADENING: BEGINNERS FRENCH
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *In line with the UL strategy to broaden the curriculum, this module will offer students in a range of different disciplines an opportunity to engage in learning French. In our increasingly multicultural and multilingual society, it is crucial that students have opportunities to learn about and appreciate other languages and cultures. To this end, the module aims at developing students' competence in French and is targeted at those who have not studied French previously. The module is mapped on to the A1 level of the Common European Framework for Languages where the emphasis is on achieving a basic level of communication in all four skills (listening, speaking, reading and writing). It will also aim at developing confidence and a degree of accuracy when using the language in a limited range of situations. The module also aims to stimulate students' interest in the French-speaking world and deepen their knowledge and understanding of French society and culture.*

Syllabus: This module aims to introduce students to French and gradually develop their ability to the level of A1 as outlined by the Common European Framework for Languages. Students should develop a basic understanding of everyday vocabulary, understand the rules of pronunciation and have a basic grasp of the relevant grammar for that level. The module will allow students gain sufficient proficiency in French to:
-manage to pronounce very short, isolated mainly ready-made expressions;
-show a limited control of a few simple grammatical structures;
-use a very basic repertoire of words related to personal details;
-use a limited range of vocabulary to talk about particular concrete situations;
-use a small range of ready-made expressions and phrases related to everyday topics (introductions, leave-taking and apologies);
-write simple isolated phrases and sentences on everyday topics.

BR4921 - BROADENING: BEGINNERS GERMAN
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *In line with the UL strategy to broaden the curriculum, this module will offer students in a range of different disciplines an opportunity to engage in learning German. In our increasingly multicultural and multilingual society, it is crucial that students have opportunities to learn about and appreciate other languages and cultures. To this end, the module aims at developing students' competence in German and is targeted at those who have not studied German previously. The module is mapped on to the A1 level of the Common European Framework for Languages where the emphasis is on achieving a basic level of communication in all four skills (listening, speaking, reading and writing). It will also aim at developing confidence and a degree of accuracy when using the language in a limited range of situations. The module also aims to stimulate students' interest in the German-speaking world and deepen their knowledge and understanding of German society and culture.*

Syllabus: This module aims to introduce students to German and gradually develop their ability to the level of A1 as outlined by the Common European Framework for Languages. Students should develop a basic understanding of everyday vocabulary, understand the rules of pronunciation and have a basic grasp of the relevant grammar for that level. The module will allow students gain sufficient proficiency in German to:
-manage to pronounce very short, isolated mainly ready-made expressions;
-show a limited control of a few simple grammatical structures;
-use a very basic repertoire of words related to personal details;
-use a limited range of vocabulary to talk about particular concrete situations;
-use a small range of ready-made expressions and phrases related to everyday topics (introductions, leave-taking and apologies);
-write simple isolated phrases and sentences on everyday topics.

BR4931 - BROADENING: BEGINNERS SPANISH
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *In line with the UL strategy to broaden the curriculum, this module will offer students in a range of different disciplines an opportunity to engage in learning Spanish. In our increasingly multicultural and multilingual society, it is crucial that students have opportunities to learn about and appreciate other languages and cultures. To this end, the module aims at developing students' competence in Spanish and is targeted at those who have not studied Spanish previously. The module is mapped on to the A1 level of the Common European Framework for Languages where the emphasis is on achieving a basic level of communication in all four skills (listening, speaking, reading and writing). The module also aims to develop confidence and a degree of accuracy when using the language in a limited range of situations. The module will stimulate students' interest in Spain and Latin America and deepen their knowledge and understanding of Spanish and Latin American society and culture*

Syllabus: This module aims to introduce students to Spanish and gradually develop their ability to the level of A1 as outlined by the Common European Framework for Languages. Students should develop a basic understanding of everyday vocabulary, understand the rules of pronunciation and have a basic grasp of the relevant grammar for that level. The module will allow students gain sufficient proficiency in Spanish to:
-manage to pronounce very short, isolated mainly ready-made expressions;
-show a limited control of a few simple grammatical structures;
-use a very basic repertoire of words related to personal details;
-use a limited range of vocabulary to talk about particular concrete situations;
-use a small range of ready-made expressions and phrases related to everyday topics (introductions, leave-taking and apologies);
-write simple isolated phrases and sentences on everyday topics.

BY4002 - BIOLOGY 2
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *The purpose of this module is to introduce students to fundamental concepts in cellular reproduction and genetics; diversity of life, introductory plant physiology, evolution and ecological principles.*

Syllabus: Cellular reproduction; binary fission, mitosis and meiosis. Introduction to genetics; Mendelian inheritance, chromosomes and genes, mutations. DNA; structure, replication and organisation in cells. Gene activity; the genetic code, transcription, translation and expression. Plant structure and function; transport in plants, reproduction, seed structure, germination, growth and development, plant adaptations.

Introduction to taxonomy and classification. Introduction to animal kingdom (Protozoa, Porifera, Cnidaria, Platyhelminthes, Nematoda, Annelida, Mollusca, Echinodermata, Arthropoda, Chordata). Introduction to fungi, algae and plants (Bryophyta Pterophyta, Coniferophyta, Anthophyta). Evolutionary theories, evidence for evolution, evolutionary process, origins of life. Principles and scope of ecology; ecosystems; cycles in nature; energy flows; population and community dynamics; limiting factors; food chains: succession, environmental concerns.

Prerequisites: BY4001

BY4008 - GENETICS AND MOLECULAR BIOLOGY
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *The purpose of this module is to give students an understanding of the mechanisms underlying genetic inheritance at organism, gene and molecular levels in the light of current knowledge. It is also designed to equip the students, most of whom will be aspiring second -level teachers of biology, the necessary skill and knowledge to able to teach genetics confidently, competently and imaginatively at second level.*

Syllabus: Extensions of Mendelian genetics - incomplete dominance and codominance, pleiotropy. Linkage; multiple alleles, multiple genes and epistasis. Quantitative characters, genetic variance and heritability. Basic laws of probability and inheritance of characters. Basic principles of plant and animal breeding. Human genetics. Introduction to population genetics. Speciation and evolution.
DNA and chromosome structure and packaging. DNA replication, transcription, translation and the genetic code. Mutation causes and effects at the gene chromosome and organism levels. Recombinant DNA/RNA technology. Genomics. Proteomics. Regulation of gene expression in prokaryotes and eukaryotes; genes and cancer, cell differentiation. Bacterial and viral genetics.

Prerequisites: BY4002, BY4006

BY4016 - ANIMAL PRODUCTION SYSTEMS
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *The purpose of the module is to educate the students in animal production, health and welfare so that they are able to teach it as part of agricultural science at leaving certificate level*

Syllabus: - Animal Welfare
- Five freedoms of animal welfare, Animal Welfare Law; principles of animal welfare; body condition scoring of cattle, sheep and pigs; major categories of animal diseases; zoonotic and notifiable diseases.
- Sheep Flock Management
- Sheep production systems; sheep breeds; sheep breeding; rearing and feeding of sheep and lambs; sheep diseases; building and handling facilities for sheep.
- Beef Herd Management
- Breeds of beef cattle; rearing and production of steer, heifer and bull beef; feeding of beef cattle; carcass grading systems for beef cattle; diseases of beef cattle; housing and handling facilities for beef cattle.
- Dairy Herd Management
- Breeds of dairy cattle; spring and autumn calving dairy herds; life cycle of a dairy cow; the lactation curve; diseases of dairy cows; rearing of dairy calves; feeding of dairy cows; milking machine and milking parlour operation; housing and handling facilities for dairy cows.
- Pig Production
- Breeds of pigs; the pig production cycle; diseases of pigs; feeding of pigs.
- Poultry Production
- Poultry management of production of meat and eggs; poultry housing.

Prerequisites: BY4025

BY4026 - HORTICULTURE
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *The purpose of the module is to familiarize students of the Biological Sciences (LM092) who are taking the Agricultural Science elective, with the principles and practices of Horticultural science.*

Syllabus: Composts, growing media and substrates in horticulture, seed propagation, vegetative propagation, seedbed preparation, horticultural crop rotation, vegetable crop production & fertilising, fruit crop production, protected crop structures, climatic factors associated with plant growth, micropropagation & genetic modification of plants. Sustainability of Horticulture.

Prerequisites: BY4015

BY4068 - NEW DEVELOPMENTS IN AGRICULTURAL SCIENCE 2
ECTS Credits: 3

Biological Sciences

Rationale and Purpose of the Module: *The purpose of the module is to provide students with both an understanding and appreciation of new developments in the practice and teaching of agricultural science. This will enhance their technical and pedagogical skills in agricultural science and increase their confidence in teaching the subject. In addition the module will equip students with the skills necessary to conduct independent research in agricultural science.*

Syllabus: The module is delivered through a combination of lectures, field trips and online resources. Emphasis will be placed on mixed ability teaching utilising a variety of approaches to assessment to include

formative, summative and diagnostic strategies; fostering a community of learning (FCL) and self-directed learning in agricultural science. The module content will cover the following topics:
1. Agricultural Pedagogy
There is a need to provide student with subject specific skills. Emphasis will be placed on investigative and inquiry based approaches in the classroom, laboratory and field based situations.
2. Precision Agriculture
Information technology is increasingly deployed across all farming systems for a variety of purposes such as efficient resource usage (e.g. fertilisers, fuel), animal fertility, grazing management and mitigation of the environmental impact of agriculture (e.g. greenhouse gas emissions). This content will advance student knowledge of IT use in agriculture.
Agriculture and the Environment
3. Soil Science
The national soil classification system has recently been changed with implications for agriculture, land use, environmental protection and planning. Students will gain and understanding of this new system and be able to teach it as part of Leaving Certificate Agricultural Science.
4. Health and Safety in Agriculture
Health and Safety is an often under-appreciated but crucial issue in farm management. Students will be aware of the need for farm level health and safety procedures and be able to recognise basic steps for its implementation.

Prerequisites: BY4016

BY4102 - BIOLOGY FOR BIOSCIENCES
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *The purpose of this module is to introduce students to fundamental concepts in cellular reproduction and genetics; diversity of life, introductory plant physiology, evolution and ecological principles.*

Syllabus: Cellular reproduction; binary fission, mitosis and meiosis. Introduction to genetics; Mendelian inheritance, chromosomes and genes, mutations. DNA; structure, replication and organisation in cells. Gene activity; the genetic code, transcription, translation and expression. Plant structure and function; transport in plants, reproduction, seed structure, germination, growth and development, plant adaptations.

Introduction to taxonomy and classification. Introduction to animal kingdom (Protozoa, Porifera, Cnidaria, Platyhelminthes, Nematoda, Annelida, Mollusca, Echinodermata, Arthropoda, Chordata). Introduction to fungi, algae and plants (Bryophyta Pterophyta, Coniferophyta, Anthophyta). Evolutionary theories, evidence for evolution, evolutionary process, origins of life. Principles and scope of ecology; ecosystems; cycles in nature; energy flows; population and community dynamics; limiting factors; food chains: succession, environmental concerns.

Prerequisites: BY4001

BY4104 - ECOLOGY 1
ECTS Credits: 6

Biological Sciences

Freshwater ecosystems: lentic and lotic habitats, plant and animal life; physico chemical and other abiotic influences in freshwater ecosystems Marine ecosystems, concentrating on the ecology of rocky shores; brief consideration of sandy, muddy and estuarine ecosystems; plant and animal life and the influence of physico chemical and other abiotic factors intrinsic to these ecosystems. General introduction to plant and vegetation ecology, plant communities in Ireland. Woodland ecosystems: structure, composition, succession. Adaptations of woodland plants and animals. Population dynamics and ecological strategies of woodland plants. Food webs, primary and secondary productivity in these ecosystems. Detritus and grazing food chains. Detritivores in woodlands; fungi and their role in woodlands. Introduction to vegetation sampling.

Prerequisites: BY4001, BY4002, BY4003

BY4214 - PRINCIPLES OF HUMAN NUTRITION
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *To introduce students to the basic concepts and principles of Human Nutrition*

Syllabus: This module will examine nutrients, their function, metabolism and food sources as well as discuss the latest research in the role of nutrition for the promotion of optimal health and prevention of disease. The absorption, digestion and essential functions of the macronutrients (carbohydrate, protein and lipids) and the micronutrients (vitamins and minerals) will be explored. Changes in nutritional requirements at different stages of the life cycle will discussed as well as special needs during pregnancy, lactation and aging. The impact of nutrition and food on the promotion of health and the prevention of disease will be fully explored. Topics covered include: energy requirements, carbohydrates, protein, lipids, absorption, digestion and metabolism of nutrients, vitamins, minerals, water, dietary standards, heart disease, cancer, obesity, maternal nutrition/lactation, infant/childhood/teenage nutrition

Prerequisites: BY4001, BY4002, CH4102

BY4505 - POLLUTION BIOLOGY
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *To familiarise students with the main types of environmental pollutants, their origins exposure routes and impacts. To equip students with skills in the methodology monitoring the impacts of selected pollutants.*

Syllabus: Categories of freshwater pollution. Organic pollution of surface and ground water - sources, effects and impacts. Indicators - biological and chemical monitoring; use of biotic indices. Methods for determination of nitrates, phosphorus, chlorophyll a, Ca, Mg, D.O., B.O.D., C.O.D., T.O.C., etc. Microbial pollution - methods.
Toxic pollutants in air, water, soil and food. Introduction to toxicological principles: acute toxicity; LD50; chronic toxicity (types of). Uses of lab and epidemological studies. Introduction to structure activity relationships in toxic chemicals. Risk assessment. Analytical methods. Review of toxic effects of heavy metals, chlorinated hydrocarbonsand other organics and inorganics, mycotoxins, radioactive elements. Air pollution: major air pollutants, sources and impacts, i.e. smoke SO2, NOx, PAHS CO2 Ozone, volatile organics CFC's. Global warming auses, models and scenarios; biological impacts.

Prerequisites: BY4003

CE4004 - MECHANICS OF SOLIDS
ECTS Credits: 3

School of Engineering

Rationale and Purpose of the Module: *Aims and Objectives*
** To provide a foundation for analysing structures.*
** To provide the foundations for analysing stress and strain.*

Syllabus: Infinitesimal strain at a point in a two dimensional stress field and Mohr strain circle. Selection of strain gauges for measurement on metals, thin circular plates. Complex stresses and criteria for failure of isotropic homogeneous materials (Rankine, Tresca and Von Mises). Linear elastic fracture mechanics. Fatigue. Unsymmetrical bending of open and closed thin walled beams: shear centre.
Constitutive relations. Temperature stress, Torsion of cylindrical sections, Analysis of stress at a point in 2D, Principal stress and Mohrs stress circle, thin cylinders and thin spherical vessels.

CE4008 - VLSI DIGITAL PROCESSING SYSTEMS
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *Introduce and use advanced algorithms and architectures for the efficient digital implementation of signal processing algorithms.*

Syllabus: Pipelining and parallel processing. Signal flow graphs, Fine grain pipelining. Block processing. Low power architectures. Fault-tolerant DSP.

Cyclic and acyclic convolution. Digital filter structures. CSD techniques, Distributed arithmetic, fast convolution algorithms. Parallel FIR filters. Multidimensional convolution. Sampling-rate converters.

Cooley-Tukey FFT, Goertzel algorithm. Bounds on multiplicative complexity. Multidimensional transforms.

Modular arithmetic. Galois field Architectures for multiplication, division and exponentiation.

Trellis and tree searching with the Viterbi algorithm, VLSI structures for the Viterbi decoder. Berlekemp Massey Algorithm for Toeplitz Systems.

Prerequisites: EE4817

CE4013 - STRUCTURAL ANALYSIS
ECTS Credits: 6

School of Engineering

SI units and manipulation of formulae, sources and types structural loading, reactions and supports, free body diagrams, shear force and bending moment calculations, static determinacy and indeterminacy, qualitative analysis of beams and frames, stability and analysis of pin jointed frames, section properties, engineers equation of bending.

CE4024 - STRUCTURAL STEEL AND TIMBER DESIGN
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *This module introduces the student to the structural design and detailing of elements in steel and timber with the following key objectives:*

Key objectives
** To master the concepts of structural design in steel and timber.*
** To develop the skill of detailing structural connections in steel and timber.*
** To develop an awareness of the structural uses and limitations of steel and timber.*

Syllabus:
* Structural Steel
Manufacture and composition - a review, section properties tables, design of fully restrained, partially restrained and un-restrained beams, truss design, design of long and short columns; axial and combined loading conditions, design of pinned and moment connections, baseplate and splice design, structural detailing and fire & durability issues.
* Timber Design
Properties and conversion of timber - a review, beam design, column design; axial and combined loading conditions, truss design and stability issues, Introduction to diaphragm & shearwall design, bolted, nailed and stapled connections, glulam, LVL and I-beam design, structural detailing and fire & durability issues.

Prerequisites: CE4002

CE4025 - TRANSPORT PLANNING AND DESIGN
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *This module places transport in its wider historical and contemporary context as a major determinant of sustainable human settlement. It addresses current thinking and trends and introduces the main methods of data collection and analysis, transport system planning, appraisal, design and management.*

Syllabus: History and Contemporary Picture and Trends: Physical, social, political and economic contexts, sustainable transport and settlement, current policies and trends.
Data Collection and Analysis: Use of demographic data, survey design and implementation.
Appraisal and Forecasting: Demand drivers, mode choice and behaviour, an overview of multi-modal macro and micro modelling, modelling uses and limitations, demand and capacity forecasting, impact assessment.
Road Design: Road construction details and geometric guidelines, road junction analysis.

CE4028 - ENERGY EFFICIENT BULDINGS: MODELLING AND DESIGN
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *Building energy design is now a primary driver of overall building design. Understanding building energy physics is now essential for all design team members. Aims and objectives: Train students how to design and model energy-efficient buildings; Equip students with the knowledge required to quantify the energy-efficiency of preliminary designs and propose building and material design modifications; predict thermal performance within*

building zones; understand how building design, occupancy and use interacts with thermal energy systems, solar irradiance and weather conditions as well as their effect on human comfort and energy consumption.

Syllabus: Building design and energy use: historical trends, current status and future trends Building energy policy at national and EU level; factors affecting human comfort; Steady-state and transient thermal physics of buildings; heat transfer mechanisms; performance metrics; typical metric values for building including exemplar low-energy and passive builds; design related and environmental performance drivers overall form, aspect ratio, surface-to-volume ratio, percentage glazing, orientation, site context, solar irradiance, prevailing winds, shelter, design features including insulation, solar shading, low-e coatings, automated shading and ventilation.

Overview of strategies for modelling building thermal physics; thermal resistance networks; lumped capacitance; steady-state vs. transient; dimensionless scaling parameters and empirical correlations; compiling input data - building fabric, thermal mass, weather data, building use, active, passive and mixed mode ventilation, thermal sources, heating & cooling systems, control strategies and feedback.

Design thermal model, build and digitise model, configure inputs, configure outputs, solve and interpret outputs; describe scope and limitations of model; suggest modifications to enhance energy usage, update model, analyse response and appreciate cost benefit of improvements.

CE4034 - BUILDING ENERGY SYSTEMS
ECTS Credits: 3

School of Engineering

Rationale and Purpose of the Module: *This module uses the Dwelling Energy Assessment Procedure (DEAP) as a framework for introducing the fundamentals of building environmental and energy systems so that the learning outcomes are realised:*
Syllabus: Dwelling Energy Assessment Procedure DEAP
Heat: Introduction to energy, thermal insulation, heat loss calculations, principles of air conditioning.
Lighting: sources, efficiency and control.
Ventilation: ventilation, air filters, heat recovery systems.
Hot Water: Hot water supply, low, medium and high pressure hot water heating, district heating.
Noise: managing noise.

CE4068 - PROCUREMENT AND CONTRACTING II
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *This module builds on the construction contracting and procurement topics provided in Procurement and Contracting 1 and further develops the procurement and contracting fundamentals as they apply to the various aspects of the construction industry; including civil, structural, mechanical, electrical and plant elements. In particular the causes and remedies for construction disputes are covered such that the following key objectives are met:*

To become familiar with the relevant terminology as it applies to the construction industry.
To develop a strong understanding of the standard forms of construction contracts in use in the industry, both domestically and internationally and making specific reference to the work carried out under the aegis of the various multilateral development banks.
Create an understanding of the role of the construction manager as an agent for the prevention and successful management of disputes.
Develop an ability within aspiring construction managers to appreciate and take full account of the ramifications of their, and other parties, actions in the context of successfully leading and managing complex construction projects.
To reflect the role of ethics in professional practice.

Syllabus: Construction contracts: formation, tendering, conditions, standard forms; areas of dispute and liability; certification process; claims and the importance of the programme in the management of time-related claims; dispute resolution: traditional forms, dispute boards, adjudication, alternative dispute resolution; design liability of professionals and contractors.

CE4206 - OPERATING SYSTEMS 2
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *Study of multitasking operating systems. Study will be confined to single processor systems. A UNIX or WIN-32 operating system will be selected as the prime example operating system. The module lab work will teach the student to develop concurrent program solutions. The module includes: concurrency, states, queues, scheduling. Process inter-communication. Memory management. File systems to support multitasking, File sharing, File protection, performance issues. Conditions for deadlock and solutions. I/O devices and device drivers. File security and protection.*

Syllabus: 1) Processes: Concurrency, states, queues, scheduling. 2) Process Communication: Mutual exclusion, race conditions, busy-waiting solutions, Test/Set locks, semaphores, monitors, simple message passing, pipes and classical problems. 3) Memory Management: Swapping, virtual memory, paging, segmentation, performance and protection issues. 4) File systems to support multitasking: File sharing, file protection, performance issues. The UNIX i-node system. 5) Deadlock: Conditions for deadlock and solutions. 6) Input/Output: I/O Devices for multitasking environments, need for design of re-entrant drivers. 7) Computer Security and Protection: User authentication; protection matrix; ACL; capabilities. 8) Case Study: The UNIX Operating System: Origins; Standards; Shells; Utilities; Process Management; Memory Management; File Management; Programming in the Unix environment (Or, equivalent study based on a WIN-32 operating system.)

Prerequisites: CE4204

CE4208 - DISTRIBUTED SYSTEMS
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module is designed to provide students with a framework for comparing emerging distributed systems, as well as an understanding of the algorithms necessary to support a distributed system. Computing models and data communications will be studied, as well as software development issues relating to the development of distributed applications.*

Syllabus: To introduces application design principles and techniques using available web-based technologies. (e.g.

SOAP, Microsoft.NET, Java Services). Reliability and security issues of distributed applications are addressed. Use of cookies and the covert use of applications to provide a community-wide service.

Characterization of Distributed Systems. Tools and technologies used to develop distributed applications. Mechanisms to secure applications from malicious attacks and errant processes. Component based software development (e.g. CORBA, JavaBeans). Service portability via virtual servers. Replication and Fault Tolerance. Study of evolving Web services. The role of the hidden internet for intelligence gathering. Remotely hosted application environments.

Prerequisites: CE4607, CE4206

CE4518 - COMPUTER ARCHITECTURE
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *To provide a grounding in the analytic study of computer architecture and an introduction to various architectural styles, e.g., CISC, RISC, and variousnon-von Neumann architectures.*

Syllabus: Review of Von-Neumann architecture: Brief discussion of evolution in processor design from 1940's to today. Computer classifications. Flynn's taxonomy: SISD, SIMD, MIMD.
Computer performance measurement: Execution time and clock cycles per instruction (CPI). MIPs, MFLOPs. Benchmarks: Dhrystone, Whetstone. Kernels: Livermore loops, Linpack, SPECmarks.
Floating point arithmetic: IEEE 754. Addition. Rounding. Denormalised numbers. Multiplication. Iterative division. Precision. Instruction set design and architecture: Classification. Register machines. Addressing modes. The role of high-level languages and compilers in determining instruction set architecture, "semantic gap", "high-level language architecture", CISC and RISC architectures. Processor implementation techniques: Datapath. Execution steps. Control: hardwired, microcoded. Handling exceptions. Pipelining: Hazards in pipelines. CISC and RISC pipelines. Multicycle pipelines (superpipelining). Dynamic scheduling. Scoreboarding. Tomasulo's algorithm. Instruction level parallelism. Superscalar architecture. VLIW. Software pipelining and trace scheduling.
Memory hierarchy design: Register windows. Caches: strategies, replacement policies, block size. Main memory: width, interleaving. Virtual memory: page tables, translation lookaside buffers.

Prerequisites: CE4517

CE4702 - COMPUTER SOFTWARE 2
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *Further the students' knowledge of a modern object oriented programming language with particular emphasis on classes, objects and Graphical User Interfaces. Understand the concepts of inheritance and polymorphism.*
Develop the ability to produce moderately complex event driven programs with user interfaces developed using a graphical toolbox.

Syllabus: The following topics will be covered:
In depth study of the object oriented principles, abstraction, inheritance and polymorphism.
Abstract data types including interfaces, abstract classes.
Input and output including files and streams.
Introduction to the use of regular expressions to manipulate text files
Introduction to algorithms - efficiency, simple analysis and comparison
Error handling techniques
Binary trees
Recursion
Graphical user interfaces and development of event driven applications
Unique global class naming and creation of class libraries
Code documentation and code reviews
Use case analysis

Prerequisites: CE4701

CE4717 - LANGUAGE PROCESSORS
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *To introduce the theory of compiler design and show its application in a simple compiler. An important part of the module is the implementation of a compiler for a simple, Pascal-like, language.*

Syllabus: Compiler structure: Definition of terms. Source, object and executable files. Symbols, definition and resolution. Phases of a compiler and their functions. Single and multi-pass compilation. Cross-compilation, interpreters and pseudo-machines.
Grammars: Mathematical grammars for language definition. BNF and EBNF notations. Parse trees. Properties of grammars. The Chomsky hierarchy. Syntax diagrams. Restrictions on grammars.
Parsing: Top-down parsing. Lookahead. Recursive descent. LL (l) grammars. First, follow and predict sets. Syntactic error detection and recovery for recursive descent parsers.
Semantic processing: The symbol table. Handling semantic errors.
Code generation for a simple stack machine: Translation of expressions to reverse-Polish form. Procedure calls and block structure. Static and dynamic scope. Storage management for modern languages.
Scanning: Regular expressions. State machine implementation. Nondeterministic automata and translation to deterministic automata. The use of a scanner generator such as LEX.
Table-driven parsing techniques:
LL (l) table-driven parsers. Shift-reduce parsers. LR parsing. The LR (0) Characteristic Finite State Machine. LR (l). SLR. LALR (l). The use of a parser generator such as yacc.
Code generation for register architectures. Introduction to code optimisation techniques.

Prerequisites: CE4703

CG4008 - PROCESS TROUBLESHOOTING
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To provide the student with skills and knowledge in the field of chemical and biochemical process troubleshooting.*
To provide the students with a working knowledge of a commercial Computational Fluid Dynamics code via practical computer laboratory sessions.

Syllabus: Characteristics of trouble shooting problems and the methodologies used to solve them. Approaches to the analysis and formulation of solutions to process issues.

Data gathering and critical thinking techniques. The use of interpersonal communication skills in handling management issues associated with industrial process problems.

Practical methodologies: recognising patterns, cause-effect, reasoning, and selection of valid diagnostic actions; process trouble shooting rules of thumb; formulation of realistic solutions to process problems.

Selected process trouble shooting case studies in the chemical and biochemical industries.

Process trouble shooting simulation lab.

Conservation equations for mass, momentum and energy; Finite-volume method for stirring reactor problems; Construction of geometry, grid generation techniques and discretization using commercial Computational Fluid Dynamics (CFD) solvers; Turbulence modelling; Implementation of boundary conditions.

Prerequisites: CH4405, CH4415

CH4002 - PHYSICAL CHEMISTRY 1
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module:
i. To facilitate the student in understanding of the fundamental thermodynamic laws and its qualitative and quantitative applications to chemical systems
ii. To familiarise the students with the energy terms and relations that applicable to chemical thermodynamic systems
iii. To introduce the students to the basic chemical kinetics including the quantitative expressing of the rate of chemical reactions and key kinetic parameters in the chemical kinetics

Syllabus: [Introduction to Chemical Thermodynamics; Heat; Work; Reversible and Irreversible Systems; State functions.]
[First Law of Thermodynamics; Internal Energy; Enthalpy; Standard Enthalpies.]
[Second and Third Laws of Thermodynamics; Entrophy, Clausius Inequality; Gibbs and Helmholz Free Energies.]
[Chemical Equilibrium; variations with temperature and pressure.]
[Introduction to Chemical kinetics; Zero, First and Second Order Rate Laws. Activation Energy and the Arphenius Equation; Accounting for the Rate Laws; Reaction Mechanisms; Steady State Approximation. Michaelis-Menten equation]

CH4004 - PHYSICAL CHEMISTRY 3
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module:
i. To facilitate students in understanding the fundamental thermodynamic laws and functions that rule a process of change in a physical chemical system.
ii. To provide students with requisite knowledge of analysing physical chemical systems, such as the phase transformation of a pure substance, the mixing and phase transformation of two components, using thermodynamic and derived thermodynamic functions.
iii. To familiarise the students with the phase diagrams and the use of these to analyse the above-mention physical chemical system.
iv. To provide the students with basic knowledge of electrochemistry, electrochemical cell and their thermodynamic account.

Syllabus: - 1st Law of Thermodynamics; Enthalpy
- Entropy; 2nd and 3rd Laws of Thermodynamics; Clausius Inequality
- Helmholtz and Gibbs Energies
- Chemical Potential; Fundamental Equation of Chemical Thermodynamics
- Physical Transformations of Pure Substances: Phase Diagrams; Phase Stability and Phase Transitions; The Physics of Liquid Surface
- Simple Mixtures: Gibbs-Duhem equation; Raoult's and Henry's Laws
- Phase Diagrams: Phase Rule; Two-Component Systems
- Equilibrium Electrochemistry: Thermodynamic Properties of Ions in Solution; Electrochemical Cells; Nernst Equation

Prerequisites: CH4003, CH4002

CH4008 - ORGANIC PHARMACEUTICAL CHEMISTRY 2
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To build on the functional group chemistry covered in CH4102, CH4103, CH4104 and CH4007. To extend the students' comprehension and working knowledge of functional group chemistry; to expand the range of reagents, reactions and associated mechanisms; to detail how structure and reactivity can be quantitatively correlated; to detail quantitative aspects of acid and base catalysis.*

Syllabus: Section A: Regiochemical control: addition of HBr by ionic and radical mechanisms, alcohol formation by acid catalysed hydration and via hydroboration; Chemoselective control: Lindlars catalyst and dissolving metal reduction; hydride reducing reagents, Reformatsky reaction; use of protecting groups. Stereochemical control: asymmetric induction, diastereomeric selectivity, Felkin-Anh model; enantiomeric selectivity, chiral hydride reagents (Alpine Borane and Alpine Borohyrdides), chiral catalysts -Monsanto catalyst for L-Dopa production.
Section B: Quantitative structure activity relationships: development and use of the Hammett equation; definition of general and specific acid and base catalysis, use of buffers and kinetic data to distinguish between general and specific catalysis, quantitative analysis of data.
Named (and other) Reactions: Oral presentation by students on reactions such as Hydroboration, Reformatsky, Dihydroxylation, Mannich Reaction, Reductive Amination, Birch Reduction, Michael Addition, Allylic bromination, Sharpless Epoxidation, Mitsunobu Reaction, Suzuki Coupling, Heck Reaction, Benzyne chemistry.

Prerequisites: CH4008

CH4012 - GENERAL CHEMISTRY 2
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To introduce students to the general principles of Energetics, Electrochemistry, Kinetics and Structure, building on what they have done in General Chemistry 1.*

Syllabus: Energetics: Enthalpy, entropy and free energy; first two laws of thermodynamics; thermochemistry; equilibrium constants and free energy. Electrochemistry: Free energy and cell potential; emf cells and the Nernst equation; electrochemical series; electrolysis cells and Faraday's laws; batteries and fuel cells.
Kinetics: Rate equation, rate laws and orders of reaction; factors affecting rates of reaction; activation energy and reaction profile; Arrhenius equation; catalysts.
Structure and bonding: Types of chemical bonding, classification of solids and properties. Bonding in relation to the Periodic table.
a) Molecular compounds: Lewis structures, VSEPR and molecular shape, polarity; nature of the covalent bond, types of covalent bond - sigma and pi, single, double and triple.
b) Ionic compounds: nature of the ionic bond; unit cells; lattice energy; factors affecting the strength of ionic bonds.
Solubility: Factors affecting the solubility of molecular and ionic compounds - energetics, kinetics and structure.

Prerequisites: CH4701

CH4017 - CHEMICAL NANOTECHNOLOGY
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module:
The Chemical Nanotechnology module will
-Provide the student with a broad understanding of the principles that underpin nanoscience and nanotechnology.
-To acquaint the student with synthetic methods for formation of nanostructures and new physical properties that arise.
-To enable the student to solve problems relating to size dependent physical, optical and electrical properties at the nanoscale.

Syllabus: Course will cover: (1) Chemical and physical properties as length scales vary from the macroscale through microscale to the nanoscale. (2) Chemical synthesis and modification including 0D, 1D and 3D incorporating II-VI colloidal nanocrystals. Study of carbon nanotubes, wrapping vectors, tensile strength and electronic properties (3) Kinetics of nanocrystal growth and the organic/inorganic interface. (4) Chemical functionalisation of inorganic nanostuctructures with organic molecules and the bio/nano interface (5) Industrial applications of nanochemistry, nanosizing of pharmaceuticals etc. (7). Introduction to crystal engineering with emphasis upon the following subjects: Supramolecular chemistry, especially hydrogen bonding Types of crystalline solids and their characterization (8) Pharmaceutical materials especially multi-component crystals (cocrystals) -(9) Coordination polymers especially porous metal-organic materials.

CH4027 - NANOTECHNOLOGY
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To provide a specialist module in nanotechnology.*
The Nanotechnology module will
-Provide the student with a broad understanding of the physical and chemical principles that underpin nanoscience and nanotechnology.
-Acquaint the student with synthetic methods for formation of nanostructures and new physical properties that arise.
-Enable the student to solve problems relating to size dependent physical, optical and electrical properties at the nanoscale.

Syllabus: Course will cover: (1) Chemical and physical properties as length scales vary from the macroscale through microscale to the nanoscale. (2) Study of fundamental properties of nanomaterials such as carbon nanotubes and nanoparticles in terms of geometries, tensile strength, and electronic properties (3) Functionalisation of inorganic nanostuctures with organic molecules and the bio/nano interface (4) Molecular driving forces including quantum interactions and molecular dynamics (5) Application to design and synthesis of advanced materials for renewable energy, medical diagnostics, and food production.

Prerequisites: CH4701, BY4001, CH4252, PH4131, PH4102

CH4031 - GENERAL CHEMISTRY 2 (INORGANIC)
ECTS Credits: 3

Chemical Sciences

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

CH4041 - GENERAL CHEMISTRY 2 (PHYSICAL)
ECTS Credits: 3

Chemical Sciences

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

CH4054 - PHYSICAL CHEMISTRY
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To teach key principles of physical chemistry.*
To carry out practical work to support and reinforce some of the theoretical aspects encountered.

Syllabus: Thermodynamics, heat, work, reversible and irreversible systems, state functions; First law of thermodynamics, internal energy, enthalpy, standard enthalpies, second law of thermodynamics, entropy, Gibbs free energies, Chemical equilibrium; effect of temperature, pressure, concentration, Le Chateliers Principle; Ions in aqueous solution; electrochemical cells, electrolytic conductivity, Reaction kinetics: zero, first and second order reactions and enzyme kinetics-Michaelis-Menten.

CH4102 - ORGANIC CHEMISTRY 1
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To impart to the student an understanding of, an enthusiasm for, and a basic working knowledge of organic functional group chemistry.*

Syllabus: Alkanes, cycloalkanes, alkenes, alkynes: structural formulae; shape and bonding; nomenclature; isomerism; conformational analysis; free radical and ionic reactions; mechanism of reactions; electrophilic addition; primary, secondary and tertiary carbonium ions. Haloalkanes: nomenclature; substitution and elimination reactions; mechanism of reactions - SN1, SN2, E1, E2. Alcohols, ethers and epoxides: methods of preparation; typical reactions. Aldehydes and ketones (part 1): methods of preparation; typical reactions - nucleophilic addition, Grignard reaction as a carbon-based nucleophile; keto-enol tautomerism and reaction (bromination) at the a-position.

Prerequisites: CH4102

CH4104 - ORGANIC CHEMISTRY 3
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To build on and extend the foundation chemistry covered in CH4102 and CH4103; to highlight heterocyclic chemistry as a key part of this extension; to develop the associated chemistry, reactions, biological importance of various heterocyclic compounds; to give the student a basic working knowledge and comprehension of the biomolecules - aminoacids, peptides and carbohydrates; to carry out practical work to support and reinforce some of the theoretical aspects encountered.*

Syllabus: Protein Chemistry:
Amino Acids: structure; synthesis and resolution; stereochemistry; isoelectric point; preparation from a-haloaminoacids; Gabriel Synthesis; Strecker Synthesis. Peptides: Sequence determination: N and C terminal analysis; strategy for synthesis, use of protecting groups and activating agents, solid state synthesis using Merrifield resin.

Carbohydrate Chemistry:
Monosaacharides: aldoses and ketoses; structure and stereochemistry; hemiacetal and hemiketal formation; Fischer Projections, Haworth representation, chair conformation; oxidation and reduction reactions. Disaacharides: Glycosides (sugars as acetals and ketals); structure; reducing and non-reducing disaacharides. Polysaacharides: structure and occurrence.

Heterocyclic Chemistry:
5-Membered ring aromatic heterocycles: structure, aromaticity; electrophilic aromatic substitution reactions-reactivity and orientation; 5-membered ring non-aromatic heterocycles: structure and synthesis. Basicity of aromatic /non-aromatic N-heterocycles.
6-membered ring aromatic and non-aromatic N-heterocycles: Structure, properties; electrophilic and nucleophilic aromatic substitution reactions of pyridine; reactivity and orientation; basicity. Azoles and Fused 5-membered ring aromatic heterocyles; Structure, basicity (where relevant); Azines. Nucleic acids.
Occurrence/application of all types of heterocycles encountered above. Current trends.

Prerequisites: CH4103, CH4102

CH4122 - GENERAL CHEMISTRY 2 (INORGANIC)
ECTS Credits: 3

Chemical Sciences

Rationale and Purpose of the Module: *To introduce students to the general principles of molecular structure and bonding, building on what they have done in General Chemistry 1.*

Syllabus: Structure and bonding: Types of chemical bonding, classification of solids and properties. Bonding in relation to the Periodic table.

a) Molecular compounds: Lewis structures, VSEPR and molecular shape, polarity; nature of the covalent bond, types of covalent bond - sigma and pi, single, double and triple.

b) Ionic compounds: nature of the ionic bond; unit cells; lattice energy; factors affecting the strength of ionic bonds.

Solubility: Factors affecting the solubility of molecular and ionic compounds

Prerequisites: CH4701

CH4132 - GENERAL CHEMISTRY 2 (PHYSICAL)
ECTS Credits: 3

Chemical Sciences

Rationale and Purpose of the Module: *To introduce students to the general principles of Energetics and Kinetics, building on what they have done in General Chemistry 1.*

Syllabus: Energetics: Enthalpy, entropy and free energy; first two laws of thermodynamics; thermochemistry; equilibrium constants and free energy.

Kinetics: Rate equation, rate laws and orders of reaction; factors affecting rates of reaction; activation energy and reaction profile; Arrhenius equation; catalysts.

Prerequisites: CH4701

CH4252 - INORGANIC CHEMISTRY 1B
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To introduce students to the importance of structure and bonding in determining the properties of substances, and to consider the bonding in molecules and in solids, particularly ionic solids.*
Syllabus: Binding in simple cvalent molecules:Lewis structures, molcular shape using VSEPR theory; polarity in molecules. Atomic and molecular orbitals; energy level diagrams and molecular orbitals diagrams for diatomic molecules. Bonding in transition metal complexes: crystal field theory and the colour, magnetism and thermodynamic properties of transition metal compounds. Bonding in solids: trypes of bonding and factors affecting the strength of bonding. Unit cells. Close-packing in metals. Close-packing in understanding ionic strucures; radius ratio; lattice energy.
Prerequisites: CH4701

CH4304 - ANALYTICAL CHEMISTRY 2
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To provide students with an understanding of some key elements of the theory of separation science and their application to analytical techniques*

Syllabus: Introduction to separation science
Solvent extraction. Countercurrent extraction.
Introduction to chromatography, modes of separation.
Gas Chromatography.
Liquid Chromatography.
HPLC, Ion Chromatography, Size exclusion chromatography
Mass Spectrometry
Hyphenated techniques, GC-MS HPLC-MS

Prerequisites: CH4303

CH4306 - ANALYTICAL CHEMISTRY 4
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To review and extend the student's existing knowledge and comprehension of fundamental spectroscopic techniques encountered in CH4303, CH4304 and CH4305; to provide the student with an in-depth working knowledge and comprehension of various advanced spectroscopic techniques; to emphasise the interpretation of spectral data in an integrated manner through the use of combined spectroscopic techniques; to highlight various applications of the techniques encountered; to encourage self-directed learning through the use of some recommended websites and software.*

Syllabus: Mass Spectrometry: Brief review of some basic principles; Fragmentation Patterns; Rearrangements; Interpretation of spectra; Hyphenated techniques.
NMR Spectroscopy:
1-D 1HNMR: Review of some basic principles; Relaxation Processes; Homotopic, enantiotopic and diastereotopic systems; Nuclear Overhauser Effect (NOE); Second-Order Spectral Interpretation.
13C NMR: Theory; DEPT 13Cnmr; NOE, Quantitative13Cnmr; Interpretation of spectra.
Solid State 13C nmr (brief).
2-D 1HNMR: COSY (1H-1H connectivity); NOESY, ROESY (through space 1H-1H proximity), HOSEY; HECTOR (1H - 13C connectivity); INADEQUATE (13C - 13C connectivity); TOCSY (1D and 2D); Interpretation of spectra.

Structure elucidation using combined spectroscopic techniques (of those above).

Laser Raman Spectroscopy:
Theory; Comparison with FT-IR spectroscopy; Spectral interpretation of simple organic molecules and carbon allotropes (diamond, graphite and carbon nanotubes).

Problem Sessions/Lab.

Prerequisites: CH4305, CH4304, CH4303

CH4354 - ANALYTICAL CHEMISTRY FOR THE ENVIRONMENT
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: ** To convey that spectroscopy (the interaction of light with matter) provides both a qualitative and quantitative method to determine molecular/atomic structure and concentration * To introduce analytic instruments and instrumental techniques*

Syllabus: SYLLABUS
SPECTORSCOPIC METHODS:
AAS ATOMIC ABSORPTION SPECTORSCOPY
AES ATOMIC EMISSION SPECTROSCOPY
UV/VIS ULTRA-VIOLET/VISIBLE SPECTROSCOPY
IR INFRARED SPECTROSCOPY (& FTIR)

CHROMATOGRAPHIC METHODS:
PARTITION (GLC, HPLC, TLC)
ABSORPTION (GC)
ION-EXCHANGE
SIZE EXCLUSION (GEL PERMEATION)

ELECTROMETRIC METHODS:
POTENTIOMETRIC (PH, ISE)
CONDUCTOMETRIC

CH4404 - PROCESS TECHNOLOGY 1
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To introduce students to important aspects of safety, process control, and process modelling in chemical and biochemical processing systems.*

Syllabus: Health and safety at work: types of factory environment and their physiological and psychological risks. Current legislation in the area of employer and employee liability. Codes of practice. The role of management and unions in safety.

Introduction to process control: basic control modes e.g. P, PI, PID; control system architecture and dynamic behaviour for SISO processes; controller tuning; control system hierarchies for chemical/biochemical processing plants.

Equipment and instrumentation used in chemical and biochemical processing operations: sensing and measurement; signal transmission; controllers; final control elements.

Process modelling; application of material and energy balances in the formulation of quantitative process models; process characteristics and dynamic response behaviour of first and second order systems.

CH4554 - ENVIRONMENTAL CHEMISTRY
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To provide a basis of understanding the chemical processes occurring in the environment, with particular reference to biogeochemical cycles and the chemical ideas underlying environmental problems.*

Syllabus: Chemistry of the earth: overall structure, composition, energy flow, inter-relation of the different spheres. Definitions. Concentrations.
The hydrosphere: composition; the water cycle; equilibria in aqueous systems, distribution diagrams; water pollution.
The lithosphere: composition and structure; weathering; leaching and soil chemistry; mineral resources and pollution; geochemistry; solubility, pH; E-pH diagrams.
The atmosphere: composition, chemical processes in the atmosphere, solubility in water; chemistry of acid deposition, greenhouse effect, ozone depletion, photochemical smog.
The biosphere: composition, major and minor elements; sources, utilisation and disposal; toxicology of heavy metals and organics, bioaccumulation.
Biogeochemical cycles for nitrogen, carbon, sulphur, phosphorus, etc.

Prerequisites: CH4253, CH4252, CH4701

CH4608 - PLANT AND PROCESS MANAGEMENT 2
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To provide the student with an understanding of a number of key topics in the management of chemical and biochemical processing operations.*

Syllabus: Methodologies for the identification, assessment, and control of risks and hazards associated with processing operations, including HAZOP analysis.

Costing of chemical & biochemical plants; stages of costing, methods of cost prediction, exponential, factorial etc. Cost updating. Economic evaluation of chemical and biochemical processing projects; pay-back, ROI, NPV, etc. Sensitivity analysis.

Plant location and layout: principles and application.

Environmental impact assessment of chemical and biochemical production facilities.

Industrial sustainability: concepts and practice. Case study of the application of sustainability metrics to chemical and biochemical processing plants.

CS4004 - SOFTWARE TESTING AND INSPECTION
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *To introduce students to software testing and inspection such that when given a specification and an implementation of a program, the student would be able to write the tests, run them, and report on the errors found.*

Syllabus: - Key Terminology: testing, debugging, error, bug, defect, quality, risk, mean-time between failures, regression testing and limitations of testing;
- Test types and their place in the software development process;
- Black-box and white-box testing;
- Program reading and comprehension;
- Refactoring code;
- Inspections, walkthroughs and desk-checking;
- Programming with assertions;
- Using a debugger for white-box testing;
- Reporting and analysing bugs: content of the problem report, analysis of a reproducible bug, making a bug reproducible;
- Test case design: characteristics of a good test, equivalence classes and boundary values;
- Expected outcomes, test case execution and regression testing;
- Requirements for white-box and black-box testing tools;

Prerequisites: CS4013

CS4006 - INTELLIGENT SYSTEMS
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *The purpose of this module is to familiarise students with a targeted subset of the principles and methods of Artificial Intelligence and Intelligent Systems. Given that students from a number of programmes will be taking this module, examples and projects work will be relevant to each group of students in so far as possible*

Syllabus: To provide students with an understanding of the basic principles, methods and application domains for Artificial Intelligence. To introduce students to the development of Intelligent Systems, Knowledge Representation, and Machine Learning.
This module introduces the history and development of intelligent system concepts. It includes discussions on AI and Expert Systems, Heuristic Search, Evolutionary Algorithms, Artificial Neural Networks, Cognitive Science, and issues in representation, reasoning and machine learning, together with a set of design principles for intelligent autonomous agents.
Real world applications of the course topics are also presented in areas such as robotics and financial prediction.

CS4014 - SOFTWARE DEVELOPMENT PROJECT
ECTS Credits: 6

Computer Science & Information Systems
Rationale and Purpose of the Module: *This module is intended to provide the student with an opportunity to undertake a semester long software development project. A student will gain experience of working in a team and the confidence to tackle a large software system.*

Syllabus: A substantial semester-long software project is set.
Students, working in teams, produce a complete implementation.
A partially specified project is presented.
Students complete the requirements and then take the project through the design, coding and testing stages.
The language and technology of implementation depends on the type of project specified but will generally allow students as much free choice as possible.
(Lectures and labs will run from weeks 1 to 5 inclusive). These along with tutorials during this period will build on existing modelling, design and programming skills required to achieve the proposed system.
During the remainder of the semester students will meet will their assigned supervisor to discuss their work to date in a tutorial setting on a regular basis.)

CS4030 - DIGITAL ARTS 2
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *This module builds upon the curriculum of a range of modules especially Digital Arts 1. It deepens the engagement with this field by introducing the perceptual and aesthetic ramifications of the digital arts and situates the wide range of practices within cultural, psychological, political and economic models. It provides a foundation enabling students to situate, develop and specialise their digital arts practice as well as a context to which digital arts research can be related.*

Syllabus: 1. Video Art
2. Film Theory
3. Installation and Interactive Art
4. Electronic and Experimental Music
5. Digitally Enabled Sculpture
6. Sound Art

Prerequisites: CS4019

CS4040 - ADVANCED VIDEO PRODUCTION
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *To give students a theoretical grounding in digital media formats, to explore the fusion of the sonic with the visual and to combine skills in video, graphics and animation toward creating higher-quality video content.*

Syllabus: 1. Collaborative Design (Creation, Production, Delivery) 2. Semiotic theories relevant to media, meaning, artist and audience 3. Theories underpinning audio-visual production 4. Conceptual Design Approaches 5. Performance Practice Aesthetics 6. Client relations relevant to audio-visuals 7. Video Art Aesthetics

Prerequisites: CS4053, CS4034

CS4056 - MOBILE APPLICATION DESIGN
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *To introduce students on digital media and music technology programmes to the creation of content and the development of applications for mobile devices.*

Pre-Requisite Modules:
(CS4061 Media Programming 1 & CS4082 Introduction to Web Development)
OR
(CS6221 Programming Protocols for Musical Systems)

Syllabus: - Challenges of designing applications for mobile devices.
- Design dimensions for mobile applications: scenario-related dimensions, interaction-related dimensions, user-related dimensions, data/content related dimensions and communication-related dimensions.
- Designing for multiple mobile platforms and multiple displays: practical guidelines, techniques, standards and best practices.
- Content optimization and design skills for mobile application development.
- Creation of raster and vector visual assets for mobile applications using a variety software products.
- Creation of applications for mobile devices using a development environment suited to the programming skills and abilities of the students that will take this module.
- Applications will work with images and sound; the creation of animated applications; list manipulation; parsing comma-delimited files and XML files; work with databases; text-to-speech and speech-to-text; read and respond to sensors, communicate with web APIs.

Prerequisites: CS4061, CS4082, CS6221

CS4059 - CREATIVE CODING
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *To introduce students to the design and development of interactive audio-visual artworks using low level coding.*

Syllabus: This module will focus on the development of interactive audio-visual (a/v) artworks. Student will focus first on the analysis of existing a/v artworks. They will then create a concept, design and develop an interactive artwork using low level coding. Key topics include: 1. Low level programming (C++ and Open Frameworks) 2. Use of Integrated Development Environment (IDE) - XCode 3. Real-time manipulation of audio elements by means of code (C++) 4. Real-time manipulation of video elements by means of code (C++) 5. Communication protocols for interconnection with third-party software (MIDI, OSC) 6. User responsive art installations.

CS4076 - EVENT DRIVEN PROGRAMMING
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: This module will provide students with a comprehensive introduction to event driven programming where a strong emphasis will be placed on practical application in at least two high level development environments. In addition, students will be introduced to multiprocessor support for event driven programs and shown how to improve event processing performance through parallel event transformation.

Syllabus: Imperative versus event driven paradigms.
Introduction to GUI creation; graphical structures: frames, boxes, layout managers, menus, windows.
Event handling process, event handling mechanisms: event classes, event sources, event listeners.
The Delegation Model of event handling.
Avoiding deadlocks in GUI code.
Limits of message passing libraries and thread libraries.
Event processing performance.
Introduction to multiprocessor support for event driven programs.
Techniques to improve event processing performance through parallel event transformation.

CS4078 - APPLIED INTERACTION DESIGN
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *This module will provide the student with knowledge of and practical experience in using techniques for the design of engaging interaction.*
Building on the design knowledge and technical skills the students have acquired at this stage of their course, applied interaction design problems will be presented to the students for analysis, reflection and intervention.
Adaptation of Interaction Design methods will be discussed, and the particular perspective of Participatory Design will be examined in detail.

Syllabus: This module deals with topics and methodologies for Interaction Design work. The topics include:
Overview of the latest literature and current practical projects in interaction design
Exploration and evaluation of practical approaches to interaction design as a discipline in a variety of current settings, and particularly of Participatory Design methods.
Exploration of novel interaction modalities around tangible, ubiquitous and wearable devices.
Application and adaptation of interaction design methodologies to specific design settings.
Discussion and review of sensitive design settings such as healthcare, safety-critical environments, education, etc.
The role of high-fidelity prototypes in developing the interaction design process. The discussion and analysis of these topics will be based around practical interaction design assignments.

CS4084 - MOBILE APPLICATION DEVELOPMENT
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *The module will focus on the tools and environments that exist to help developers create real world applications that run on wireless and mobile devices. A strong emphasis will be placed on providing students with hands on experience in the programming and testing of applications for mobile devices. Throughout this module students will use an object oriented programming language, basic APIs and specialised APIs to develop applications for mobile devices.*

Syllabus: Challenges to be faced when developing applications for mobile devices.
Platform specific mobile applications and/or mobile web applications; mobile application lifecycles.
Mobile applications and their architectures.
Overview of operating systems (OSs) and Application Programming Interfaces (APIs) to choose from when developing applications for mobile devices.
Comparison of native development environment options; software development kits (SDKs) and emulators.
Installing and configuring the development environment.
Managing application resources; designing user interfaces; data storage and retrieval options; synchronization and replication of mobile data.
Communications via network and the web; networking and web services; wireless connectivity and mobile applications.
Performance consideration: performance and memory management; performance and threading; graphics and user interface performance; use various facilities for concurrency.
Security considerations: encryptions, authentication, protection against rogue applications.
Location based application; location API.
Packaging and deploying applications for mobile devices.

CS4115 - DATA STRUCTURES AND ALGORITHMS

ECTS Credits: 6

Computer Science & Information Systems
Rationale and Purpose of the Module: *To provide a uniform theoretical treatment of the data structures and algorithms used in systems and applications programming. This module includes a practical component to reinforce learning and to encourage students in the practical use of theoretical material.*

Syllabus: - Mathematics Review; - Review of the ADTs, internals and usage of simple data structures and associated algorithms, in particular recursive algorithms; - Linked Lists and Networks; - Recursion, and the elimination of recursion from algorithms; - Study of sorting algorithms: quicksort, heapsort, mergesort and bucket and radix sorting; - Analysis of general divide-and-conquer algorithms; - Searching: tree searching, AVL trees, splay trees; - Graph algorithms: graph traversal and spanning forests, depth and breadth first search of graphs; connectivity; minimal spanning trees for weighted graphs; shortest path algorithms; networks.

CS4157 - SOFTWARE QUALITY
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *To provide an understanding of the processes and techniques used to develop and maintain quality software.*

Syllabus: Software quality assurance and standards; Software Inspections; Process versus Product quality and quality characteristics; Software testing techniques and strategies; Software Maintenance; Quality metrics; Evolution of software process; Introduction to ISO15504; Configuration Management.

CS4174 - PERFORMANCE TECHNOLOGY 1
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *Students will develop their knowledge of performance technology in the context of digital musical instruments through a combination of laboratory based small group project work and lecture based learning.*

Syllabus: This module will focus on the design and the creation of digital musical instruments. Students will design and build a musical instrument - a complete system encompassing musical controller, algorithm for mapping input to sound, and the sound output itself. Students will focus on improvisation techniques as they prepare their prototypes for live performance. The module will culminate in a musical performance where students will demonstrate their instruments.
Key topics will include:
Sensor system implementation for live music performance.
Software implementation of real time performance systems.
Aesthetic issues in digital musical instrument performance.

CS4187 - PROFESSIONAL ISSUES IN COMPUTING
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *Information and Communication Technology (ICT) industries employ large numbers of people who create technologies affecting a wide range of different types of communities within society as a whole. It is very important that students who will be entering these industries do so with an understanding of ethical professional and cultural issues that they will need to engage with as professionals. To this end Professional Issues in Computing focuses on the ethical, legal and social consequences of the design, implementation and use of computer and information systems.*

Syllabus: What is a computer professional?
Ethical theories including: consequentialism and non-consequentialism; utilitariasm; deontological theory.
Ethical decision making frameworks.
Applying ethical theories to moral problems in ICT.
Codes of conduct of professional bodies in ICT.
Legal implications of being a professional including: Intellectual property law; privacy and data protection; computer crime; Irish, European and American laws and potential for conflict.
Conflict between the legal and the ethical approaches.
Social impacts of ICT including: Digital divide - exclusion based on: race, gender, age, language; North/South divide, power and democracy, unstoppable progress, physical and social disability.

CS4358 - INTERACTIVE MULTIMEDIA
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *To understand the principles and techniques of Interactive Media. Content creation, processing and management. High-level authoring. Distribution methods. Intellectual Property Rights.*

Syllabus: - Introduction to Digital Media: overview; communication theory; mediation.
- Cognitive Models: representation of aspects of mind; acquisition of knowledge.
- Interaction Design: linking media and support objects in temporal structures.
- Metaphors: describing concepts in accessible form; interface metaphors; domain metaphors.
- Image, Video and Sound Processing: introduction to high-end processing tools such as Adobe PhotoShop, Adobe Premiere, SoundForge, etc.; media asset management.
- Authoring: introduction to high-end authoring tools such as Macromedia Director, Authorware, Flash, etc.; synchronisation.
- Interfacing high-end authoring systems: extending the functionality of authoring systems through plugins; design of plugins.
- Distribution: CD, DVD, Web, DAB, DVB; quality and bandwidth considerations; compression; streaming.
- Intellectual Property Rights, Copyright.

CS4416 - DATABASE SYSTEMS
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *Databases, particularly relational databases and database management systems (DBMSs) are central in the design and development of modern information systems. Understanding of their structure and skills in their application are fundamental aspects of a proper foundation in any domain of software development.*

Syllabus: The concept of a DBMS and DB Architectures are introduced. This module will build upon the notion of a database as introduced in Information Modelling and Specification including revision of those concepts previously introduced, i.e. the relational data model, including issues, such as Integrity Constraints, SQL, and Views.
- Concepts of databases and DBMSs;
- Database Architectures;
- Revision of the Relational Model; SQL Tables, Views and the DDL; Referential and Existential Integrity Constraints;
- Normalisation: Functional Dependencies; 1st, 2nd 3rd, 4th Boyce Codd and Fifth Normal Forms;
- Technologies: Transaction Management; ACID properties; Security; Data Storage & Indexing; Triggers & Active DBs; Query Optimisation; Distributed Architectures;
- Use of embedded SQL, cursors, triggers;
- Object DBs and Object Relational DBs;
- Data Warehousing, Decision Support & Data Mining;
- Emerging Technologies;

Prerequisites: CS4513

CS4457 - PROJECT MANAGEMENT AND PRACTICE
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *To examine the processes by which the development of computer-based information systems are managed, and the considerations needed for successful implementation of such systems.*

Syllabus: Why management of IS projects can be the deciding factor for success or failure; responsibilities for managing medium to large-scale information systems development projects; from project initiation to systems implementation; the tools and techniques applicable to planning, monitoring and controlling a project.

CS4458 - COMPUTER SUPPORTED COOPERATIVE WORK
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *This module will introduce students to the CSCW and groupware field. It will cover basic concepts in the field and include an examination of software systems designed to support cooperative work - their design, use and evaluation. Issues such as peripheral awareness, ownership of information, common information spaces, media spaces, group support systems, coordination mechanisms and contextual factors in the workplace will be studied. Students will use some groupware technologies and undertake a project.*

Syllabus: The limitations of traditional HCI;
Understanding the work context;
Cooperative work;
Methods for observing work - field studies and ethnography;
Coordination mechanisms;
Examination of variety of commercial and research collaborative systems;
Constructing common information spaces;
Examining collaborative learning in the workplace;
Evaluation methods for CSCW;
Open issues in the field.

CS4566 - REQUIREMENTS ENGINEERING
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *System and software requirements exist at the boundary between the often conflicting needs and expectations of stakeholders and the myriad capabilities and potential of software to fulfil them. Special rare skills are essential in order to adequately elicit, specify, verify, validate and then manage both the scope of the system and the software requirements themselves.*
This module aims to introduce students to the necessary skills and make them aware of the real challenges that are presented by the requirements task.

Syllabus: - System and software requirements
- The Requirements Engineering Process
- Stakeholders and their role in RE
- Requirements and Design
- The elicitation and discovery of requirements: RAD, Task Analysis
- Elicitation techniques: Prototyping and Scenarios, Viewpoints
- Discovering and Inventing Requirements: CRC Cards
- The modelling and analysis of requirements
- Problem Frames and modelling
- A comparative review of modelling techniques
- Perspectives and values in modelling methods
- Requirements Documentation: Standards and Templates
- Quality Measures of Software Requirements
- Documenting Functional Requirements
- Techniques for writing requirements
- Writing non-functional requirements
- Communication techniques
- Management of requirements; Change control
- Requirements Management Tools: Requisite Pro; DOORS, etc.
- Organisational and Social Issues
- Requirements validation: reviews and walkthroughs
- Negotiation and agreement of requirements

Prerequisites: CS4125

CS4815 - COMPUTER GRAPHICS
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *Given the role of graphical user interfaces in the computing devices today this programme should include at least one module relating to computer graphics.*

Syllabus: Physical devices for graphics systems: Input and Output devices, Raster Scan devices, RGB colour systems, Video Memory Models; Implications of these for interactive graphics systems.

General structure of Interactive Graphics systems: Issues involved in digitising analogue information: antialiasing techniques; Design and implementation of drawing algorithms for basic shapes: Issues and techniques; Establishing Device, Language and Application Independence: Conceptual levels in graphics systems; Frames of reference and Viewing systems;

Control and manipulation of graphics elements: Input and Output primitives, Clipping functions, Transformation (rotation, scaling, translation, reflection, shears) and Segmentation functions; Transformations in 3-D; Projections; Viewing in 3D; Drawing Curves: Techniques, Properties of different types of curves;

Basic Modelling: Representation of surfaces via polygons; Realism; Hidden surface removal; Surface generation via bi-cubic curves; Rendering.

CS4826 - HUMAN-COMPUTER INTERACTION
ECTS Credits: 6

Computer Science & Information Systems

Rationale and Purpose of the Module: *The objective of this module is to develop an understanding of the issues involved in the increasingly important area of human-computer interaction. The module will provide a broad introduction to a variety of topics concerning user requirements, user interface design, usability studies, integrating human factors in software development, and social and organizational factors involved in implementing systems. It will examine guidelines and standards, as well as emerging interaction paradigms. The widespread adoption of graphical user interfaces (GUIs), and the potential afforded by new developments*

such as groupware, multimedia, hypertext, and virtual reality systems all require that even greater attention be paid to how these technical developments can be packaged and presented suitably to the "user".

Syllabus: The module addresses the nature of HCI. Specifically it covers the topics of: understanding the user, human information processing, perception, interfaces and interaction, input and output devices, use & design, the design process, requirements, evaluation, usability methods and tools, empirical and analytical methods, standards & guidelines, mobile technology, information appliances, social and organizational constraints, intelligent agents, and future trends.

CU4006 - TRAVEL LITERATURE
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To introduce students to the genre of travel writing. To analyse different forms of travel writing from fictional to non-fictional, from historical sources to postcolonial approaches.*

Syllabus: This module will cover the genre of travel literature, giving a background to the origins and following developments up to the present day and by examining different forms of travel literature.
After an introduction to the history of travel literature, utopian literature as well as colonial representation of the 'New World' will be examined in the period dating from the late fifteenth century through to the final decades of the seventeenth century. Comparing and contrasting the representations of America found in the reports of the earliest Spanish explorers with that found in later Puritan accounts, this element of the course will analyse the European 'invention' of America as a pre-lapsarian utopia. The main part of the module will then concentrate on Ireland as a travel destination, seen from an outsider's perspective through the eyes of European visitors from the Middle Ages up to the twentieth century and compared with travel accounts of Irish writers. Questions of identity, cross-cultural awareness and language as a communication tool will be analysed.

CU4014 - ANALYSING MEDIA DISCOURSE
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module:
** Students will acquire knowledge about the linguistic features of media texts;*
** Students will acquire skills to enable them to engage critically with a range of media texts;*
** Students will be exposed to both qualitative and quantitative methods of analysing media texts;*
** Students will acquire specific skills in Critical Discourse Analysis and Corpus Analysis and multimodal discourse analysis.*

Syllabus: Text linguistics: This section of the course will introduce students to a range of concepts required to analyse media texts (e.g. morphology, syntax, semantics, grammar, lexicon, pragmatics) (3 weeks)
Critical Discourse Analysis: Theory and Practice (3 weeks) - students will carry out an in-depth qualitative analysis of a number of media texts on a chosen topic.
Corpus Textual Analysis: Theory and Practice (3 weeks) - students will build up a corpus of media texts on a particular topic from a variety of media and then analyse them using corpus linguistics software.
Multimodal Discourse Analysis: Theory and Practice (3 weeks) - students will carry out a project in the area of New Media discourse analysis.

CU4018 - EUROPEAN CINEMA FROM THE 1960s TO THE PRESENT
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To give students a comprehensive overview of the major currents and trends in European cinema in the post Second World War period with the advent of the French Nouvelle Vague being considered as a watershed event. To build on students' prior knowledge and exposure to film studies and enhance their ability to analyse and critique films.*

Syllabus: This module will build on students' prior experience of film studies and will involve a comprehensive overview of the major cinematic movements in contemporary Europe over the last fifty years with an introduction to some of the major directors of this period and their oeuvre. The module will also examine the techniques of film as employed by these directors, their critical approaches and how major theoretical movements have been influential in their work. It will lastly consider the impact of the digital revolution on film making and the film industry.

CU4026 - HOW TO READ A FILM: INTRODUCTION TO FILM STUDIES
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module:
** To introduce students to the field of film studies.*
** To give students the theoretical tools to analyse film.*
** To give a European perspective on the film industry.*

Syllabus: This module will make the distinction between knowing a lot about films and being able to address the question what is cinema.
To this end the module will examine the techniques of film, critical approaches and how major theoretical movements have been applied to this field.

Prerequisites: CU4025

CU4112 - CULTURAL STUDIES 2: LANGUAGE AND CULTURE
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *This course is designed to serve as an introduction to basic concepts and theories in the study of language and culture. The various branches of the study of language and culture will be introduced and discussed in class lectures, with particular attention being paid to issue of globalisation. The more specific objectives of this course are:*
** Recognize the fundamental relationship between language and culture.*
** Describe current perspectives on the nature of language and culture from an applied linguistic context*

Syllabus: Students will gain an in-depth knowledge of the relationship between language and culture. The course will begin by introducing the Sapir-Whorf hypothesis and will then look at a further three core sections, namely:
(1) Culture and language in use
(2) Culture, language and the individual
(3) Culture, language and society

Prerequisites: CU4111

CU4116 - CULTURAL STUDIES 4: CULTURAL THEORY
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To give students the opportunity to study, in depth, the writings of key cultural theorists of the 20th century. To develop an awareness of the place in theory in cultural practice. To develop skills of presentation, appraisal and comparison of material of high theoretical complexity.*

Syllabus: This module will cover a number of different theorists and theoretical positions in sequence. The relevant theorists will include Matthew Arnold, Friedrich Nietzsche, Sigmund Freud, Laura Mulvey, Karl Marx, Theodor Adorno, Roland Barthes and Jean Baudrillard. The theoretical positions covered will include humanism, psychoanalysis, feminism, Marxism, neo-Marxism, structuralism, poststructuralism, semiotics and postmodernism.

DM4006 - ENGINEERING DESIGN
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To introduce the student to product engineering design systems and techniques.*
To provide experience in product design and concurrent engineering.
To develop skills in developing automated process plans using variant and generative approaches.
To provide the students with experience in the use of finite element methods as part of the design cycle.
To focus on the engineering of the solution by providing hands-on experience in the analysis of case studies, supplemented by an overview of the theoretical analysis.

Syllabus: Overview of the design process and innovative approaches in product design.
Concurrent engineering as a product development approach.
Design for manufacture, assembly, disassembly and service.
Computer aided process planning.
Product design and analysis tools
Solid Modelling and Finite Element Analysis.
Analysis Types: Static, Dynamic, Stress, Thermal, Contact stress, Buckling, Fatigue. Design Optimisation, Processing and Post processing - theoretical and practical issues.
Practical Case studies: static stress analysis, modal analysis, thermal analysis, basic fluid/structure interaction analysis.
Use of the SolidWorks Simulation software package.

DM4016 - PRODUCT AUTOMATION
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To inform the student of the various automated components contained within typical industrial products.*
To provide the student with an understanding of pneumatic and hydraulic systems used within the production of products.
To establish how product design can impact on industrial robotics.
To illustrate how product design can impact on production line feeding mechanisms.

Syllabus: Mechanics
Velocity, displacement, angular velocity, torque, power, work etc.

Circuitry:
DC Circuits, AC Circuits, - involve making simple circuits, PCB manufacturing etc.

Motors
DC, AC, Stepper motors, how they work, picking the correct type, sizing the motor.

Industrial Robotics
Robot anatomy, joints and links, drive systems, control systems, grippers, sensors, applications, material handling, assembly linked to product design, design for manufacture. Numeric Control, features of CNC, applications of CNC, Robot programming, CNC programming.

Pneumatics & Hydraulics
Sizing systems, control of systems, design of systems, electro-pneumatics.

Automated Assembly
Linked to the DFM module, tools techniques, quality requirements, tolerances, feeding mechanisms, magazines feeders, vibratory bowl systems.

Vision Systems
Operating principles, industrial applications, advantages, disadvantages.

DM4028 - ENGINEERING SUSTAINABLE PRODUCTS
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To inform the student of the need to design and manufacture products in an environmentally sustainable manner.*
To illustrate the use of life cycle analysis software to ensure that the lowest impact material selection, manufacturing processes etc. are adhered to.
To identify the various recycling/recovery processes available to ensure that the student designs a product with these solutions in mind at end of life.
To identify key alternatives to existing fossil fuels in energy creation and thereby help promote a more sustainable manufacturing environment.

Syllabus: Design for Environment
Strategies, tools, key fundamentals such as design for dematerialisation, design for product recovery and design for capital protection and renewal.

Sustainable Manufacturing
Alternative energy supplies, solar, wind, geothermal, alternatives to oil such as bio-diesel, gaining energy from recycling materials or waste e.g. incineration, pyrolysis. Material properties, material property charts, material selection, case studies.

Recycling Technologies
Magnetic separation, shredding, eddy current separation, infra-red separation, examination of waste streams,

destruction disassembly versus step by step disassembly. Design obstacles to disassembly, design techniques to encourage disassembly and thereby encourage effective recycling/recovery.

Lifecycle Assessment
Overview of total product life cycle, from raw material selection to transport to manufacturing processes and systems to packaging and the impact individual decisions regarding the product have on the environment. Using LCA software to calculate the cost to the environment.

Reverse Engineering
Techniques, systems of approaching systematic reverse engineering to enable design for the environment and to learn from previous mistakes. Product redesign can take the form of incremental or radical changes.

Legislation
WEEE directive, RoHS directive, ISO 14062 environmental aspects to product design, ISO 9000.

Design for End of Life
Examination of fastening technology, standardisation of techniques, placement of access points, location of high value/hazardous materials.

DM4038 - ADVANCED MANUFACTURING
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To give an in-depth examination of advanced manufacturing methods currently used in Ireland. This will introduce students to current state-of-the-art manufacturing technology through a combination of lectures, workshop component manufacture and industrial presentations / site visits. It will also introduce the students to novel energy efficient methods of manufacture.*

Syllabus:
Die casting / injection moulding
The general principles of the diecasting process.
- Diecasting of metals and alloys
- Die design principles.

Material selection and component features used in the manufacture of dies.
Injection mould tool design.
- Design of cavity layout
- Gating system and runner system
- Design of ejection systems and sliding cores.

Metal forming
Rolling
Forging
Piercing, blanking and bending process
Combination and Progressive Die Design
Cutting tools / machining
Mechanics of cutting, tool/chip temperature, tool wear and failure,
Cutting tool materials, high-speed-steel, carbides, ceramic and coated cutting tools
ISO codes for inserts and holders, cutting fluids.
Tool economics, tool life for maximum production and minimum cost.
Advanced manufacturing techniques
EDM, ECM, Ultrasonic, abrasive jet and laser beam machining
ICT manufacturing methods
Standard packages
IC fabrication process
Printed circuit board manufacture

EC4006 - Intermediate Macroeconomics
ECTS Credits: 6

Economics

Rationale and Purpose of the Module:
Macroeconomics deals with the economy as a whole. It is not primarily concerned with how the individual or firm behaves, but how - collectively or in aggregate - households or firms behave. It seeks to explain why unemployment is high or low; why prices are rising or falling; why interest rates or the cost of borrowing are high or low.
This course aims to build on what you learned from your first year macroeconomics course, EC4102. We will pay particular attention to key macro models including the IS-LM and the Aggregate Demand - Aggregate Supply (AD-AS) framework. At the same time we will cover all the main subject areas of modern macroeconomics, from unemployment to inflation and open economy issues. By the end of the course you should gain an insight into a number of macro models, their relative strengths and weaknesses, and their policy implications.

Syllabus:
1. Macroeconomics: data and method; key macroeconomic variables.
* National Income: Measurement issues (MT Chapter 1, 2; LW Chapter 1, 23)
2. National Income Determination: short and medium run view
* The Simple Keynesian model
* IS-LM analysis
* AD-AS model; introduction to monetary and fiscal policies (MT, Chapters 9-10; LW 3, 17)
3. Inflation
* Measurement, cost and policy prescriptions (MT, chapter 4, LW chapter7)
4. Unemployment
* Measurement, cost and remedies
* Inflation-unemployment trade-off: the Phillips curve (MT Chapter 6, 13; LW Chapter 21, 22)
5. The Open Economy
* Exchange rate regimes
* PPP and IRP
* Economic policies (MT Chapter 5, 12; LW Chapter 9, 10, 18)
6. Growth Theory
* The economy in the very long run: traditional and 'new' growth theories (MT, chapter 7 & 8)
7. Celtic Tiger
* Recent performance of Irish Economy (LW, chapter 24)
8. Macroeconomic Policy Debates
* Stabilization Policy (MT chapter 14)
* Government Debt (MT chapter 15)
* Economics of EMU (MT, chapter 16; LW chapter 14)
9. Special Topics:
* Institution and Macroeconomics: Political regimes and Macroeconomic performance (reading list to be supplied later)
* Environment and sustainability (reading list to be supplied later).
10. Summary & Review.

EC4014 - INTERNATIONAL ECONOMICS
ECTS Credits: 6

Economics

Rationale and Purpose of the Module: *The world economy is becoming increasingly integrated and interdependent in terms of the economics ties linking countries and regions. Three ways in which countries are linked are through the exchange of goods and services (trade), investment flows (capital mobility) and migration (labour mobility). This module builds on introductory micro and macro-economic principles in order to provide students with the tools of analysis necessary to examine*

the international economy and to explore the key issues that are shaping our global economy. The emphasis is on current issues in international economics. In this module we examine why international trade and factor mobility, as well as concentrating on how economics and politics interact to understand the existence, or absence, of certain policies at an international level.

Syllabus: The module is divided into six sections set our below. Each topic will have a corresponding problem sheet which students should work through as an aid to understanding the material presented in lectures. Further detailed references and readings for each topic, where relevant, will be given in lectures.

Section IIntroduction and Context

Topic 1 Introduction and Context

Section II International Trade Theory

Topic 2 Comparative Advantage

Topic 3 The Standard Trade Model

Topic 4 The Heckscher-Ohlin Trade Model

Section III International Trade Policy

Topic 5 Tariffs

Topic 6 Nontariff Trade Barriers

Section IV Integration and Investment Relations
Topic 7 Economic Integration

Topic 8 International Resource Movements

Section V Balance of Payments and Exchange Rates Markets
Topic 9 Balance of Payments

Topic 10 Foreign Exchange Markets and Exchange Rates

Section VI The International Economy in Operation
Topic 11 Exchange Rate Regimes

EC4018 - MONETARY ECONOMICS
ECTS Credits: 6

Economics

Rationale and Purpose of the Module: *This course in Monetary Economics covers topics in Financial Markets, Financial Institutions, Central Banking, International Finance and Monetary Theory. These topics are discussed at various stages in the course. The central theme is to develop a dynamic monetary model of a small, open economy. The Course Outline (see below) explains how this is achieved and at what point the other topics are examined. Among the policy issues discussed are: economic adjustment to asymmetric shocks given the constraints of monetary union; the operations and policies of the European Central Bank; the transmission of monetary policy in the Euro-area; and the determination of interest rates.*

Syllabus:
1. Introduction to the Theory of Income Determination
-Equilibrium in the Goods and Services Market
-Deriving the SRAS model
-Adjusting to Demand-side Shocks
-Adjusting to a Supply-side Shock

2. Money and Banking
-Money Creation in a Modern Economy
-The money multiplier
-The Role of a Central Bank
-Seigniorage
-Lender of last resort
-High-powered Money and the Money Multiplier
-Instruments of Monetary Policy

3. Money and Interest Rates in a Closed Economy
-The Demand for Money
-Money Market Equilibrium
-Aggregate Demand and Interest Rates
-Monetary Policy and the Keynesian, Classical Debate
-Monetary Financing

4. The IS-LM Model
-Equilibrium in the Goods Market: The IS Curve
-Equilibrium in the Money Market: The LM Curve
-Equilibrium in the Goods and Money Markets
-The Relative Effectiveness of Fiscal and Monetary Policy in the IS-LM Model
-The IS-LM Model and Aggregate Demand

5. The Phillips Curve and the Inflation-Unemployment Trade-off
-The expectations-augmented Phillips curve
-Deflation, Expectations and Credibility
-The sacrifice ratio
-The Augmented Phillips Curve: Evidence from the Euro-area
-Estimates of the natural rate of unemployment
-Recent Developments Relating to the Phillips Curve
-The Phillips Curve and the AD-AS Model

6. The Mundell-Fleming Model
-Internal and External Balance
-Introduction to the Mundell-Fleming Model
-The Model Under Fixed Exchange Rates
-The Model Under Floating Exchange Rates
-Exchange Rate and Country Risk
-Economic Policy, Output and the Current Account
-The Aggregate Demand Curve

Guest Lecture Dr Alan Ahearne NUI, Galway
-How has the ECB responded to the financial crisis? Long term refinancing operations (LTRO) and Outright Monetary Transactions (OMT).
-How has the Federal Reserve responded to the financial crisis? Quantitative easing (QE).

Guest Lecture John Rowe Financial Markets Division, Central Bank of Ireland
-Monetary Policy Framework
-National Central Bank's and the Liquidity Position of Commercial banks.
-Forecasting Liquidity Facilities.
-Reaction of Central Bank's to the Financial Crisis.

7. European Monetary Union and the European Central Bank
-The Political Benefits of EMU to Ireland
-The Economic Benefits of EMU to Ireland
-The Economic Costs of EMU
-The European Central Bank
-ECB Independence
-How Interest Rates Are Set in the Euro Area
-Monetary Policy in EMU
- The Euro Area Inflation Record
- One Monetary Policy Fits All?

8. A Dynamic Monetary Model of Aggregate Demand and Aggregate Supply
-The Dynamic Model of Aggregate Demand and Aggregate Supply
-The Dynamic Aggregate Supply (DAS) Curve
-The Dynamic Aggregate Demand (DAD) Curve
-Deflationary Demand-side Shock

-The Central Bank's Inflation Target
-An Expansionary Demand-side Shock
-The Labour Market and the Adjustment Process

9. Savings, Investment and the Balance of Payments
-Savings and Investment in a Closed Economy
-Saving, Investment and the Balance of Payments
-The Interest Rate and Capital Flows
-The Real Exchange Rate and Net Exports
-Savings and Investment in the Small, Open Economy
-The Effects of Fiscal Policy
-The Effects of a Change in the World Interest Rate
-Applying the Model to the Irish Economy in EMU

10. The Economic Crash of 2008 and Its Aftermath
-The Property Boom
-Displacement
-Credit expansion
-Euphoria
-Financial Distress
-Revulsion
-Coping With the Fiscal Crisis
-Coping With the Banking Crisis
-The Troika Agreement
-Is the Irish National Debt Sustainable?
-No-one Shouted 'Stop'
-Specific Policy Failures

Prerequisites: EC4102, EC4004

EC4044 - APPLIED ECONOMIC ANALYSIS
ECTS Credits: 6

Economics

Rationale and Purpose of the Module: *This module broadens and deepens the knowledge of intermediate micro and macroeconomics gained from EC4004, Economics for Business, as well as introducing key tools for applied analysis of economic data.*

Syllabus: The objective of this module is to deepen and broaden students' knowledge from the intermediate micro and macroeconomics learned in EC4004.

Lectures:
Week 1 Consumer Theory
Week 2 Producer Theory
Week 3. Markets, exchange
Week 4. General Equilibrium, Computable General Equilibrium
Week 5. Game theory and Policy
Week 6. Asymmetric Information
Week 7. Long Run 1: The "Solow Model" with Human Capital
Week 8. Long Run 2: The Ramsey Problem
Week 9: Medium and Short Run: IS/MP/PC Model with uncertainty
Week 10: Policy Application: Open economies in monetary unions
Week 11: Policy Application: funding pension systems in ageing societies
Week 12: Policy Application: Hyperinflations, deflations.
Labs: Weeks 3-6, mathematical prerequisites, 7-9, Data-based labs, 9-11, writing workshops.

Prerequisites: EC4101, EC4102, EC4004

EC4102 - MACROECONOMICS
ECTS Credits: 6

Economics

Rationale and Purpose of the Module: *The purpose of this course is to introduce the student to the principles underlying the macroeconomy. This is the study of how aggregate economic variables (such as the real growth rate, inflation and unemployment) inter-act and how the policy-maker (Government and Central Bank) can influence their behaviour. Following an introduction to the key macroeconomic variables and globalization, a model of how the macroeconomy operates (the theory of income determination) is developed. This model is then expanded at various stages to include the money market and the foreign exchange market. The expanded model is used to discuss issues in macroeconomic theory and policy such as role and operations of the European Central Bank (ECB) and the relative importance of fiscal, monetary and exchange rate policies. The course concludes by discussing recent trends and economic issues relating to the Irish economy.*

Syllabus:
Topic 1. Introduction to Macroeconomics
Irish macroeconomy, political economy, macroeconomic constraints, globalization, macroeconomic models and the time horizon, a brief history.

Topic 2. National Income and Economic Performance
Aggregate production function, measuring the output of nations, the national income accounts, adjusting for inflation, the business cycle, the long-run performance of the Irish economy.

Topic 3. Inflation
Measuring inflation, the Irish inflation record, the effects of inflation, deflation.

Topic 4. The Labour Market and Unemployment
The labour market, the natural rate of unemployment, frictional and structural unemployment, cyclical unemployment, why doesn't the labour market clear?, the costs of unemployment, reducing unemployment, unemployment in Ireland, unemployment in the Euro area.

Topic 5. Introduction to the Theory of Income Determination
Macroeconomic models, Keynes's General Theory, equilibrium in the goods and services market, aggregate demand, aggregate supply, equilibrium, adjusting to demand-side shocks, adjusting to supply-side shocks, real GNP and unemployment.

Topic 6. Consumer Theory and the Income Determination
Income, consumption and savings, personal income, consumption and savings in Ireland, the Keynesian multiplier.

Topic 7. Introduction to the Theory of Fiscal Policy
Fiscal policy, assessing the stance of fiscal policy, problems in implementing stabilization policy, taxation and the supply-side of the economy, the dynamics of debt stabilization.

Topic 8. Fiscal Policy and Economic Planning in Practice: The Irish Record
Economic planning, Irish fiscal policy in historical perspective, is there such a thing as Expansionary Fiscal Contraction?, the end of history.

Topic 9. Money and Banking
What is money?, types of money, functions of money, creation of money, the role and functions of a Central Bank, control of money, the credit-fuelled property bubble and the crash.

Topic 10. Money and Interest Rates in a Closed Economy
The demand for money, money market equilibrium, nominal and real interest rates, aggregate demand and interest rates, monetary policy in a closed economy, crowding-out, government monetary financing.

Topic 11. The Balance of Payments and the Exchange

Rate
Balance of payments, the significance of the current account balance, the foreign exchange market, the exchange rate of the Irish pound and the euro, the determinants of exchange rates, factors influencing exchange rates in the medium term, exchange rate regimes.

Topic 12. Inflation and Interest Rates in Open Economies.
Purchasing power parity (PPP), PPP and the real exchange rate, harmonized competitiveness indicators, relative PPP, uncovered interest rate parity theory.

Topic 13. The Long-Run Performance of the Irish economy.
The growth of population, the standard of living, interpreting the record 1922-'61, the 1960s, the record since 1971, the property and construction bubble 2001-'07, the great recession and its aftermath.

Prerequisites: none

EC4108 - CONTEMPORARY ISSUES IN THE GLOBAL ECONOMY
ECTS Credits: 6

Economics

Rationale and Purpose of the Module: *An understanding of the main issues confronting the international economy is a pre-requisite to finding solutions to global problems. The recent financial and banking crisis and the attendant severe budgetary and fiscal problems facing many countries (especially Ireland and the peripheral EU countries) has led to some significant re-appraisal of what had become mainstream thinking in relation to economic policy and indeed in some circles market capitalism. Increasingly, much debate in the international economy is polarised between two camps: those who see globalisation as the panacea for solving economic and social problems and the anti-globalisation movement that views the process of globalisation as the main cause of problems. This module seeks to provide the student with a balanced and objective analysis of the main issues confronting the world economy and through the use of economic theory, empirical evidence and objective analysis seeks to distinguish between fact and fiction.*

Syllabus: The module will have as its main objective an exploration of the main issues that confront the world economy. While it would be unreasonable to expect one module to cover all the issues in depth the following will be analysed and discussed:

Topic 1: (i) The identification of the causes of the financial crisis and fiscal crises in the world economy and in Ireland. (ii) The current state of the world economy; an overview of the current and future economic challenges facing the globalised economy. (iii) Review of history of the global economy.

Topic 2: (i) Foreign trade and protectionism: stylised facts about trade and review of gains from trade. (ii) Trade policy rules and evolution of international trade regime; the Doha Round and the role of the World Trade Organisation (WTO).

Topic 3: (i) The evolution of international monetary and financial system. The role of the multilateral institutions such as the International Monetary Fund (IFM) and the World Bank. (ii) Changing hegemonic role of the US economy in international political economy and the rise of the BRIC economies. (iii) The European integration; why many EU countries formed a monetary union; macroeconomics in the Eurozone.

Topic 4: The economic performance and problems confronting less developed countries; The development prerequisites, the development history: 1945-1980 and the development policy since 1980; The importance of aid from rich countries.

Topic 5: (i) The policy role, challenges and opportunities of international migration; recent trends and the EU single labour market. (ii) Changing facets of international production; analysis and policy implications of outsourcing; trends in the patterns of offshoring and outsourcing.

Prerequisites: EC4102, EC4101

EC4112 - MACROECONOMICS (FOR NON-BUSINESS)
ECTS Credits: 6

Economics

Rationale and Purpose of the Module: *The purpose of this module is to introduce the student to the principles underlying the macroeconomy. This is the study of how aggregate economic variables such as, the real growth rate, inflation and unemployment, behave and how the government and central bank can influence their behaviour. The first part of the course deals with key topics such as the theory of income determination, the consumption function and fiscal policy as well as the foreign exchange market. The latter part examines monetary policy instrument including how interest rates are determined and how monetary policy is conducted by the European Central Bank. The benefits and costs of economic and monetary union are also addressed in this introductory macroeconomics module.*

Syllabus: 1. GNP, business cycle, unemployment, inflation. Policy constraints;
2. The Theory of Income Determination: Basic Model, The aggregate supply and demand model: Three issues: including demand and supply-side shocks, Okuns law, Natural real GNP and automatic adjustment mechanisms.
3. The Consumption Function and Income Determination including disposable income, consumption and saving; Keynesian multiplier; average and marginal propensity to consume.
4. Fiscal Policy and the Business Cycle Stabilisation policy, fiscal policy in Ireland
5. Money and Banking Definitions; types of money; modern banking systems; money creation, money multiplier; instruments of monetary policy.
6. The Price Level and Money Supply and the quantity theory of money and implications.
7. Interest Rate Determination. Monetary policy; demand for money; money market equilibrium, monetary policy and the Keynesian, Classical debate.
8. The Balance of Payments and Exchange Rate Theory. Foreign exchange market, flexible exchange rates, real exchange rates, trade-weighted exchange rate index, Central Bank intervention, external reserves, fixed exchange rates.
9. Purchasing power parity including absolute and relative PPP.
10. Fixed Exchange Rate Systems including the operation of fixed exchange rate systems; monetary adjustment mechanism; sterilisation; fixed exchange rate systems in the past; benefits and costs
11. European Monetary Union including economic benefits and costs to Ireland; adjusting to economic shocks
12. The European Central Bank. The design of the ECB; price stability; central bank independence; monetary policy in EMU.

Prerequisites: EC4102

EC4408 - PUBLIC FINANCE
ECTS Credits: 6

Economics

Rationale and Purpose of the Module: *This course covers the theory and practice of public finance. It examines the theoretical rationale for government intervention in modern increasingly globalised economies. More specifically it examines the theory and practice of the allocative, stabilisation and re-distributive roles of government. This involves analysis of theory and practice in relation taxation and expenditure decisions.*

Syllabus: 1. Pareto Optimality, General Equilibrium, Social Welfare Functions,
2. Allocative Role of Government - Market Failures: Public Goods, Externalities, Natural Monopolies,
3. Cost Benefit Analysis,
4. Taxation: Incidence and Partial Equilibrium, Taxes on Labour, Taxation and the incentive to work.
5. The Welfare State: Tax and Social Welfare Systems, Fiscal Measures to Reduce Poverty and Inequality.
6. Economics of Regulation.

Prerequisites: EC4101, EC4102, EC4004

EC4418 - MONETARY ECONOMICS AND INTERNATIONAL FINANCE
ECTS Credits: 6

Economics

Rationale and Purpose of the Module: *The approach adopted in this module is to explain the main monetary theories and policies in the context of Ireland's membership of European Monetary Union and the operations and policies of the European Central Bank. Among the issues discussed are: economic adjustment to asymmetric shocks given the constraints of monetary union; the operations and policies of the European Central Bank; the transmission of monetary policy in the Eurozone; the determination of interest rates; exchange rate, interest rate, and fiscal policies in the Eurozone. In addition, a number of topics in international finance are examined including the various hedging techniques developed to minimize exchange rate and interest rate risk.*

Syllabus:
1) The Design of the European Central Bank;
2) The ECB's Monetary Policy;
3) Project: An Introduction to Time Series Analysis;
4) The ECB and Interest Rate Policy;
5) Managing Interest Rate Exposure;
6) 'One Monetary Policy Fits All';
7) Open Economy Monetary Model;
8) Controlling the Money Supply;
9) The ECB and the Stability Pact;
10) ECB and Exchange Rate Policy;
11) Managing Exchange Rate Exposure;
12) Conduct of Monetary Policy be World's Major Central Banks

Prerequisites: EC4102, EC4004

EC4711 - EU ECONOMIC ENVIRONMENT
ECTS Credits: 6

Economics

Rationale and Purpose of the Module: *To provide students with an understanding of the economic structures and policies operating at the level of the European Union, together with an analysis of the progress towards integration, its impact on member states and the rest of the world. The module provides a framework understanding of the EU, its institutions, and their competences in key areas of economic activity.*

Syllabus: The topics covered are set out as follows:
1. EU Competition Policy;
2. The EU Trade or Common Commercial Policy (CCP);
3. Monetary Integration and Economic and Monetary Union (EMU);
4. The Common Agricultural Policy (CAP);
5. The EU and Central and Eastern Europe (Enlargement);
6. The EU and the Less Developed Countries (LDCs).

Prerequisites: EC4034, EC4013

ED5502 - DIGITAL SYSTEMS 4
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *Introduces the concepts and design issues for interfacing digital hardware to a microprocessor. This involves bus cycle timing, memory and I/O interfaces (serial and parallel) and interrupt architectures.*

Syllabus: Bus cycle timing: Read and Write cycles. Synchronous and asynchronous bus cycles
The memory interface: Basic Memory device characteristics (ROM, EPROM, EEPROM, FLASH, FRAM, SRAM and DRAM). Static memory timing waveforms, address decoding (full and partial), the memory map.
I/O interfacing: Memory mapped and Isolated I/O, simple handshaking concepts. Software polling.
Serial Communication: Asynchronous and synchronous. RS-232, RS-485 and RS-422. SPI and I2C. USB
Typical peripheral interfaces: Parallel ports, serial, switches, LCDs, keypad interfaces and uses. I/0 Ports. Timers, ADC and DAC converters.
Interrupts: Basic interrupt processing concepts. Interrupt hardware -priority encoders, daisy chaining, interrupt vectoring. Programmable interrupt controller.

Prerequisites: ED5501

EE4008 - AVIONICS
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module:
** To make the students aware of the principles of operation of avionic systems and the application of telecommunications and control techniques to aeronautics.*
** o introduce the students to the principles of radar, radio navigation and telecommunications systems.*

Syllabus: Principle of operation of avionic systems

Brief description of instrumentation, sensors, actuators, computer-based data acquisition and control systems.

Introduction to navigational, communications and air traffic control systems.

Air Data Systems
Inputs: - pressure, air temperature. Outputs; - pressure altitude, air speed, mach number, air density, temp, etc.
Air data instruments; altimeter, airspeed indicator, vertical speed indicator, mach metre, etc.
Compass Systems
Gyroscopic Instruments, mechanical gyros, gimballed gyros, strap down gyros,
Laser Gyros, Sagnac effect,
Inertial Navigation Systems
Flight control systems

Aircraft use of radio; navigation, radar, voice and data communication
Radio wave propagation and radiation, propagation in the real atmosphere, ground effects: multipath and clutter, ground waves, sky and space waves.
Modulation, AM, FM, SSB, etc.
Radio antennas, unipole, dipole, loop antenna, capacitive antenna, microwave horn
Avionics radio systems across different frequency bands

Introduction to Principles and Use of Radar
Primary and secondary radar systems
Antennas, mechanically steered radar beams, phased arrays.
Pulse radar, radar transmitters and receivers, radar displays, moving target indicator. Doppler radar, CW and frequency modulated radar.
Radar range equation, input noise, signal-to-noise ratio.
Radar cross section of target aircraft
2D and 3D radar systems
Radar resolution, in range, azimuth and elevation.

Navigation Theory and Systems
Navigation aids for aircraft
Radio Navigation and Telecommunications Systems
Instrument Landing Systems
Microwave Landing Systems
Loran C, Very High Frequency Omnidirectional Range (VOR), GPS, Automatic Direction Finder (ADF), Non Directional Beacons (NDB).
Navigation sub systems surveillance radar for Air Traffic Control.

Digital Data Busses used on Aircraft
MIL STD 1553, ARINC 429, A629

Prerequisites: EE4001, EE4004

EE4012 - CIRCUIT ANALYSIS 1
ECTS Credits: 6

Electronic & Computer Engineering

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

EE4013 - COMPUTER NETWORKS
ECTS Credits: 6

Electronic & Computer Engineering

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

EE4018 - ENGINEERING MANAGEMENT
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module:
Comprehensive overview of the workings of a technology-based business, and the chemistry of techniques available for the prudent management of such a business in an increasingly competitive environment.

Syllabus: THE FIRM AND ITS ENVIRONMENT.
Introduction to economic, managerial, behavioural and social responsibility theories of organisational objectives.
Present market trends and business in the 21st Century.
General external analysis (national, international and global) STEP
Industry analysis (5 forces, OT). Internal analysis (SW)

SPECIFIC FUNCTIONAL ACTIVITIES: Marketing (4Ps, Ansoff, Product Life Cycle, Boston Matrix), Accounting (Balance sheet, Profit and Loss, working Capital Management, Ratio Analysis, Costing and Budgeting) Finance (sources and Cost of Capital, Financial and Capital Structure, Investment Appraisal and Evaluation, Taxation) HRM (Resourcing, Training and Development, Industrial Relations, Current Trends) IT (Key Business-related attributes, Networking, Hierarchy of data/information needs, Decision Support systems, IKBS) Operations Management (Procurement, TQM, FMS, JIT, Value Chain Analysis).
Management: Planning (PERT), Controlling (Loops), Motivation (Expectancy and other theories), Organising, Coordinating. Job Design, Decision Making, Leadership Theories, Team working and development, communication. Overview of essential practical skills.

EE4022 - SEMICONDUCTOR DEVICE FUNDAMENTALS
ECTS Credits: 6

Electronic & Computer Engineering

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

EE4023 - DISTRIBUTED SYSTEMS
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module is designed to provide students with a framework for comparing emerging distributed systems, as well as an understanding of the algorithms necessary to support a distributed system. Computing models and data communications will be studied, as well as software development issues relating to the development of distributed applications. Potential security threats in distributed systems will also be discussed.*

Syllabus: [Distributed System Fundamentals] Types of Distributed Systems, Distributed Systems Architectures, Location of Services, Data conversion and Marshalling of data. Replication, Clock synchronisation, Mutual Exclusion & Deadlock Detection, Distributed File System Case study. [Component based Software Architectures] Elements of Component based Software Architectures, Case Study: e.g. CORBA, Java Remote Method Invocation (RMI). Portability and conversion utilities. [Web Services] Simple Object Request Protocol (SOAP), Representational State Transfer (REST). Fault Tolerance. [Service Portability] Performance, Scalability, Security, Availability, Compliance to standards, Flexibility, Platform

requirements, Manageability. Consistency and Replication. [Cookies] Uses and Abuses [Application Servers] Comparative study. [Distributed System Security] Identification of attacks. Mechanisms to avoid attacks & to minimise impact of attacks.

EE4024 - ELECTRICAL ENERGY (ELECTRICAL MACHINES)
ECTS Credits: 6

Electronic & Computer Engineering

Review of electromagnetism, Faradays, Amperes and Lezs laws, MMF, flux, flux density, magnetic field intensity and reluctance, self and mutual inductance, magnetic materials, BH curves, core losses.
Magnetic circuits, electric circuit analogies, analysis of simple magnetic circuits.
Transformers: Construction and principles, ideal transformer, voltage and current transformers, power transformers, single/3 phase, equivalent circuits, open and short circuit tests, application in power systems, per unit system.
Machines - DC motors and generators: construction and principles, separately excited, series, shunt and compound machines. Voltage and torque equations. Equivalent circuits, Power flow. Machine characteristics: open circuit/magnetization, speed, torque and dynamic characteristics. Which configuration for which application. DC machines in modern power generation and motion control. AC machines, rotating magnetic fields, alternators, 3 phase generators, salient pole/cylindrical rotor, derivation of equivalent circuit from open circuit and short circuit tests, synchronous reactance, the phasor diagram (of cylindrical rotor machine) and the Power Angle Curve. Synchronising to an infinite busbar. Steady state stability limit.
Induction machines (motors and generators) single phase, 3 phase. Derivation of equivalent circuit, determination of torque speed characteristic. Locked-rotor and no-load tests. Induction generator. Introduction to V/F control. Starting methods and protection.
Electrical machines developments for renewable energy generation.
AC power real and reactive power calculations. Power factor correction, balanced 3 phase systems analysis, star and delta connected loads, advantages of 3 phase systems, the per unit system.

EE4028 - TELECOMMUNICATION NETWORK ARCHITECTURES 2
ECTS Credits: 6

Electronic & Computer Engineering

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

EE4034 - TELECOMMUNICATIONS FUNDAMENTALS
ECTS Credits: 6

Electronic & Computer Engineering

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

EE4044 - COMMUNICATIONS AND NETWORKS PROTOCOLS
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *The main objective of this course is to provide an opportunity for students to gain a basic understanding of Communication Networks and Protocols*

Syllabus: Motivations and objectives of computer networks; overview of layered architecture and the ISO Reference Model; network functions, circuit-switching and packet-switching; physical level protocols; data link protocols including HDLC and multi-access link control. Network control, transport, and session protocols including routing flow control; end-to-end communication and inter-networking. Presentation layer protocols including web, virtual terminal and file transfer protocols, cryptography, network security. It also introduces some important merging technologies, such as, integrated voice and data networks (VOIP) and the integration of wireless and wired networks. Specific examples and standards will be cited throughout the course.

Prerequisites: EE4313

EE4117 - ELECTROMAGNETICS 1
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module is a 3rd year core module for BE in Electronic Engineering (LM070).*

Syllabus: Review of vector calculus.
Electrostatics - Electric field, calculation of the electric field, electric potential, conductors and dielectrics, electrostatic field boundary conditions, capacitance. Poisson's and Laplace's equations. Current density. Resistance calculations.
Magnetostatics - Magnetic flux density, vector magnetic potential.
Biot-Savart law, magnetic field intensity, magnetic circuits, magnetic materials, inductance.
Time-varying fields - Faraday's law, Maxwell's equations, time harmonic electromagnetics, plane electromagnetic waves in lossfree and lossy media, low-loss dielectrics and conductors, power propagation and the Poynting vector, instantaneous and average power densities.
Transmission lines - Transverse electromagnetic waves along a parallel-plate transmission line, transmission line equations, wave characteristics along infinite and finite lines, transmission lines as circuit elements, resistive and arbitrary terminations, the Smith chart, impedance matching.

EE4214 - CONTROL 1
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *The module introduces students to some basic control theory, Dynamic System Modelling, open- and closed-loop systems, signal flow graphs, time response of first and second order systems. This module also gives students a basic introduction (from the control perspective to support the control theory and dynamic systems modelling) to some of the basic devices used in control, including actuators, sensors and transducers.*

Syllabus: Dynamic System Modelling: Laplace Transform method, open and closed loop systems, signal flow graphs, transfer functions, time response of first and second order systems.
Laboratory Work: Modelling and simulation of dynamic

systems using Matlab Simulink and LabVIEW. Basic laboratory exercises, including data acquisition from sensors.
Introduction to instrumentation. Sensor characteristics. Signal conditioning. Review of typical sensors.

Prerequisites: MA4001, MA4002, MA4003

EE4216 - CONTROL 2
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module extends fundamental Control principles with much more emphasis placed on the application of linear analytical techniques to control system design.*

Syllabus: LINEAR SYSTEM ANALYSIS: Bode, Nyquist, and root locus, transfer function of plant with delay and non-minimum phase systems. Stability and Performance analysis using Bode, Nyquist, Routh-Hurwitz, and Root Locus methods. Design techniques for system compensation using Bode diagrams, Nichols charts and Root Locus. Lead and lag compensation, the application of these using op-amps as an example, internal compensators. Introduction to Modern Control methods using State Space Techniques.
PROCESS CONTROL: Terminology and practice, application and use of three term control, PID design in the frequency domain, integral wind-up and similar problems, Benchmark methods for tuning PID controllers, (Ziegler-Nichols, Haalman etc.,).

EE4218 - CONTROL 2
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *To further develop analysis and design skills in Automatic Control*

Syllabus: LINEAR SYSTEM ANALYSIS: Bode, Nyquist, and root locus, transfer function of plant with delay and non-minimum phase systems. Stability and Performance analysis using Bode, Nyquist, Routh-Hurwitz, and Root Locus methods. Design techniques for system compensation using Bode diagrams, Nichols charts and Root Locus. Lead and lag compensation, the application of these using op-amps as an example, internal compensators. Introduction to Modern Control methods using State Space Techniques.

PROCESS CONTROL: Terminology and practice, application and use of three term control, PID design in the frequency domain, integral wind-up and similar problems, Benchmark methods for tuning PID controllers, (Ziegler-Nichols, Haalman etc.,).

Prerequisites: EE4214

EE4314 - ACTIVE CIRCUIT DESIGN 2
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module introduces the basic properties of operational amplifiers feedback, and their use in both linear and non-linear applications as well as the introduction of AC low frequency design. An introduction to Analogue signal conversion is also given.*

Syllabus: THE DIFFERENTIAL AMPLIFIER AS A TWO ENDED INPUT AMPLIFIER. Introduce the diff amp as the input element to Op Amps. Define the terms Differential Gain, Common Mode Gain and Common Mode Rejection Ratio
OP-AMP CHARACTERISTICS: Simplified internal view of a typical 3-stage op-amp, current limiting, open-loop transfer curve, offset error. Op-amp configurations; current in, voltage out etc. Finite gain errors. Slew limitations.
OP-AMP LINEAR APPLICATIONS: Selected linear applications, including voltage amplifiers, regulators, integrators and instrumentation issues.
FEEDBACK: Effects of feedback on gain, input impedance, output impedance, correction of disturbances. Bandwidth of single pole amplifiers. Op-amp frequency shaping networks. Placing poles and zeros in the closed loop response.
OP-AMP NON-LINEAR APPLICATIONS: Comparators, Schmitt trigger, rectifiers, peak detectors etc. Non-linear oscillators (square-triangle), monostable circuits.
A.C. COUPLED AMPLIFIERS: Low frequency limitations, break points, Bode plots, design steps.
ANALOGUE SIGNAL CONVERSION: Introduction to D/A and A/D as system functions. D/A conversion using R-2R ladders with I/V conversion. DAC specifications. Description of A/D conversion using successive approximation method. Differential signalling, line drivers and hardware for serial data transmission.

Prerequisites: EE4313

EE4317 - ACTIVE CIRCUITS 4
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module introduces students to integrated circuit design, to the limitations that apply to chip-level components, and to IC design methods.*

Syllabus: IC technologies and components: Processing methods. Semiconductor Junctions. Passive (R and C) components and their limitations.
Integration of BJTs, JFETs and MOSFETs. Device characteristics.
Analogue bipolar design methods: mirrors, high-gain stages, output buffers.
Analogue CMOS design methods: mirrors, high-gain stages, output buffers.
Digital logic families, an overview.
Analogue building blocks: overview of op-amps, comparators and PLLs.CMOS and BiMOS technologies.
Review of some analogue ICs, bipolar and MOS.

Prerequisites: EE4316

EE4328 - POWER ELECTRONICS
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module will give students (electronic, Robotic, Control and Energy students) an understanding of modern power electronics both at the device, products level and at the renewable energy generation and distribution level.*

Syllabus: Introduction (examples of typical power conversion applications e.g. a complete computer power supply system block diagram/space craft system, importance of efficiency, comparison linear vs switching supplies, overview key components utilised in power

conversion)
Switch realisation: semiconductor switches: diodes, Power MOSFETs, Thyristors, GTOs, IGBTs, properties, circuit symbols, comparative characteristics and application areas, power losses in switches.
The ideal switch, ripple and switching frequency, conduction losses, switching losses.
Switch mode power conversion: basic concepts; role of inductors, capacitors and transformers.
Analytical treatment of converters in equilibrium (steady-state converter analysis).
Modelling and simulation of converter in steady state (SIMPLIS)
Overview conversion topologies (non-isolating buck, boost, buck-boost)
Three phase full wave uncontrolled rectifier with inductive loads: circuit diagram, waveforms, output voltage, input current, input harmonics.
Single phase full wave thyristor controller rectifier: circuit diagram, waveforms and calculations.
Inverters main concepts, square wave inverters, Sine PWM inverters: circuit diagram, Circuit waveforms, Amplitude modulation index and frequency modulation index.
Variable Speed Drive: Fixed frequency induction motor torque speed characteristic, V/F operation, torque speed capability with V/F drive, typical V/F drive circuit diagram.
Continuous v discontinuous conduction mode.
Converter dynamics and control (overview small signals models, example topology, transfer functions). Key skill which can be applied broadly.
Energy storage and energy transfer components and magnetics (capacitive, inductive, uncoupled and coupled).
Modern rectifiers (topologies, harmonics)
High power resonant converters
HVAC / HVDC Power systems and conversion basic understanding.
Harmonics/Flicker/Reactive Power Control.
Modelling of power convertors.
Low voltage ride-through (wind application)

EE4408 - ASICS 2
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module is a 4th year core module for BE in Electronic Engineering (LM070) students. This is a follow-on module from EE4407 (ASICs I) which dealt with digital IC design issues. This follow-on module deals with analogue and mixed-signal IC design with an emphasis on the practice of theory and the use of IC CAD (Integrated Circuit Computer Aided Design) tools (analogue and mixed-signal IC design entry, simulation and layout CAD).*

This module deals with the areas of design MOS circuit concepts, operational amplifiers, D/A converters, A/D converters, testability, ESD topics, plus assembly and packaging.

Syllabus: Basic electrical properties of MOS and CMOS circuits. Drain-to-source current Ids versus voltage Vds relationships. The threshold voltage Vt. MOS Transistor Circuit Model. MOS transistor transconductance gm and output conductance gds. Future trends.

Sheet resistance Rs and resistor design in CMOS. Area capacitances of layers and capacitor design in CMOS. Choice of Layers.

Operational amplifier (op-amp) architectures, design parameters and transistor sizing. Trade-offs in design. Op-amp DC and AC operation.

The CMOS Inverter. Inverter delays. Driving large capacitive loads. Propagation delays. Wiring capacitances.

Latch-up in circuits.

Digital-to-analogue converters. Introduction. D/A characteristics. Current-scaling D/A converters. Voltage-scaling D/A converters. Charge-scaling D/A converters. D/A converters using combinations of scaling approaches.

Analogue-to-digital converters. Successive approximation A/D converters. Parallel A/D Converters. High-performance A/D converters.

Test and testability. System partitioning. Layout and testability. Reset/initialization. Design for testability (DfT). Testing combinational logic. Testing sequential logic. Scan design techniques. Built-in self-test (BIST). Practical DFT guidelines.

Static electricity & product quality. ESD (ElectroStatic discharge).

Assembly and packaging. Introduction to ASIC packaging. Chip terminal design. Multichip packaging. Die separation techniques.

Prerequisites: EE4407

EE4522 - DIGITAL SYSTEMS 1
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module is the first module in the core Digital Systems stream of the BE programmes in the department of Electronic and Computer Engineering.*

Syllabus:
Introduction to digital systems
Distinguish between analog and digital representations.
Number systems and codes
Conversion between number systems.
Describing Logic Circuits
Truth tables and Basic Boolean manipulation
Simple Gating functions, Data selectors.
Demultiplexers.
Karnaugh Mapping
Logic Characteristics
Delays and spurious responses. Buffers, Schmidt inputs.
Characteristics of CMOS digital ICs.
Basic Arithmetic
Unsigned numbers, signed numbers. 1's and 2's complement arithmetic
Ripple carry adders
Latches and flip-flops
D-type level triggered. Edge-triggered D-type. J-K
Timing waveforms for flip-flops
Shift register operation
Edge-triggering concepts
Propagation delay, set-up, hold, asynchronous inputs
Registers and counters:

EE4524 - DIGITAL SYSTEMS 3
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *The module provides an in-depth treatment of the following topics: Basic Microprocessor; Processor Architecture and programming in machine code; Instruction sets,*

Addressing modes, Exception handling, I/O programming; Simple handshaking concepts.; Software polling, Interrupts, Basic interrupt processing concepts, Interrupt service routines (ISRs); C programming as a programming language for embedded systems; Practical application of using development using the toolchain; Introduction to techniques used for testing embedded system software. (Digital Systems 1 on the programme is a prerequisite for this module.)

Syllabus: The Basic Microprocessor:

Processor Architecture and programming in machine code. Programmer's model, data formats. Program instruction cycle.

Instruction sets:

Addressing modes: register, immediate, direct, indirect, relative. Program control flow instructions. Stacks, local variables and subroutines. Exception handling.

I/O programming:

Simple handshaking concepts. Software polling.
Interrupts: Basic interrupt processing concepts. Interrupt service routines (ISRs). Interrupt hardware -priority encoders, interrupt vectoring. Programmable interrupt controller.

C programming as a programming language for embedded systems:

Pointers in C. Macros. Linking and sub-programs. Inline assembly programming in C.

Memory: Addressing concepts. ROM, RAM memory. Volatility. DRAMs, multiplexed addressing
Serial data: Asynchronous and synchronous transfers. RS232, SPI

Prerequisites: CE4701

EE4816 - SIGNALS AND SYSTEMS 1
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *To introduce a number of mathematical and computer aided tools for analysing signals and systems in the time and frequency domains, such that students will develop a sound knowledge and understanding of linear transform theory for signal processing, and to apply it to correlation and filtering of signals, in analogue and digital domains.*

Syllabus: Signal Classification: pulse waveforms, periodic waveforms, sine waves and phasors, signal symmetry. Fourier Series and Fourier Transform. Sampling, replication, and aliases.
Finite Fourier Series and the DFT.
Correlation and Convolution, digital and analogue.
Introduction to Digital Filters and the DtFT.
Windowing of signals, aspects of A/D and D/A conversion.
Discrete-time systems and the z-transform.
Elementary FIR filter design. LP, BP and HP filters.
Simple IIR filters, intuitive design methods.

EH4002 - CRITICAL PRACTICE 2 - RENAISSANCE LITERATURE
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *The purpose of this module is to further develop the introduction of foundational skills to students of English literature, following on from Critical Practice 1, with a focus on Renaissance literature.*

Syllabus: This module introduces students to genre-based studies in poetry and drama, in this case, to significant ideas and key works from the English Renaissance. The period studied, from the Reformation to the Restoration, sees the introduction into England both of new philosophies, such as humanism, and new literary forms, such as the sonnet. Therefore, the module aims to place the literature in those cultural, social, and political contexts which inform and affect its interpretation, and, through an account of the poetic and dramatic developments of the period, to equip students with the skills to identify and critically analyse poetic forms and dramatic conventions.

EH4006 - VICTORIAN TEXTS AND CONTEXTS
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *This module aims to introduce students to key elements of nineteenth century literatures in English with a specific focus on Victorian and Edwardian texts and contexts. Students will examine a range of literary texts produced in the period and relate them to the political, social and historical circumstances in which they were written.*

Syllabus: Addressing developments in literary practice and form, we will focus initially on the rise of the novel, and will also consider changes in the nature of author and audience during the second half of the nineteenth century. Nineteenth century aesthetic, political and social contexts for the literature will be central to our work and a range of theoretical approaches will be tested in relation to these categories. As part of this endeavour, students taking the module will be asked to participate in a group-based research project.

EH4008 - BRITISH LITERATURE SINCE 1945
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *This module studies British literature from the end of the Second World War to the present day. Students will read a range of literary texts produced in the period and will contextualise them politically, socially and historically. Topics will include the impact of the Second World War and the concomitant erosion of the British Empire; the enduring legacy of modernist literary experimentalism in post-Second World War literature; the rise of various liberation movements, including women's and gay liberation and post-colonial challenges to notions of Britishness; the impact of literary theory and the emergence of postmodernism.*

Syllabus: This module covers British literature from 1945-present. Writers will include major novelists of the period such as Jean Rhys, Doris Lessing, Margaret Drabble, A. S. Byatt, Salman Rushdie, Jeanette Winterson, Kazuo Ishiguro and Zadie Smith; poets such as Philip Larkin, Dylan Thomas, Derek Walcott, Geoffrey Hill and ted Hughes; and playwrights such as John Osborne, Joe Orton, Harold Pinter, Tom Stoppard, Caryl

Churchill and Sarah Kane. To define the themes and interpret this literature, students will become familiar with political, social and historical contexts (the Second World War, various liberation movements, the rise and fall of the welfare state), with significant concepts and philosophies (Thatcherism, postmodernism), and with literary movements (Angry Young Men, Kitchen Sink Realism, New Brutalists)

EH4016 - STATE OF THE UNION: AMERICAN LITERATURE SINCE 1890
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *This module follows on chronologically from EH4145 American Literature, covering the period from the closing of the frontier to the present day. Through a selection of texts reflecting the diverse voices of the literature, students explore the physical, cultural and socio-political geographies of America. Reading accounts of the city and town, the urban and suburban, the road, the land, the reservation, or the South, students engage with questions of self and society, class and race, national identity, marginalisation, counterculturalism and globalisation, as expressed within differing literary movements.*

Syllabus: This module covers American fiction, poetry and drama from 1890 to the present day, including works by, for example, Chopin, Wharton, Crane, Stein, Frost, Stevens, Pound, Eliot, O Neill, Cummings, Fitzgerald, Faulkner, Hemingway, Welty, Williams, Salinger, Kerouac, Heller, O Connor, Ginsberg, Plath, DeLillo, and Pynchon; African-American writing by Du Bois, Hurston, Hughes, Wright, Ellison, Baldwin, Morrison and Baraka; Asian-American writing by Mukherjee, Tan and Lahiri; Jewish-American writing by Singer, Malamud, Bellow, Miller, and Roth; Native American writing by Silko and Erdrich; literature after 9/11. In defining the themes and interpreting the literature of the period, attention is paid to political, social and cultural contexts (for example, the Great Depression, the World Wards, the Civil Rights Movement, the Vietnam War), to significant concepts and philosophies (for example, realism, naturalism, modernism, postmodernism), and to literary movements (for example, regional writing, the Lost Generation, the Harlem Renaissance, the Beat Generation).

EH4018 - CONTEMPORARY IRISH LITERATURE
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *This module aims to introduce students to a range of Irish narrative texts written in English since 1980 and in doing so:*
Explore the engagement of these texts with contemporary historical, social and political contexts.
Consider the contemporary writing of cultural and social identities in, and about, Ireland.
Evaluate literary responses to the Northern Troubles and consider the ways in which literary/cultural constructions of Northern Ireland are reproduced at home and abroad.
Examine the representation of community and political activism in Irish writing.
Address the construction of gender and sexuality in contemporary Irish writing.
Explore the writing of the Irish diaspora as well as that of its immigrant communities.
Evaluate a range of theoretical approaches which have been, or might be, applied to this literature.

Syllabus: The period since 1980 has seen profound changes throughout the island of Ireland, particularly in the post-Robinson period. Drawing on the work of writers north and south, as well as those working within both the diaspora and immigrant communities in Ireland, students will consider how these texts have constructed and deconstructed the cultural, social and political landscape of contemporary Ireland.

EH4026 - COLONIAL/POSTCOLONIAL LITERATURE IN ENGLISH
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *On successful completion of this module, students will be able to apply a critical and cogent awareness of*
Colonial and postcolonial histories of the 19th and 20th centuries.
Multiple socio-political and cultural contexts associated with Anglophone world literature.
Key literary texts in the field of postcolonial studies from around the world.
A sample of key theoretical debates in the field of postcolonial studies at large (connected to additional theoretical fields such as feminism, ecocriticism, postmodernism, and so on).
Ways to compare, contrast and combine different theoretical and methodological positions in the field of postcolonial studies.

Syllabus: This module will examine colonial discourse of the British Empire, through a series of colonial and postcolonial literary and theoretical readings. More specifically, we will review the fundamental dichotomies of colonial discourse - master/ slave, centre/margins, enlightenment/barbarism, authenticity/ hybridity, secular modernity/ religious conservatism, nation/nativism - and will proceed to read articles and novels from the end of the 19th century, as well as 20th century, from India, Africa and the Caribbean, that both address and attempt to reconfigure the colonial experience from a variety of perspectives.

EH4036 - IRISH LITERATURE 1930 - 1990
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *The module revises and updates a module (EH4126 -- Imagined Spaces: Irish Cultural Texts) in ways which better reflect the broad range of faculty interests in twentieth-century Irish literature. It will introduce students to a range of Irish literary work and cultural movements in the period 1930-1990. This was a period in which literary censorship was a controversial topic, and the threat posed by literary radicals to the stability of the new state(s) widely debated. Taking this as a starting point, the module will encourage students to interrogate the ways in which Irish literary culture challenged state censorship, how it evolved over the century, and what the impact of literary writing has been on dominant social and cultural formations on the island. Attending to innovations in style, structure, and genre in the period, the module will concentrate on formal as well as cultural experimentation.*

Syllabus: The module will introduce students to a range of twentieth-century Irish literary work, focusing on literary realism, avant-garde experimentation, autobiography and memoir, radio writing, and film adaptation, to give just some examples. Topics covered may include urban/rural representations, the "Irish city"

(which will include transnational examples), "the Troubles" in Irish culture, changing gender representations, sexualities, language questions, migration, and the representation of minority communities in the culture. While the main focus will be on literary material, the module will also consider the broadcast media and film work of some authors involved, such as Kate O'Brien and Sam Hanna Bell, to give two well-known examples.

EH4038 - STUDY OF A MAJOR AUTHOR
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *This module offers students the opportunity to engage in intensive study of an author whose work has significantly affected the traditions of literature written in English. Students will read an extensive selection of the authors works in order to understand fully his/her individual development and his/her important contributions to literary history.*
On successful completion of this module, students will have gained
An understanding of the author in his/her political, historical, and cultural contexts;
Familiarity with a range of the author's works and with a range of his/her thematic, stylistic, aesthetic, and formal concerns;
An understanding of the author's importance in the literary canon;
An understanding of different theoretical and methodological ways of interpreting the major author.

Syllabus: This module will function as a critical survey of the work of a major author. Students will study the authors development from early efforts to mature output and will be able to analyse and discuss the authors overall impact on literary history. Students will be able to position the author historically and politically and will understand the author's role as a contributor to intellectual history. Students will be able to position the author in different theoretical and methodological frameworks and will be able to assess and interpret a wide range of the authors work

Example One:
Virginia Woolf
This module will trace the development of the modernist novelist Virginia Woolf from early work to mature output. Students will read most of her major fictions as well as a selection of her essays and autobiographical pieces. Students will study Woolf as a theorist and practitioner of modernist narrative form, as a woman writer deeply interested in questions of female creativity and a significant contributor to feminist literary theory, and as a figure increasingly relevant to studies of memory and trauma. Students will also consider Woolf as a cultural icon by considering her work in relation to recent films and novels that deploy her work and life.

EH4125 - FEMINIST LITERARY THEORY
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *To introduce students to a range of writing by women and to demonstrate how understandings of literature are marked by gender. To explore critical views of the institution of literature and to produce models of the reading and writing processes from a feminist perspective.*

Syllabus: This course will combine feminist theory and the analysis of literary texts. We will consider five main areas of feminist theory and criticism: the concept of a 'feminine aesthetic'; the contribution of psychoanalytic theory to understandings of gender, identity and writing; the relationship between 'race', ethnicity and gender in literature; questions of 'gender trouble' and sexuality; and postmodern feminist perspectives as they apply to literary texts. Throughout the course, theoretical approaches will be tested in relation to a range of women's writing. Primary texts will be drawn from English language traditions in the first instance, although writings from other language traditions may be included depending on staff expertise.

EN4018 - TEACHER AS PROFESSIONAL
ECTS Credits: 6

School of Education

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

EN4022 - EDUCATIONAL TECHNOLOGY FOR TEACHING AND LEARNING
ECTS Credits: 6

School of Education

Rationale and Purpose of the Module: *This module introduces students to various forms of educational technology. The module provides participants with both the practical and pedagogical skills to integrate these technologies into their teaching. The module also provides students with relevant policy and professional issues related to ICT use in educational settings. A core focus of the module is to empower students to capitalise on the personal, social and educational benefits of the technologies whilst recognising the critical questions raised by an increasingly technological society.*

Syllabus: Reconceptualising teaching and learning in the context of ICT; rationale for the integration of educational technologies in schools; national and international policy trends in educational technology; critical perspectives on educational technology; deconstructing the 'net generation'; critical media literacy; cyber bullying and child welfare issues; information security and legislative requirements; productivity tools for teachers; teacher and student generated content (wikis, podcasting, video content); technologies in the classroom; assistive technologies in education; Communication and collaborative learning technologies (LMS platforms in schools, Social media in education); ICT planning and leadership; use of ICT in supporting independent learning; Evidence-based uses of technologies in the classroom; emerging trends and technologies in education

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EN4026 - INCLUSIVE EDUCATION 2: SPECIAL EDUCATIONAL NEEDS
ECTS Credits: 6

School of Education

Rationale and Purpose of the Module: *Successful inclusion of students with special educational needs is underpinned by positive teacher attitudes and a capacity to differentiate appropriately. This module aims to enhance students understanding of inclusion and to develop their capacity to identify and respond to students special educational needs collaboratively and within a whole school framework.*

Syllabus: Knowledge of key national and international policy and legislative documents that pertain to special educational needs in Ireland; identification and assessment of need across cognitive, physical and emotional/behavioural domains; effective writing of individual education plans; knowledge and application of evidence based strategies in the area of SEN; understanding and support of SEN within a whole-school framework; collaboration with key stakeholders (e.g. parents/students) and a multi-agency approach to the inclusion of young people with SEN; experience of an alternative educational experience.

EN4032 - UNDERSTANDING YOUNG PEOPLE AND HOW THEY LEARN
ECTS Credits: 6

School of Education

Rationale and Purpose of the Module: *The purpose of this module is to introduce students to key concepts in developmental psychology and how young people learn. The module will provide students with a critical understanding of key learning theories, examining behavioural, cognitive and constructivist theories from both a historical and contemporary perspective. Students will gain a critical understanding of relevant aspects of adolescent development and their applications to teaching, learning and assessment.*

Syllabus: Seminal and contemporary learning theories including behavioural, cognitive constructivist and bio-ecological accounts of learning; Adolescent Development (physical, cognitive, social/emotional); Factors to be considered in understanding student learning: personality, intelligence, attention, memory, thinking and problem solving, language and literacy development, metacognition; attributions; motivation

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EP4003 - ENTREPRENEURSHIP AND INNOVATION
ECTS Credits: 6

Management and Marketing

Rationale and Purpose of the Module: *The aim of the module is to help students to develop an entrepreneurial mind-set that includes creativity, innovation and diagnostic abilities. The course focuses on entrepreneurship and innovation for new start-up businesses as well as entrepreneurial behaviour within larger organisations. Key objectives are to introduce students to the theory and practice of entrepreneurial creativity and innovation and to provide an understanding of the nature of entrepreneurship, the characteristics of the entrepreneur, the intrapreneur and the role of the socio-cultural and economic environment in fashioning innovative entrepreneurship. In addition the module examines the process of managing innovation.*

Syllabus: This module commences with an introduction to the nature and development of entrepreneurship and emphasises the strong link between entrepreneurship and innovation. This leads to an overview of the schools of thought on entrepreneurship and an understanding of the entrepreneur and the entrepreneurial process. Creativity and innovation are examined with contextual emphasis on innovation in products, services and processes; product strategy, and new product/service development. Corporate entrepreneurship is explored and creative thinking is applied to identify venture opportunities, business planning, networking and technology transfer.

EP4408 - SMALL BUSINESS CONSULTING
ECTS Credits: 6

Management and Marketing

Rationale and Purpose of the Module: *The aim of the module is to provide participants with an understanding of both the business planning and consultancy process. Students will act as consultants for existing SMEs. In undertaking the consultancy project, students benefit enormously from this experience as they have the opportunity to apply experiential knowledge and concepts learned in the classroom to real-life business situations.*

Syllabus: Knowledge is structured in two main sections, Theory and Application of Consultancy. Initially major consulting concepts and models are imparted, following which students work together in groups engaging in experiential learning acting as consultants for an external SME.

EQ4014 - FOUNDATIONS OF EQUINE PERFORMANCE
ECTS Credits: 6

Biological Sciences

Horse handling and management; methods of control and restraint, protocols for assessing and monitoring horse health, welfare status and fitness for use, use of lunging on hard and soft surfaces and as an evaluation tool for lameness and respiratory assessment. Measuring physiological indicators; respiration, temperature, heart rate, hydration. Assessment and selection for performance; genotypic and phenotypic considerations, environmental and training contributions, cloning the sports horse, sales evaluation. Training; identification of efficient athletic technique, exercises to improve athletic performance, improving accuracy and power in athletic technique in the horse, use of jumping exercises to improve power and agility, establishing independent balance in the horse and rider.

EQ4032 - EQUESTRIAN SKILL ANALYSIS
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *This module provides important foundation skills for students of equitation in movement and technique analysis, necessary for evaluating equines as athletes. Students are provided with the knowledge and skills to evaluate the physical interactions between the horse and rider.*

Syllabus: Common misconceptions in rider skill requirements. Rider movement; the role of nervous, skeletal and muscular systems in proprioception and movement, use of body segments for balance and to influence the horse, core stability, skill related components of fitness, physiology and psychology of motor learning, limiting factors - joint range of movement, mental fitness and physical fitness. Qualitative analysis of rider movement, variations by sports discipline. Analysis of technique, strategies and rules of the 3 main Olympic equestrian disciplines and horse racing. Use of video analysis of, and feedback on rider performance. Analysis of efficient technique and its role in influencing the horse and avoiding injury. Simple methods for developing rider and horse skills; use of simple off and on horse techniques on the flat, over

ground poles and jumping to promote efficiency, rhythm, balance, coordination and accuracy in rider and horse movement. Developing skills and knowledge on bandaging, bitting, early handling of horses and corrective and surgical shoeing. Factors affecting rider movement; tack and equipment, horse and rider conformation, rider gender, length of stirrup and saddle design.

ER4508 - POLLUTION CONTROL 2 (WASTE MANAGEMENT)
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To provide an understanding of current waste management options, their benefits and associated problems, and their place in the hierarchy of waste management.*

To provide an understanding of the science and technology underlying solid waste management including the problems encountered.

To provide an understanding of the locational issues for different types of waste processing plants, including the NIMBY Syndrome.

To provide an understanding of the technology of waste to energy systems.

Syllabus: [Waste Minimisation]. [Hazardous Waste Management]. [Waste to energy systems]: Incineration, landfill; composting. Dust collection devices (cyclones, ESP, baghouses, scrubbers). Leachate control and gas capture. [Waste recycling] techniques and economics. [Re-use] of waste materials.

ER4606 - CLEAN TECHNOLOGY
ECTS Credits: 6

Chemical Sciences

Rationale and Purpose of the Module: *To provide an introduction to the concept of clean technology.*
To survey methods of recycling, reducing or removing gaseous or aqueous waste from industrial processes using a clean technology approach.

Syllabus: Introduction to clean technology. Examples of Clean Technology in the agricultural industry, agrochemical, fine chemical and pharmaceutical industry. Role of catalysts, reactor configuration and design, Elimination of emissions from material handling and storage, Control of fugitive emissions, Use of biotechnology.

ET4004 - TCP / IP NETWORKING
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *The aim of this module is to provide a detailed study of the TCP/IP model and the internet. The module also covers advanced topics in multimedia communications.*

Syllabus: The internet and TCP/IP model: Evolution of internet; TCP/IP model (layers description and functions, PDU encapsulation, protocol architecture); TCP/IP internetworking principles.
Network layer: Internet protocol (IP) mobile IP, addressing (IPv4 vs. IPv6); NAT operation (static vs. dynamic); subnetting and supernetting; address resolution with ARP and RARP; routing protocols (RIP, OSPF, BGP), Quality of Service (DiffServ vs. IntServ); control and assistance mechanisms (ICMP); internet multicasting (MBone operation) and group management (IGMP)
Transport layer; Unreliable datagram transport with UDP; real-time transport with RTP and RTCP; reliable connection-oriented transport with TCP and SCTP; wireless TCP.
Application layer: Review of client-server model; domain name system (DNS); TCP/IP configuration; static (BOOTP) vs. dynamic (DCHP); terminal networking with Telnet; file transfer with FTP and TFTP; email service (SMTP, POP, IMAP); browsing with HTTP; network management with SNMP.
Multimedia communications; streaming audio, internet radio, VoIP (SIP v H323), video on demand, IPTV.

ET4006 - ELECTRONICS (ED)
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *To provide the students with the knowledge and skills required to specify and manage classroom based projects using analogue and digital electronic devices and equipment available in schools. To develop the knowledge, skills, values and attitudes appropriate to the teaching of technologies.*

Syllabus: Transistor switch and operational amplifier circuits (op-amps) with output devices lamp, buzzer, LED, speaker, motor, relay. Operational amplifier circuits (op-amps) assembled as comparator, amplifier, and oscillator. Simple timing circuits. Logic Circuits, basic logic gates AND, OR and NOT NAND, truth tables for each. The main logic families (TTL and CMOS). The use of logic gates with sensors and output devices. Inputs and Outputs, buffers (transistors, amplifiers, paralleled outputs), Schmitt trigger. Binary inputs. Counters, clock circuits, de-bouncers, counters, seven segment displays and display drivers. Circuit Design and Assembly of Pre-designed Circuits. Printed circuit boards (PCBs) Use of prototyping boards for initial assembly and testing of circuits. Strategies for teaching this subject area at second level. Designing, planning and managing appropriate teaching and learning activities for this subject area.

ET4014 - DATA SECURITY
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *To introduce the concept of security services such as authentication, integrity and confidentiality.*
To introduce the role of digital signatures and their implementation using cryptographic ciphers.
To introduce basic security protocols that provide security services.
Attacks against security services: Replay attack, man in the middle attack.

Syllabus: [Introduction to Security Services:] Security attacks, OSI model, security services: concepts of confidentiality, data origin authentication, entity authentication, data-integrity, access control, availability.
[Digital Signatures:] The role of signatures, MACs, Hash functions, digital signatures, public key certificates, X509 certification authorities, e-mail security: PGP.
[Security Protocols:] Introduction to key management, peer-to-peer distribution protocols and identification protocols. Secure web (https/ssl), secure shell (ssh) etc.

[Identification techniques:] Identification tokens and smart cards. Biometric identification: finger prints, retina scan, face recognition, voice recognition.
[Attacks:] Definition of attacker and capabilities of attacker, introduction to attacks on protocols, such as replay attacks, man in the middle attack.

ET4018 - MOBILE AND WIRELESS COMMUNICATIONS
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *The aim of this module is to provide an introduction to mobile communications and mobile networking.*
At the completion of the module, students should have an understanding of the important issues in providing a mobile communications system including signal transmission, network management and interaction with a fixed network. Students should understand the principles of operation of a current mobile communications system and the potential for future services development.

Syllabus: Digital mobile and personal communications systems: General configuration of cellular systems; comparison a with fixed communications systems; systems overview: Fixed wireless Access, cellular, WLAN, Wireless Personal Area Network (WPAN), satellite.
Cellular Concepts: Frequency reuse; channel assignment; capacity; sectoring.
Review of wireless transmission; Signals, propagation issues, coding, modulation, multiplexing, spread spectrum.
Medium access control: SDMA, TDMA, FDMA, CDMA, WCDMA, effects of Multiple Access Interference and ISI.
Mobile telecommunications systems: GSM, GPRS, EDGE, UMTS, HSDPA, future generation (4G)
Key concepts in the dynamic management of resources; call control, switching, wireless access and channel allocation, handoff, roaming, HLR and VLR.
Wireless network issues: MAC, QoS, ad-hoc networks, MANET.
Example systems: Bluetooth, IEEE 802.11, Ultra-wideband (UWB).
Mobile IP, mobile TCP issues.
Support for mobility at higher communications layers.

ET4027 - COMPUTER FORENSCIS
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module aims to give the student a firm understanding of the problems associated with computer forensics in relation to data recovery from digital media, whether the data was accidentally lost or deliberately destroyed.*
The student will learn to extract information from a computer which might be of relevance at a crime-scene using a variety of forensic techniques, tools and commands.

Syllabus: Computer Forensics: Definition; Evolution of Computer Forensics; Need for Computer Forensics in the digital age.
File systems: Disk technologies; Data organisation; File systems on UNIX and Windows.
Data recovery: Recovering data and analysing data usage patterns: the Audit Trail; Use of caches, spooling, paging files, logs, backup media, computer memory (while still powered).
Tools for forensic analysis: Laboratory/project based: file system analysis tools; investigate a case study forensic problem; emphasis on the use of tools.

ET4028 - HOST AND NETWORK SECURITY
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *Gain an in-depth knowledge of host and network security.*
Assess the security of a network.
Recommend and implement measures to prevent security threats.
Research and develop security audits.
Conversant in current trends and methodologies.

Syllabus: [Security Fundamentals] Basics of host and network security: threats, vulnerabilities and risk, risk assessment, business continuity and disaster recovery, security policies, defence in depth.
[Firewalls] Packet filters, stateful firewalls, proxy firewalls. DMZ concept, layout and design.
[Auditing and Intrusion Detection] Audit trail features, user profiling, intruder profiling, signature analysis, network IDS, host IDS, distributed IDS, combining firewalls and IDS.
[Wireless Security] Wireless standards and technologies: IEEE 802.11, WEP Bluetooth, BlackBerry, wireless applications. Wireless network threats: wireless packet sniffers, transmission alteration and manipulation, denial-of-service attacks.
[Designing Secure Networks] Host hardening: anti-virus software, host-centric firewalls and IDS. Installing and managing firewalls and IDS. VPN integration. Creating a security policy.
[Assessing Network Security] Assessment techniques, maintaining a security perimeter: system and network monitoring, incident response, accommodating change. Network log analysis, troubleshooting defence components, importance of defence in depth. Design under fire: the hacker approach to attacking networks.

ET4088 - ENERGY MANAGEMENT AND TECHNOLOGY
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module provides the necessary understanding, knowledge and skills for students to undertake a career in Energy Management.*
This module will be a direct replacement for ET4048 /ET4068 Electronic Systems for the Built Environment 2 on LM080 and LM087

Syllabus: [Energy Management Systems] ISO50001, Energy policy, plan do, check, act.
[Energy Audit] Basic components of an energy audit, industrial audits, commercial audits, residential audits. Equipment for an energy audit
[SMART Meters] Operation & functionality of SMART meters and means of communication with them.
[Data logging & Databases] Collection, transmission and analysis of utility (electricity, water, gas) consumption data.
[Automated Control for the Built environment] Building management systems, Energy efficient electrical services, energy efficient space and water heating
[Economic Analysis] life cycle costing, payback periods, cost benefit analysis
[Demand side management] Automation of processes to reduce costs and emissions. Dynamic synchronisation of electrical energy consumption with lowest tariffs.

ET4122 - ANALOGUE ELECTRONICS 2
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *The aim of this module is to continue the introduction and analysis of the principles of operation of electronic devices and circuits using the principles introduced in Analogue Electronics 1ö. A more in-depth analysis will be undertaken using suitable analysis techniques. At the end of this module students should be able to solve problems concerning simple DC circuit theorems and analyse AC circuits using both the phasor approach and the complex notation approach.*

Syllabus: SINUSOIDAL SIGNALS: Single phase generation by coil rotating in magnetic field. Trigonometric representation, amplitude, frequency and phase concepts. Voltage and current relationships for resistor, inductor and capacitor. Reactance. Response of R-C, R-L and L-C circuits to sinusoidal signals. Impedance. Phasor diagrams. Power topics; distinction between power and VA, power factor.
COMPLEX ANALYSIS: Analysis of circuits using complex notation, derivation of amplitude and phase data from complex representation of signals and impedance. Transfer functions, frequency response, corner frequency, Bode diagrams for simple R-C circuits. Power dissipation in complex impedance. Maximum power transfer theorem for complex source and load impedances.
TUNED CIRCUITS: Series and parallel R-L-C circuits, resonance, Q, bandwidth, dynamic impedance. Circulating current in parallel tuned circuit.
COUPLED CIRCUITS: Inductively coupled coils, induced e.m.f., mutual inductance, coupling coefficient. Reflected impedance for loaded coupled circuit for k < 1. Input and output equivalent circuits. Properties of ideal voltage and current transformers. The auto transformer.

Prerequisites: ET4141

ET4142 - COMPUTER SYSTEMS ARCHITECTURE
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *Introduce students to the architecture of modern computers and processors.*

Syllabus: Use of a microprocessor in a computer; relationship between hardware, software and operating system; Microprocessor concepts: von Neumann computer, block diagram of a microprocessor, fetch-decode-execute cycle.
Memory, I/O and microprocessor in a computer, read/write cycles
Programmer's model of a simple microprocessor, using a simplified 8086 as an example
Registers, addressing modes (simplified) and instruction set of an 8086, including unconditional and conditional jump and branch instructions, status bits, the stack and subroutines
Evolution of Pentium from 8086;
Example of an embedded system and comparison with a PC - similarities and differences;
Introduction to the PC, its bus structure and relevance of the BIOS
Project Work: Writing simple assembly and C programs and verifying their operation; Exploration of PC using 'My Computer' and other PC-based tools

Prerequisites: ET4151

ET4162 - COMPUTING SYSTEMS ORGANISATION
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *By introducing the concept of connected computing using networking examples, students will appreciate the driving forces affecting computer organisation and architecture. Students will learn about Instruction Set Architecture and its significance in computer design.*

Syllabus:
1. Networking Basics
   a. Exploring the influence of networking on computer organisation
   b. Introduction to networking infrastructure
   c. Networks and the internet
2. Error correcting codes
3. Assembly language programming
4. Computer performance and performance measurement
5. RISC, CISC and limitations of each
6. An overview of multicore processing
7. Memory hierarchy in detail

ET4224 - ROBOTICS 1: SENSORS AND ACTUATORS
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module introduces students to fundamental principles of*

** Measurement of physical phenomena utilising various sensing techniques.*
** Transducer action and signal conversion*
** Various Actuator types and principles of operation.*
** Specification of a complete measurement system.*

Syllabus: Introduction to Physical Phenomenon:-
* SI Units.
* Principles of sensor operation (mechanical, thermal, sound, light).
Sensors and Transducers:-
* Concept of transducer action as signal conversion with particular emphasis on an electrical signal as the output.
* The ideal transducer.
* Resolution, accuracy, linearity definitions and relevance.
* Review of some physical phenomena that result in electrical parameter variations

Actuators
* Magneto Motive Force & magnetic circuits, transformers, DC generators and motors.
* Motors: DC machines with permanent magnet and field windings, Induction motors, Stepper Motors, Stepper drives.
* Motor Drive Circuits.

Sensor Interfacing Circuitry introduction/review
* Review of Op-Amp as applied to sensing systems, Instrumentation amplifiers, diff amps, etc. Simple DACs, ADCs successive approximation and integrating, operating principles and suitability for industrial applications. Overall concepts of accuracy, drift, resolution, and common mode rejection applied to a measurement system, complete system composed of a transducer, amplifier and ADC.

Prerequisites: EE4102, EE4313, EE4101

ET4243 - WEB AND DATABASE TECHNOLOGY 2
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module will introduce the students to the concepts of database design, management and applications, such that they will gain a working knowledge of how to design and build a database and database-driven web sites that meet given business requirements, using industry standard database management systems.*

Syllabus:
* Data models & database architectures
* Database Management System (DBMS): typical functions/services and major components
* The relational database model: introduction & additional concepts
* Database design methodology: conceptual, logical and physical database design phases
* Introduction to Structured Query Language (SQL): Data manipulation and Data definition
* Approaches for integrating databases into the web environment; client-server architectures
* Introduction to Microsoft Web Solution Platform: Active Server Pages (ASP) and ActiveX Data Objects (ADO); Introduction to scripting languages
* Web database programming case study

Prerequisites: ET4132

ET4725 - OPERATING SYSTEMS 1
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module provides an introduction to multi-tasking operating system concepts. Topics include: processes, threads, memory management and file systems. Focus is on a single processor machine. The module will include a laboratory project.*

Syllabus: Operating System: Definitions, types of operating systems.

Processes: Concurrency, states, queues, scheduling, threads.

Interprocess communication and synchronisation: Mutual exclusion, race conditions, busy-waiting solutions, TSLs, semaphores, monitors, simple message passing, classical problems.

Deadlock: Conditions for deadlock and solutions.

Memory Management: Swapping, virtual memory, paging and segmentation.

File systems to support multi-tasking: Disk organisation, space management, file sharing, file protection, performance issues.

Input/Output: I/O devices in multi-tasking environments.

Laboratory: The students will become familiar with one operating system: UNIX or Microsoft Windows. Exercises will involve: shell scripting, system calls using C/C++, solving synchronisation problems in a concurrent programming environment.

Prerequisites: ET4253, ET4263

EV4013 - EQUINE PHYSIOLOGY
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *This module builds on the previous modules BY4001, BY4002, BC4902 and EV4012 and forms a core module on the Equine Science Degree programme.*

Syllabus: Integrating the students' prior knowledge, and valuing a quantitative approach, this module leads to an advanced understanding of mammalian body systems, exemplified by equine performance and dysfunction. The systems to be studied include:
Blood circulation and the cardiovascular system.
Respiration.
Water balance and excretion including renal function and urine formation.
Gastrointestinal function.
The nervous system: central, autonomic.
Special senses.
Temperature regulation.
Skeletal muscle.
Endocrinology and metabolism.
Reproduction and lactation.

Prerequisites: BY4002, EV4012, BC4902, BY4001

EV4014 - EQUINE NUTRITION
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *The purpose of this module is to provide students with an understanding of the scientific principles of Equine Nutrition and how these relate to the practical applications of feeding.*

Syllabus: Classification, digestion, absorption and metabolism of carbohydrates, protein and lipids; Amylose and amylopectin; Utilisation of the products of dietary energy and protein, Glycemic response, insulin production, insulin resistance and hyperinsulinaemia; microbial fermentation, manipulation of fermentation; VFA absorption; VFA efficiency, lactic acid production, Feed digestibility including aspects on apparent and true digestibility; Transit and retention times, Protein degradation and amino acid absorption; NPN and N utilisation, FFAs; NEFAs; Water; water requirements; Appetite; Feeding standards, Metabolic body size and intake; Feed energy systems, Partition of dietary energy for horses, an evaluation DE and NE systems; energy and protein requirements based on UFC and MADC; heat increment; Efficiency of utilisation of ME; A critical review and evaluation of feeding experiments, and nutrient balance studies; Dietary electrolyte balance; Feeding for performance and metabolism of nutrients during exercise, Applied equine nutrition including aspects on nutrient requirements and utilisation during periods of for growth and production (lactation, gestation). An overview of dietary related problems; Application of current equine nutritional research;

EV4015 - EQUINE HEALTH AND DISEASE
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *To acquaint students with the physical appearance and behaviour of the healthy horse so that signs of ill health and disease are recognised at an early stage, thus enabling them to make informed decisions about the necessity for veterinary intervention.*
To acquaint students with disease conditions of toxicologic origin and with the causes, management and prevention of infectious diseases.

Syllabus: To acquaint students with the physical appearance and behaviour of the healthy horse so that signs of ill health and disease are recognised at an early stage, thus enabling students to make informed decisions about the necessity for veterinary intervention. To acquaint students with disease conditions of toxicological origin and with the causes, management and prevention of infectious diseases. Topics covered include parasitic, bacterial and viral diseases of the horse. Diseases of metabolic and degenerative origin are also discussed, including degenerative orthopaedic diseases and osteoarthritis. Disease conditions of the airways and their impact on athletic performance of the horse are discussed from the perspectives of contributing environmental factors and prevention.

EV4017 - EQUINE PHARMACOLOGY
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *To acquaint students with the classes of drugs which are of relevance to equine medicine and to provide an insight to the factors that determine species differences in drug response.*

Syllabus: To acquaint students with the classes of drugs which are of relevance to equine medicine and to provide an insight to the factors that determine species differences in drug response. Classification of drugs and sources of information on drugs. Drug dosage forms and routes of administration. Processes of drug absorption, distribution, metabolism and excretion. Basic principles of pharmacokinetics. Pharmacological effects, mechanism of action and fate of therapeutic agents that affect various systems of the body (equine), with particular emphasis on drugs affecting the musculoskeletal and respiratory systems; Antimicrobial drugs; Non-steroidal anti-inflammatory drugs; Anthelmintic medication; Applied toxicology; Drug assay methodology; Drug licensing, registration and legislation. Performance enhancing drugs, mechanism of action and current legislation; Doping, current doping problems in the equine industry; international trends; diagnostic assays and their sensitivities.

EV4024 - EQUINE REPRODUCTION
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *The purpose of this module is to provide students with an understanding of the scientific principles of Equine Reproduction and how these relate to the practical applications of equine breeding.*

Syllabus: The syllabus is comprised of the following: reproductive anatomy of the mare and stallion, reproductive endocrinology of the mare and stallion, oestrous cycle, fertilization, pregnancy, parturition; neonatal physiology; male reproductive physiology and practical aspects of equine breeding management. The management of brood mares and stallions are presented from a physiological and husbandry perspective. The events at parturition are presented and discussed in the context of the management of the neonatal foal and the early return of the mare to reproductive activity.

EV4032 - THE HORSE INDUSTRY
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *This module provides the student with an understanding of the nature and scope of the horse industry, both national and international.*

Syllabus: Topics covered on this course include aspects related to: The Irish Horse Industry, the UK Horse Industry, The Horse Industry in Europe, US and Australia; comparative analysis of nature, size, economic importance, policies, supports, regulations, organisations, education and training of personnel. Safety, health and welfare within the horse industry; legislation. Horse welfare; issues and legislation. The statutory and regulatory organisations that operate, control and administer the horse industry. Ancillary industries; horse feed industry, transportation, tourism. Racecourse management. Aspects of breeding and training racehorses and sport horses.

EV4042 - EQUINE REPRODUCTION
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *The purpose of this module is to provide students with an understanding of the scientific principles of Equine Reproduction and how these relate to the practical applications of equine breeding.*

Syllabus: The syllabus is comprised of the following: reproductive anatomy of the mare and stallion, reproductive endocrinology of the mare and stallion, oestrous cycle, fertilization, pregnancy, parturition; neonatal physiology; male reproductive physiology and practical aspects of equine breeding management. The management of brood mares and stallions are presented from a physiological and husbandry perspective. The events at parturition are presented and discussed in the context of the management of the neonatal foal and the early return of the mare to reproductive activity.

FI4008 - EMPIRICAL FINANCE
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module: *The course provides students with a thorough grounding in the empirical study of international financial markets to prepare them for potential careers as traders, risk-managers, quantitative analysts, stockbrokers, fund managers, etc. in the financial services industry. The learning experience is enhanced through the learning-by-doing experiences of course participants through a mix of computer workshop-oriented tutorials and labs, and interactive web-based simulations.*

Syllabus: Introduction to Financial Statistics: measures of location and spread, common probability distributions, understanding probability density functions, importance of higher-order moments in financial modelling. Application of probability distributions in financial modelling. The linear regression model and parameter estimation. Fundamentals of model specification testing. Financial modelling in volatile markets. Introduction to lattices (binomial/trinomial trees), their use in the representation of stochastic processes and their applications in basic derivative security valuation. Real options theory. Hedge funds.

FR4142 - FRENCH LANGUAGE AND SOCIETY 2: INTRODUCTION TO FRE
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module:
(i) to review key aspects of contemporary Francophone societies;
(ii) to continue to develop students receptive and active language skills;
(iii) to consolidate students' knowledge of French grammar;
(iv) to reinforce students awareness of issues related to the evolution of the French language and in particular regional varieties and la Francophonie;
(v) to promote students reading and analytical skills in the study of French literature.

Syllabus: Students are introduced in lectures to the study of social, historical, linguistic and literary aspects of France and francophone societies. Themes presented this semester are
(i) Decolonisation and the variety of francophone communities;
(ii) The search for identity in modern literature;
(iii) La Francophonie and regional varieties of language.
Tutorials explore these subjects and students reading and writing skills are improved through regular exercises. Particular attention is paid to oral and aural skills in French which are developed through the discussion of a broad selection of contemporary oral and written texts from diverse media. Students continue to review issues related to French grammar.

Prerequisites: FR4141

FR4146 - FRENCH LANGUAGE AND SOCIETY 4 MODERN CONTEMPORARY
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *This module is an introduction to contemporary social, economic and political life in France. This is achieved: by developing students' knowledge of French culture and society, by focusing on the country's cultural, social and political aspects, by encouraging team-work and intercultural understanding.*

Syllabus: The module provides students with a platform to broaden and advance their experience of language learning. Language and culture are interwoven through the four distinct parts of the module. In the lectures, students are introduced to analytic tools to study particular social political and cultures aspects. In the tutorials, analysis work of newspaper articles is undertaken making students aware of the vital link between culture and language learning. In short, the module is centred on a series of lectures analysing the major issues in French politics, economics and society from 1945 to the present. Language tutorials review some of the points raised in the lectures through close reading and discussion of authentic texts related to the lectures. Language tutorials also endeavour to develop written skills in the French language through translation and/ or essay writing. Tutorial are also devoted to the study of a literary text closely related to the subject matter.

Prerequisites: FR4143

FR4148 - FRENCH LANGUAGE AND SOCIETY 6 MEDIA/CURRENT ISSUES
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module:
The purpose of this module is to give students an overview of the French media industries and the ability to evaluate their functions. This is achieved by:
- The study of the relationship between the media and the state
- In depth analysis of different branches of the media
- Practice in using the language of the media and in analysis particular media artefacts.

Syllabus: This module has three parts, each dedicated to particular aim of the module.
A general lecture will cover topics on the role of the media, the role of the state, the particularity of the French press, the development of French cinema from its beginnings to the present day. There will be a translation class and a two hour seminar in which three films will be studied as set texts and in which students will be prepared for their final oral examination.

Prerequisites: FR4147

FR4242 - FRENCH LANGUAGE, CULTURE AND SOCIETY 2A
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module:
(i) To provide students with an introduction to major aspects of contemporary Francophone societies and cultures;
(ii) To familiarise students to issues related to the evolution of the French language particularly its regional varieties and la Francophonie worldwide;
(iii) To promote students reading and analytical skills in the study of French literature;
(iv) To give a solid grounding to a number of points of French Grammar.
(v) To further develop students' practical language skills (oral and written).

Syllabus: Students are introduced in lectures to the study of social, historical, linguistic and literary aspects of France and francophone societies. Themes explored this semester are
(i) Decolonisation and the variety of francophone communities
(ii) The search for identity in modern literature
(iii) La Francophonie and regional varieties of language.
These topics are discussed in depth in the more active setting of weekly tutorials. Oral and aural skills in French are a particular focus, and they are developed through the discussion of a broad selection of oral and written material from diverse media. The study of French grammar in semester 1 is continued.

Prerequisites: FR4241

FR4246 - FRENCH LANGUAGE CULTURE AND SOCIETY 4
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *This module aims:*
- To improve oral and written language skills through activities such as textual analysis, translation, essay writing, oral presentations, discussion and debate;
- To provide an in-depth study of aspects of post-war France in political, social and economic contexts;
- To enable students to understand the ideological and cultural background to modern France through a reading of selected eighteenth-century texts;
- To practise translation from and into French of texts relating to post-war France, and to become familiar with the theories relevant to the translation of such texts and the strategies available to the translator when translating them.

Syllabus: Development of active and receptive language skills, both written and oral; key moments in the history of post-war France; revolutionary ideals in eighteenth-century France; introduction to the theory and practice of translation, focusing on the area of post-war France.

Prerequisites: FR4243

FR4248 - FRENCH LANGUAGE CULTURE AND SOCIETY 6
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *The purpose of this module is: (i) to give students an overview of the French media industries and the ability to critically evaluate their functions; (ii) to enable students to improve written and oral language skills; (iii) to provide an understanding of the principles of bilateral interpreting and introductory practice; (iv) to give students practice in translating a variety of texts and to familiarise them with the appropriate translation strategies.*

Syllabus: (i) Communication and the media in France - the study of the relationship between the media and the state; analysis of different branches of the media; practice in using the language of the media and in analysing particular media artefacts. (ii) Work on video documents on current issues in francophone countries to improve comprehension and oral skills. (iii) Translation of journalistic texts from French to English in the light of translation theory in order to foster the development of transferable translation strategies. (iv) principles and practice in bi-lateral interpreting.

Prerequisites: FR4247

FR4622 - LITERATURE AND CULTURE 2: TWENTIETH-CENTURY LITERATURE IN FRANCE
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To develop students' knowledge of twentieth-century literature from a variety of critical perspectives.*

To enable students to apply critical skills to the study of recent literature in French.

To develop students' skills in communicating ideas in oral and written French.

Syllabus: A number of literary texts of an appropriate linguistic level and representativity in terms of period and genre will be studied in this module.

FR4626 - FRENCH LITERATURE AND CULTURE 4 19TH CENTURY ART
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To provide students with the means to recognise and evaluate the links between art and society in 19th century France. This is achieved by:*
- giving an overview of the political, economic and cultural development of France from the revolution to circa 1880
- studying selected poems from mid-century onwards
- analysing French painting, particularly the realist/impressionist tradition
- reading and studying a selected realist/naturalist novel

Syllabus: The module is structured around a lecture and tutorials.
The lecture will cover aspects of the development of France as well as introducing students to the study and appreciation of painting in the period.
The tutorials will concentrate on textual analysis of the poetry and the novels.

FR4628 - FRENCH LITERATURE AND CULTURE 6: MODERNITY AND GENRE; THE NOVEL IN FRENCH
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *This module offers a thorough discussion of the question of literary genre and cultural modernity - with particular reference to the novel genre in French over a period of four centuries. In so doing, it builds upon the pre-existing knowledge of students who have been exposed to a number of examples of the genre in preceding modules, while synthesising across the historical scope of their prior exposure to French literary and cultural artefacts. It consolidates the linguistic work done in earlier modules through a challenging exposure to works of a certain difficulty and length, deepening students' practices of both reading and responding to major cultural artefacts in the target (French) language.*

Syllabus: The module seeks to foster a sense of the long-term in cultural and literary developments. Hence the inclusion of texts spanning four centuries (17th, 18th, 19th and 20th). Elements of context will be provided, through the inclusion of reference to wider historical development, social and cultural theory, and to the parallel and related development of other literary genres. Secondary reading will be duly circumscribed with emphasis being placed on thorough and close readings of the individual works. This emphasis will be replicated in the forms of assessment adopted. Students will be required to give an analytical presentation in the target language of an agreed extract (close reading and linguistic skills). Assessment will also include an extended synthetic essay in the target language (argumentational and linguistic skills).

FR4922 - FRENCH FOR BUSINESS 2A
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module:
(i) To consolidate and expand students Business French acquired in Semester one;
(ii) To provide students with an understanding of key aspects of contemporary Francophone societies;
(iii) To further develop practical language skills (receptive and active);
(iv) To develop students appreciation of French literature;
(v) To extend students' knowledge of French grammar

Syllabus: Students are introduced to the detailed study of social, historical, linguistic and literary aspects of France and la Francophonie.
Themes presented this semester are
(i) Decolonisation and the variety of francophone communities
(ii) The search for identity in modern literature and
(iii) La Francophonie and regional varieties of language.
Oral and aural skills in French are further improved through the discussion of a broad selection of contemporary oral and written texts from diverse media. With the use of authentic material (both written and oral) and with a variety of linguistic activities simulating a business environment students are asked to deal competently with tasks encountered in specific situations. The areas of focus include: finance, accounts, and investments. Students also study a literary text related to one of the lecture themes. The study of French grammar -in semester 1- is continued.

Prerequisites: FR4921

FR4924 - FRENCH FOR BUSINESS 4A
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module:
To extend within a French business context students' reading, speaking, writing and listening skills already practised in the previous terms of university study. This is achieved:
- by revising and increasing students' knowledge of French vocabulary and grammar
- by familiarizing them with new aspects of French society and culture
- by introducing students to Business French relevant to their future professional needs

Syllabus: The French for Business 4 module provides students with the space to expand their knowledge and language skills. Using authentic material, students are asked to perform in a simulated business environment a variety of tasks encountered in specific situations -Focus area: Corporate culture (workers and their workplace, internal communication, time management). In addition students make short oral presentations in the target language on selected French social/ cultural issues. Students also study a literary text related to the area of study currently "Les mains sales" by Jean-Paul Sartre.

FR4928 - FRENCH FOR BUSINESS 8A
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *While building on previously acquired reading, speaking, writing and listening skills, the course aims to enhance students' ability to engage with and express effectively ideas and concepts through the means of the target language relating to contemporary French -society and issues.*
-by working with authentic documents (press articles, one literary text, websites)
-by providing students with opportunities to practice their oral and written skills
-by encouraging intercultural understanding via tandem learning with French students

Syllabus: The French for Business 8 module provides students with a language rich environment to further their knowledge and increase their confidence. In the lecture, students gain an insight into contemporary French society. The political situation and recent cultural, economic and social developments in France are examined. In the tutorials, students conduct research and complete a task based Internet project on a French city -a city that they know from their Erasmus/Coop placement experience- identifying and analysing a number of political, economic, social, or cultural issues. Finally, students study a literary text related to the module title, currently, Journal du dehorsö by Annie Ernaux.

Prerequisites: FR4927

FT4204 - FOOD CHEMISTRY
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *To introduce students to the utilisation of raw materials by the food industry*
To provide a general course on the chemistry of raw materials and of foods

Syllabus: Overview of utilisation of plant and animal raw materials by agri-industries. Biochemistry of raw materials - amounts and types of proteins, lipids, carbohydrates and secondary metabolites of economic importance. Anatomical and structural aspects of raw materials. Food Analysis. Relationship between raw material composition and biochemical and physical properties.

FT4214 - PUBLIC HEALTH NUTRITION
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *This module provides the necessary understanding, knowledge and skills to allow students undertake more advanced learning in nutrition in subsequent semesters. Public Health Nutrition will focus on population-based epidemiological evidence linking diet and disease and explore interactions between nutrition, genetics and lifestyle. Specific topics of issue to public health including obesity, type II diabetes, heart disease, specific micronutrient deficiencies, dental health, osteoporosis, cancer and immunity will be discussed. The role of national and international regulatory agencies (including the World Health Organisation, Food Safety Authority of Ireland, Food Safety Promotion Board, European Food Safety Agency) will be examined in terms of safe guarding population public health. The purpose of this*

module is to: a) to provide an overview of the role of nutrition as a major factor in the aetiology of chronic disease of relevance to public health b). To examine the role of diet in treatment and prevention of a range of chronic disease c).Explore a number of emerging diet-related public health issues. The most relevant and up-to-date literature will be used and referenced to provide the best evidence base for this module content.

Syllabus: Overview of public health nutrition from an epidemiological perspective and strategies to tackle major, population-based public health issues including ecological public health strategies 2. Examine the role of diet in selected chronic disease of public health concern including obesity, type II diabetes, heart disease, specific nutritional deficiencies, dental health, osteoporosis, cancer and immunity. 3. Discuss the role of media / regulatory bodies / food industry / society / culture on major public health issues. 4. Other factors (environmental, psychological) influencing consumer food and lifestyle choice and attitudes surrounding preference will also be explored. 5. Examine the role of national and international regulatory agencies in ensuring consumer public health including; World Health Organisation, Food Safety Authority of Ireland, Food Safety Promotion Board, European Food Safety Agency.

Prerequisites: BY4214

FT4428 - ADVANCED FOOD CHEMISTRY
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *To provide an advanced course in Food Chemistry*
To develop a comprehensive understanding of the relationships between food characteristics and their molecular basis.

Syllabus: Detailed treatment of the chemistry of lipids, carbohydrates and proteins in food systems. Analytical techniques. Relationships between structure and function. Industrial modification of lipids; oxidative rancidity and its control. Emulsification. Non-enzymatic browning and caramelisation reactions. Natural and chemically modified polysaccharides. Roles of proteins in gelation, dough formation, foaming, texture formation, etc. Effects of processing and storage.

FT4438 - FOOD MICROBIOLOGY
ECTS Credits: 3

Biological Sciences

Rationale and Purpose of the Module: *To provide a specialised course on the microbiology of foods.*

Syllabus: Roles of major families of microorganisms in food preservation/spoilage, food fermentations and public health. Isolation and characterisation. Physiological characteristics of selected food microbes. Microbial testing and control in food products. Advanced detection methods. Hygiene, cleaning and disinfection in the food factory. HACCP and Quality Systems. Foodborne pathogens of current concern including Listeria monocytogenes, psychrophilic C. botulinum, Aeromonas, Yersinia, Bacillus cereus, Salmonella etc.

FT4458 - FOOD PRODUCTION SYSTEMS
ECTS Credits: 3

Biological Sciences

Rationale and Purpose of the Module: *To give students a general understanding of agricultural production in Ireland.*
To give students an appreciation of the factors influencing the production of novel crops and their subsequent utilisation.

Syllabus: [Soils and plant nutrition]; soil composition, physical chemical and biological properties. [Fertiliser use]. [Production of conventional and novel crops including crops for biomass use]. [Grassland and grazing], grazing systems, grass conservation. [Milk and meat production], rearing and management of cattle, sheep and pigs, production systems. [Effects of production methods on post-harvest and processing quality].

FT4468 - FOOD BIOTECHNOLOGY
ECTS Credits: 6

Biological Sciences

Rationale and Purpose of the Module: *To introduce students to the basic concepts of Food Biotechnology.*
To develop an understanding of the enabling technologies used to manipulate micro-organisms, plants and animals for the production of food.
To develop a critical awareness of the impact of Food Biotechnology on the production and processing of food.
To develop a critical awareness of the impact of Food Biotechnology on the ethics, labelling and regulatory issues related to the consumer and the environment

Syllabus: Introduction to Food Biotechnology, Outline of basis of traditional and novel food biotechnology processes; principles of fermentation, separations, recovery systems; Introduction to novel platform technologies; Genomics, Proteomics, Bioinformatics. Biotechnology and the food industry: Enzyme and bacterial mediated bio-transformations; Flavour Ingredients, Brewing, Winemaking, Enzyme technology. Food applications of microbial biotechnology; Lactic acid bacteria and Yeast; metabolic and protein engineering, overexpression of enzymes and metabolic end products; Probiotics and nutrigenetics.
Plant Biotechnology; Plant transformations, genetic strategies for improvements of characteristics, pesticide resistance, yield improvement, metabolite production. Animal Biotechnology; Genetic strategies for improvements of animal characteristics, disease resistance, yield and performance improvement, transgenic animals, Quantitative trait loci (QTL's) Related issues; Regulations and Legal declarations, Ethics, Consumer concerns, biotechnology and the environment, Future trends

Prerequisites: BC4904, BC4803

GA4012 - CELTIC CIVILISATION: CONTINUITY AND CHANGE
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *To offer an introductory module in Celtic Civilisation for the Spring Semester encompassing Celtic Mythology, Religion, Customs and Literature*

Syllabus: This module will give an overview of the socio-cultural context of Early Irish literature and culture, as well as Celtic Mythology and Customs, including the following:
-representations of Celtic Deities in the Classical commentaries and in vernacular sources
-Celtic Mythology in early written sources
-an overview of Early Irish festivals and customs and the survival of same in modern Irish folklore
-Celtic Cosmology - including representations of the otherworld(s) in Early Irish literature and in Modern Folklore
-interpretation of historical, literary and folklore sources pertaining to the social, cultural and religious customs and worldview of the Celts

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GA4105 - IRISH FOLKLORE 1
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *To introduce students from various disciplines (e.g. anthropology, comparative religion, ethnology, history, literature, sociology, etc.) to the area of folkloristics and to the study of Irish folklore*

Syllabus: An introduction to Irish folklore with special reference to the following areas: definitions of folklore, folklore collection and classification; verbal arts and minor genres; story-telling and narrative genres; indigenous and international tale-types in Ireland; and traditional custom and belief, including calendar customs

Prerequisites: GA4105

GA4116 - IRISH LANGUAGE 2
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *The course aims to build on the language skills acquired in module GA4115. It introduces students to the study of Irish placenames and surnames. The course is designed to:
Enable the student to understand and use basic structures of Irish grammar.
Expose the student to a range of vocabulary and expressions which will allow her/him to present her/himself to, and communicate with Irish speakers.
To foster autonomous language learning skills.
To develop listening and speaking skills in Irish acquired in GA4115.
To equip the student with basic writing skills.*

Syllabus: Language element: This is a continuation course. Topics covered include: Matters of work, food and drink, sickness and injury, clothes and shopping, holidays and travel, orders and making arrangements. Gaeltacht regions and certain dialect features will be discussed and some of the many Irish-language materials and resources now available online will be explored. Note: The language syllabus of this course has been developed by NUI-Maynooth and follows the guidelines established by the Council of Europe's Common European Framework of Reference for Languages. Those who complete modules GA4115 and GA4116 will gain enough practice with the language to sit the A1 level European Certificate in Irish, known as Teastas Eorpach na Gaeilge. The certificate examination is completely voluntary and is not administered by the University of Limerick, but does give the student an internationally recognized qualification in Irish. Please see course tutor if you would like more details.

Lecture topics to be covered include: placenames, an understanding of the factors involved in their creation, the people who made them and the purposes they serve, the classification of placenames, baill choirp mar logainmneacha, pagan/Christian associations of placenames, toponyms of sea-side and island areas, case-study of the Aran Islands, the most common Irish surnames, the surnames of County Limerick, the influence of invasion on Irish surnames, how surnames evolved / changed, genealogical sources for tracing Irish ancestors, the genealogy market, some prominent Irish families e.g. the O'Malley's, Granuaile.

Prerequisites: GA4115

GA4228 - IRISH FOLKLORE II
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *The purpose of the module is to provide the student with an introduction to research in Folklore and Ethnology in either Irish or English, taught on a one-to-one basis and by embarking on an extended research project.*

Syllabus: The student will initiate a research project on a topic approved by a supervisor. The student will, by a specific date, submit a 500 word brief which will include a resume of the subject matter, the scope of the project, a review of sources and an outline of the methodology required. The student will start the collection of the necessary data.

GE4142 - GERMAN LANGUAGE AND SOCIETY 2: INTOD GERMAN STUD II
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To give an overview over major trends in German culture and society from 1945 to today by means of texts and visual material.
To introduce aspects of social and regional variation in the German language. To continue introduction to the analysis of literary texts in German.
To conclude the revision of grammatical structures enabling students to use them with a high degree of fluency and correctness.*

Syllabus: Lecture: Post-war German-speaking countries: society and institutions; political, economic, cultural and literary trends; contemporary literature and culture in the German-speaking countries of Europe. Tutorials: a) analysis of literary texts to provide further access to the topics discussed in the lecture while at the same time further developing reading techniques, principles of textual analysis and text discussion in oral and written form; b) Contrastive grammar work continued. Language laboratory: exercises in pronunciation, listening comprehension and grammar utilizing CALL facilities.

Prerequisites: GE4141

GE4146 - GERMAN LANGUAGE AND SOCIETY 4: GERMANY PAST AND PRESENT
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To enhance students' knowledge about present day Germany by exploring the historical background of cultural life in Germany today. To further develop writing skills and reading comprehension at advanced level. To further develop students' skills in the analysis of more complex literary texts in German. To consolidate grammatical structures at an appropriate level.*

Syllabus: Lecture: German revolutions, democracy, fascism; cultural institutions, cultural life; the cultural and literary heritage.
Tutorials: a) reading and discussion texts supporting the lecture; conversation class b) literature class: exploration of the myths and their significance in German literary, cultural and political history and in Germany today; c) advanced grammar work.

Prerequisites: GE4143

GE4148 - GERMAN LANGUAGE AND SOCIETY 6: ISSUES AND DEBATES
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To explore current issues of particular relevance in the German speaking countries today with a particular focus on literary/cultural controversies*
To heighten students' awareness of the importance of registers in the German language.
To continue the study of more complex literary texts in German in a wider context.
To consolidate grammatical structures at advanced level.
To further develop writing and oral skills as well as reading comprehension at advanced level.

Syllabus: Lecture: cultural, economic and political issues in unified Germany, Austria and Switzerland; dealing with the past; nationalism and national identity; economic, cultural and social debates (also with regard to the EU): equality, environmentalism, cultural politics, social reforms, migration.
Tutorials: a) discussions of literary texts, newspaper, magazine articles and TV programmes on topical issues focusing on the characteristics of different text types and language registers; b) issues in Austria and Switzerland including presentations in the foreign language; c) translation class English/German with a particular focus on the problem of registers.

Prerequisites: GE4147

GE4212 - GERMAN FOR BEGINNERS 2 (APPLIED LANGUAGES)
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *This module aims to:*
To give an overview of major trends in German culture and society in the post-war period.
To consolidate and develop basic communicative skills acquired in GE4211
To introduce further basic grammatical structures/functions and consolidate those covered in previous module.

Syllabus: Lecture: Post-war German-speaking countries: society and institutions; political, economic, cultural and literary trends; contemporary literature and culture in the German-speaking countries of Europe.
Tutorials: The course builds on GE4211, introducing further grammatical structures, functions and vocabulary. Development of all four language skills in the classroom and laboratories. Transfer of known structures to a variety of communicative contexts. Further guidance will be given to students on how best to develop self-study skills to reinforce material covered during the course. One tutorial provides an introduction to German drama and further short stories.
Language Laboratory: One hour per week will be spent in the computer laboratory, consolidating grammar and develop self-study skills to reinforce material covered during the course.

Prerequisites: GE4211

GE4242 - GERMAN LANGUAGE, CULTURE AND SOCIETY 2A
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To further develop student awareness of political structures and to provide an understanding of German-speaking countries as economic and industrial entities; to continue development and consolidation of communicative skills; to develop autonomous language learning methods. Continued emphasis on establishing a solid foundation in the language; by the end of Year 1 students are expected to use all basic grammatical structures with a high degree of fluency and correctness.*

Syllabus: Lecture: Post-war German-speaking countries: society and institutions; political, economic, cultural and literary trends; contemporary literature and culture in the German-speaking countries of Europe.
Tutorial work: one hour textwork develops skills relating to textual analysis, grammar in use and writing, literary texts relating to lectures will also be discussed in this class and examined in the oral and written exams; one hour grammar/translation consolidates existing grammatical knowledge and introduces more complex structures through contrastive work using English/German translation exercises; German linguistics relates general linguistic course to the German situation, focusing on past and current developments in the German language.

GE4246 - GERMAN LANGUAGE CULTURE AND SOCIETY 4
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To develop students' understanding of contemporary Germany by analysing central issues/concepts from 18th century to the present day; to consolidate and improve text analysis and oral, reading and writing skills, to revise problem areas in German grammar and introduce selected new or more complex grammatical and syntactic structures. To introduce the systematic study of*

translation theory and practice, to introduce students to a range of text-types and registers.

Syllabus: Lecture: German revolutions, democracy, fascism; cultural institutions, cultural life; the cultural and literary heritage.
Tutorial work: Oral presentation & discussion class: drawing on text and audio-visual materials to develop formal oral skills (note-taking, structuring presentations, summarising and reporting content); literary text analysis & production; Translation theory and practice: historical and socio-political texts

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GE4248 - GERMAN LANGUAGE CULTURE AND SOCIETY 6
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To examine Germany's role within Europe and beyond and explore points of contact between Ireland and Germany; to continue improvement of text analysis and oral, reading and writing skills, to revise further problem areas in German grammar and increase students' confidence in using more complex grammatical and syntactic structures. To continue the systematic study of translation theory and practice, introducing students to a range of text-types and registers.*

Syllabus: Lecture: cultural, economic and political issues in unified Germany, Austria and Switzerland; dealing with the past; nationalism and national identity; economic, cultural and social debates (also with regard to the EU): equality, environmentalism, cultural politics, social reforms, migration.
Tutorial work: Oral presentation & discussion class: drawing on text and audio-visual materials to develop formal oral skills (presentations, talks, interviews). Text analysis & production: analysis & writing of project proposals, evaluations, etc.; Translation theory and practice: advertising, commercial and literary texts. This hour will be combined with a class providing an introduction to interpreting

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GE4622 - GERMAN LITERATURE AND CULTURE 2: TEXT, WRITER AND READER
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To introduce students to aspects of text theory and reception theory. To show a literary work, its writer and its readers as products of their time and literature as a reaction to social and political developments.*

Syllabus: Lecture: What is a text? The process of reading; intertextuality; reception of literature; relationship between work and biography of the writer; literature on stage: theatre; literature and politics.
Tutorials: a) continuation of the introductory course to German literature; b) a study of the biography of two writers, their work and their time with a particular focus on dramatic texts.

GE4626 - GERMAN LITERATURE AND CULTURE 4
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To examine major literary and cultural movements of the 19th century through a study of representative authors and various genres. To give students an understanding of the intellectual, artistic and philosophical milieu in 19th century German culture.*

Syllabus: A study of classicism in drama and poetry and its relationship to preceding movements: 'Enlightenment' and 'Sturm und Drang'; poetic realism (1850-1890) in its social context - industrialisation, urbanisation, growth of the middle classes; and impressionism as an expression of the mood of pessimism at the turn of the century and its role in the 'Wilhelminische Zeit prior to World War I.

GE4628 - CURRENT TRENDS IN GERMAN LITERATURE AND CULTURE
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To develop an understanding of current trends and developments in literature, cinema and other forms of cultural practice in post-unification Germany, in Switzerland and in Austria by studying individual works in their social and political context.*
To engage critically with contemporary literary and cultural production in the German-speaking countries and to analyse a variety of literary texts and films in German.

Syllabus: An examination of most recent developments in literature and cinema in the German-speaking countries. Analysis of literary texts, films and other cultural products (TV, music, visual arts etc.) in their social and political context and discuss how they engage with issues that feature strongly in current debate, such as multiculturalism, experiences of migrants, new women's writing, postcolonial aspects, questions of identity and changing memory discourses. Recent debates on colonialism and post-colonialism in a German context; Postmodernism and Pop Literature; Changing Constructions of Identity in Germany, Switzerland and Austria.

GE4922 - GERMAN FOR BUSINESS 2A
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To continue the business German foundation provided in Semester 1. To continue to provide an insight into socio-economic and political structures in Germany and to develop students' familiarity with German culture. To equip students with the linguistic skills necessary to deal with business situations. To familiarise students with organisational structures of German firms.*

Syllabus: Lecture: Post-war German-speaking countries: society and institutions; political, economic, cultural and literary trends; contemporary literature and culture in the German-speaking countries of Europe.

Tutorials: a) analysis of literary texts to provide further access to the topics discussed in the lecture while at the same time further developing reading techniques, principles of textual analysis and text discussion in oral and written form; b) introduction to firm structures in Germany; induction in telephone techniques and other work-related interactive skills
Language laboratory: exercises in pronunciation, listening comprehension and grammar utilizing CALL facilities

Prerequisites: GE4921

GE4924 - GERMAN FOR BUSINESS 4A
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To prepare students for job interviews and applications and to reflect on their professional goals and career aspirations. To enable students to write and communicate successfully in a professional business and/or legal context in a form they are likely to encounter during their work experience and future career.*

Syllabus: Lecture: Focus on job application process in German-speaking countries, future career familiarisation with current affairs with the focus on economic and legal topics;
Tutorial: a) production of business and legal correspondence;
b) introduction to translation into English and German; text work in form of summaries and descriptions of graphs etc. c) revision of all grammatical structures, emphasis on passive and indirect speech

Prerequisites: GE4924, GE4143

GE4928 - GERMAN FOR BUSINESS 8A
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To develop the skill of precise writing in German. To provide an insight into the workings of the European Union (EU) and to examine the role of Ireland and Germany and current challenges and chances. To cover current topics and debates in the German-speaking countries. To prepare students to sit, on an optional basis, international examinations in Business German such as "Pr³fung Wirtschaftsdeutsch international".*

Syllabus: Lecture: cultural, economic and political issues in unified Germany, Austria and Switzerland; dealing with the past; nationalism and national identity; economic, cultural and social debates (also with regard to the EU): equality, environmentalism, cultural politics, social reforms and migration.
Tutorials: a) discussions of literary texts, newspaper, magazine articles and TV programmes on topical issues connected with the lecture, focusing on the characteristics of different text types and language registers; b) examination of the institutions and policies of the EU with particular reference to Germany's and Ireland's role within the EU; c) revision of business material in general.

Prerequisites: GE4927

HI4068 - IRELAND AND THE WIDER WORLD, 1919-73
ECTS Credits: 6

History

Rationale and Purpose of the Module: *The module will introduce students to the study of international history and Irish diplomatic history. It will examine Ireland's changing place in the world and its involvement in international and European affairs during three key periods 1919 to 1939, 1939 to 1961. 1961 to 1973. It aims to uncover the key assumptions and doctrines underpinning the conduct of Irish foreign policy; to explore the Irish foreign policy formulation process, to examine the key bilateral and multi-lateral external engagements of the Irish state since independence. The module will provide a framework for studying the key concepts, institutions and chronology of the period. Expected to lead the discussion on that issue. a) to introduce students to the key events which shaped Ireland's relations with the wider world in the twentieth century b) to explore the historiography specific to the theme, c) to consider how the newly independent state engaged in diplomatic relations with other states and confirmed its legitimacy, d) to examine the principal features of the Irish diaspora in the US, Australia, New Zealand and South Africa and d) to research and produce a written analysis of selected topics based on accurate use of secondary and primary source material.*

Syllabus: Introduction to the key themes in Irish foreign policy in 1919; The origins of Irish foreign policy; the diplomatic service in 1919; Anglo-Irish relations - Anglo-Irish treaty 1921, from empire to commonwealth, dominion status, imperial conferences, Statute of Westminster 1931; External Relations Act 1936, 1937 Constitution; Ireland and the United States - Wilson and peace 1918-1920, relief aid and recognition, immigration legislation; disarmament, normalisation; FDR and Ireland; the Spanish Civil war 1936; Emigration - the diaspora, the missionary movement. World War two - neutrality, the role of foreign diplomats in Ireland, 'benevolent neutrality', the balance sheet in 1945; the Marshall Plan, 1947-58; the Cold War - North Atlantic Treaty Organisation; Ireland and the European Economic Community; multilateral organisations - League of Nations, the United Nations; the developing world - South America, Africa and Asia 1945-74; Overview

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HI4082 - EUROPE: SOCIETY AND GOVERNANCE; 1890 - 1990
ECTS Credits: 6

History

Rationale and Purpose of the Module: *The aim of this module is to examine significant political, social and cultural aspects of modern life in Europe. This course will, therefore, probe some of the key social and cultural transformations of the twentieth century, and discuss the key political issues and events that have defined that period.*

Syllabus: Introduction to the course: war, revolution, restoration 1914-24; European societies at war; revolutionary situations/regime change; restoration of order; democracy/dictatorship and war 1924-44; American money and reconstruction; decadent decade? jazz, cocaine and sex; depression and sobriety; political mobilisation and violence; authority restored; conservatism/fascism/Stalinism; the twenty-year crisis: international relations; the Nazi new order and total war; Holocaust; reconstruction/Cold War 1944-74; 1945: Europe's 'zero hour'? Re-establishing order: Europe's political divisions; recovery, growth, and limits: the

European economy; seducing Europeans: mobility, consumerism, and culture; the ‘second sex’; feminism and post-feminism; turning tides: youth, political protest and cultural revolt; the post-post war society and state (1970s-90); rebuilding the European house: Thatcher and Gorbachev; Which Europe? Race, ethnicity, and memory; after the Wall: the return of ‘Europe’

HI4102 - IRELAND: REVOLUTION AND INDEPENDENCE, 1898 - 1968
ECTS Credits: 6

History

Rationale and Purpose of the Module: *This course charts the history of how Ireland emerged from the British Empire in the years following 1898.*

Syllabus: The course is divided into lecture themes which address a wide range of important topics. These include the impact of the Boer War on Ireland, resurgence of the Irish Republican Brotherhood, rise of Sinn Fein, Larkin and the Union Movement, Connolly and Irish Socialism, 1916 Rising, War of Independence, Civil War and Partition, Ireland during and after the Second World War, the declaration of the Republic, Civil Rights and the origins of the modern 'Troubles'.

HI4142 - GAMES OF THRONES: GENDER, POWER AND IDENTITY, IRELAND AND THE WIDER WORLD, 1500-1950
ECTS Credits: 6

History

Rationale and Purpose of the Module: *The module examines conflict, power and identity in Ireland, Europe and the wider world in the early modern and modern periods. Its purpose is to examine power and conflict in past societies, and the impact violence and unrest had for men and women, families, localities, states and continents. The module will introduce students to key concepts including gender, representations of power and identity.*

Syllabus: representations and realities of power: men and women; exercising power: religions, monarchies, dictatorships and institutions; violence; war and conflict; dynastic rivalry and conflict; local and agrarian unrest; the 'mob'; statecraft; diplomacy; heresy and censorship; ideology; subversion and non-violence; sexual politics and sectarianism.

HI4148 - THE HISTORY OF AUSTRALIA
ECTS Credits: 6

History

Rationale and Purpose of the Module:
This course aims to provide a survey of the history of Australia between the establishment of the penal colony in New South Wales in 1788 and 1918.

Syllabus:
The course comprises lectures dealing with such themes as 'Terra Nulius' and the choice of Botany Bay, the French reconnaissance, hulks and prison ships, convictism, Aborigines, the 'Irish Plots' of 1800 and Castle Hill revolt of 1804, Governors Bligh, Macquarie, Darling and Bourke, the Bigge Report, 'Black War', Anti-Transportation League, Gold, Squatters, the 'Kelly Outbreak', new colonies, Federation, ANZAC and Australia during the First World War.

HI4152 - FROM KINGDOM TO REPUBLIC: IRISH HISTORY, 1660-1960
ECTS Credits: 6

History

Rationale and Purpose of the Module: *This general history module will provide those with little or no prior experience of history with an overview of Irish society and politics from c.1660 to 1960. It is ideal for the general arts student, the international student and those who wish to have a general introduction to Irish history. This is to be offered to students of the new BA Arts.*

Syllabus: Defining Ireland; economy, society and class; women and politics; the Three Kingdoms; the Boyne and the emergence of a protestant ascendancy; agrarian society in pre famine Ireland; the Famine: dealing with the catastrophe; patriots, nationalists, republicans, unionists, and others: politics and its followers; origins of independence; constitutional developments and the two states of Ireland; economic development; population and social change; education and language; the evolution of popular culture; the Irish diaspora.

ID4112 - DESIGN MECHANICS
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *This module provides students with the necessary knowledge of mechanical stress and strain theory which when applied allows them to design mechanical components and/or structures capable of withstanding a required load. The module then studies the implementation of these designs by examining the components required to convert the designs into real world systems.*

Syllabus: Direct stress and strain. Stress and strain in compound bars. Buckling. Thermal stress. Shear stress. Torsion. Shear force diagrams. Bending moment diagrams. Bending stress. Stress concentration. Fatigue. Prime movers. Belt drives. Gears and gear trains. Bearings. Shafts and couplings.

IE4214 - INDUSTRIAL ORGANISATION
ECTS Credits: 6

School of Design

Rationale and Purpose of the Module: *To introduce the subject of operations management, differentiating between operations and processes*
To introduce performance optimisation within limited system resources
To prepare students for coop

Syllabus: Basic concepts: Operations versus processes and relationships to lead-time, Little’s law, lean production and dynamic responsiveness, make-to-order versus make-to-stock, resources (4 Ms), types of manufacture, product-process matrix, production planning and control activities
Cost estimating: cost elements, materials, time and capacity, quality costs, overhead activity costs, final cost/selling price, break-even analysis and make/buy, budget variance control, target costing
Layout: types of layout, Systematic Layout Planning, work-station space allowances and templates, material load and/or adjacency measures of proximal desirability, Pareto analysis of flows, string diagrams, layout

evaluation and improvement.
Project Planning: Gantt, networks, critical path, uncertain times, resource levelling, time-cost trade-offs, line-of-balance.
Dispatching clerical process, priority dispatching rules, Kanban Inventory control direct/indirect and opportunity costs of inventory, independent demand systems: perpetual and periodic reordering, safety stocks, dependent demand, bill-of-materials, material requirements planning, lot-sizing by EOQ for 1 product, Pareto ABC inventory analysis, limitations of EOQ, push versus pull, system requirements for small-lot production Organization structure: organisation charts, determining processes and functions, grouping and integration, alternative structures.

IE4238 - OPERATIONS ANALYSIS AM
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To give students an understanding of the use of analytical models in the management of resources.*
To provide students with skills for the application of linear programming and related models to resource management.
To give students an understanding of the technique of simulation and its application to systems design

Syllabus: Introduction to operations management and its applications.
Introduction to Linear programming, transportation, assignment model and network models.
Introduction to Integer programming, problem complexity and solutions to integer programming problems.
Introduction to linear programming computer software.
Introduction to discrete event simulation, the simulation process? Steps involved in carrying out a simulation project. Computer simulation packages: computer implementation issues, development of simulation models using a simulation package. Statistical aspects of simulation? Input analysis, random number generation, output analysis.

IE4248 - PROJECT PLANNING AND CONTROL
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To develop students' abilities to plan and manage large engineering projects, and to develop skills required to effectively communicate with other company departments directly involved in such projects, namely: Finance, Manufacturing and Corporate Management.*

Syllabus: What is a project: the 3 goals of a project - Project selection methods, project appraisal criteria, economic analysis, Project life-Cycles

The project manager's role and responsibilities, leadership, professional project management, projects within organisations, the project team, motivation, teamwork, communications on projects.

Project planning: Project Charter and scope, work breakdown structures (WBS), linear responsibility chart (LRC), multidisciplinary teams, concurrent engineering, interface management, Design Structure Matrix.

Project Budgeting: Cost estimation for projects: Estimating resource, time and cost requirements and constraints; Life-cycle costs, detailed & parametric cost estimating models, Budget determination.

Project management software, MS Project applications and examples.

Project Scheduling: PERT and CPM networks, finding the critical path and critical time, milestone management, calculating slack, project uncertainty and risk management, probabilistic activity times, simulation, the Gantt Chart, additional diagramming methods.

Project Resources: Expediting a project, crashing a project, resource loading and levelling managing scarce resources on one or several projects, multiple projects, Critical Chain project management.

Project Control: Plan-Monitor-Control Cycle, Project reporting, Earned Value, Project control systems, Scope creep and project change control.

Evaluating projects: Evaluation criteria, project auditing, project termination

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IN4004 - INSURANCE LAW AND CLAIMS
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module:
1. To develop in the student an understanding of and insight into the insurance law and claims processes
2. To examine the nature of the interface between insurance organisations and regulators.
3. To introduce students to the practice of insurance claims departments. Stress will be given to the achievement of appreciation of recent developments in the field.

Syllabus: Provide the student with an understanding of the claims process and the law of insurance applying to Ireland. Additionally, effective investigation and negotiation techniques are taught to implement the complexities of law to give practical application scenarios. Personality and behaviour are analysed so that a negotiator or investigator can formulate optimum tactics in their vocation.

Prerequisites: IN4003

IN4008 - REINSURANCE / ART
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module: *To meet the specialist skills requirements of the re/insurance industry by equipping students with a thorough grounding in reinsurance contracts, innovations in product design and the process and structure of insurance linked securitisation (ILS).*

Syllabus: The secondary risk transfer device of reinsurance is an essential functional discipline in an insurance organisation. The discipline involves the design and implementation of a reinsurance structure that meets pre-determined criteria of cost economy and effectiveness consistent with solvency assurance. Alternative risk transfer is an evolving set of methodologies that essentially incorporate capital market instruments as an alternative to orthodox corporate insurance programs. (a) Principles and functions of reinsurance/alternative risk transfer. Technical analysis of major product types - quota share: surplus; spread

loss; loss stabilisation; operational features of managing the reinsurance/alternative risk transfer function - reinsurance accounting; accumulation control. (b) Statistical analysis of pure risk exposures, including computer based simulations of possible loss scenarios; selection of relevant risk transfer measures; underwriting techniques; exercises in reinsurance/alternative risk transfer programming.

Prerequisites: IN4003, IN4015

IN4014 - LIFE INSURANCE
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module: *The module provided the student with an understanding of the principles of life insurance and the history and importance of life insurance in both the Irish market and on a global level.*

Syllabus: The module includes an analysis of term insurance, whole of life insurance and endowment insurance. The health insurance market in Ireland is studied, as is the Irish social insurance system with specific focus on the retirement and pensions market. The module covers the nature and purpose of a variety of life insurance contracts and students gain knowledge of life insurance underwriting. With regard to life insurance underwriting, particular attention is paid to underwriting of a variety of diseases that affect human anatomy, theories of mortality and morbidity risk, formulation of mortality tables, and the calculation of premium for term, whole life, endowment and annuity.

Prerequisites: IN4003

IN4418 - RISK CONTROL AND UNDERWRITING
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module:
1. To develop in the student an understanding of and insight into underwriting.
2. To examine the nature of the interface between the corporate risk management function and the underwriting function within the insurance sector.
3. To introduce students to the theory and practice of underwriting and to acquaint students with the complex and rapidly changing environment within which risk managers operate.

Syllabus: Acquire a comprehensive understanding of the underwriting process within the context of risk management.
Material damage insurance and risk control
Loss of Profits
Pecuniary insurance
Liability insurances
Loss reserve management
Principles of insurance pricing

Prerequisites: IN4015

IN4738 - INTERNATIONAL INSURANCE
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module:
1. To develop in the student an understanding of and insight international insurance. 2. To examine the nature of the interface between regulation and insurance. 3. To allow students to comprehend the nature of cross-border business in insurance

Syllabus: The students will gain a general understanding of international insurance and produce at some in depth analysis of specific examples

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JA4112 - JAPANESE LANGUAGE, CULTURE AND SOCIETY 2 (ADVANCED)
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

JA4212 - JAPANESE LANGUAGE, CULTURE AND SOCIETY 2
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To give an overview of Japanese culture and society from 1945 to today by means of texts and visual material. To conclude the revision of grammatical structures and kanji enabling students to use them with a high degree of fluency and correctness.*

Syllabus: Lecture: Japanese history, society and institutions; Tutorials: a) analysis of literary and other texts to provide further access to the topics discussed in the lecture while at the same time further developing reading techniques; b) Grammar work continued, listening comprehension. Autonomous Project work utilizing CALL facilities.

JA4246 - JAPANESE LANGUAGE, CULTURE AND SOCIETY 4
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To enable students to understand more advanced authentic and near authentic, modern Japanese texts and to produce a greater range of spoken and written texts; to foster in students an understanding and appreciation of modern Japanese writing; to consolidate their knowledge of issues in contemporary Japanese society.*

Syllabus: Listening practice concentrating on authentic Japanese; speaking exercises using various levels of formal and informal Japanese; using language with the correct nuances of regret etc. Speaking to a group on various topics. Reading authentic and near-authentic material on Japanese life and culture as well as news stories. Writing memos, faxes, e-mails, descriptions and summaries. Use of a further 120 kanji to bring the total up to 500 characters. Translating short passages of various levels from Japanese to English.

Prerequisites: JA4213

JA4248 - JAPANESE LANGUAGE, CULTURE AND SOCIETY 6
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To consolidate students' previous acquisition of Japanese and to bring them to an upper intermediate level of language use in listening comprehension, speaking, reading and writing; to continue the study of Japanese culture and society.*

Syllabus: Listening practice using authentic materials. Further practice in the use of polite language. Vocabulary consolidation; presentations, practice for interviews. Reading practice of authentic news stories, and authentic passages relating to Japanese society and modern literature. Translation of authentic passages, literary or business-related. Writing of summaries, descriptions, letters, and passages expressing opinions. Study of a further 200 kanji, to bring the total up to 750 characters.

Prerequisites: JA4247

JA4912 - JAPANESE FOR BUSINESS 2
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To consolidate and increase abilities already gained in understanding, speaking, reading and writing, and further students' understanding of Japanese society, as well as to develop further strategies for autonomous language learning.*

Syllabus: Listening exercises dealing with street directions descriptions of places, abilities and family. Speaking practice emphasising talk about one's own and others families in the correct register descriptions of places. Reading descriptions of towns in Ireland and Japan as well as passages about Japanese sport and pastimes. Writing more complicated passages about family and place, pastimes, likes and dislikes. This will involve the introduction and practice of a further 80 kanji, bringing the total learned to 160. Discussion of aspects of Japanese society e.g. the economic system, education, Japanese literature.

Prerequisites: JA4911

JA4914 - JAPANESE FOR BUSINESS 4
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To enable students to understand more advanced authentic and near authentic, modern Japanese texts and to produce a greater range of spoken and written texts; to foster in students an understanding and appreciation of modern Japanese writing; to consolidate their knowledge of issues in contemporary Japanese business and society.*

Syllabus: Listening practice concentrating on authentic Japanese; speaking exercises using various levels of formal and informal Japanese; using language with the correct nuances of regret etc. Speaking to a group on various topics. Reading authentic and near-authentic material on Japanese business life and culture as well as news stories. Writing memos, faxes, e-mails, descriptions and summaries. Use of a further 120 kanji to bring the total up to 500 characters. Translating short passages of various levels from Japanese to English.

Prerequisites: JA4913

JA4918 - JAPANESE FOR BUSINESS 8
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To consolidate students' previous acquisition of Japanese and to bring them to an upper intermediate level of language use in listening comprehension, speaking, reading and writing; to continue the study of Japanese culture and society.*

Syllabus: Listening practice using authentic materials. Further practice in the use of polite language. Vocabulary consolidation; presentations, practice for interviews. Reading practice of authentic news stories, and authentic passages relating to Japanese society and modern literature. Translation of authentic passages, literary or business-related. Writing of summaries, descriptions, letters, and passages expressing opinions. Study of a further 200 kanji, to bring the total up to 750 characters.

Prerequisites: JA4917

JM4004 - MAGAZINE JOURNALISM
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *To give students a thorough understanding of the magazine market, from lifestyle magazines to Business to Business publications, including contract and customer publishing. To enable students to think creatively and develop their ideas to help them understand how magazines work and to create a pitch for a new magazine.*

Syllabus: Students will learn how the magazine market works, the differences between the various different kinds of magazine, readership markets and revenue streams. Professionals will speak about their part of the industry to give the students a broad understanding. Students will select a magazine and research it, from circulation to readership, advertising and other revenues. They will obtain interviews to clarify any points, and produce a profile of the magazine, which will form the basis of a presentation to the class. In the second half of the semester students will work on Project Oscarö: in groups of about five, they will generate an idea for a new magazine, research the market, produce reader profiles, produce details of features, design dummy pages and pitch their projected magazine to the class, tutors and a magazine professional. Assessment will be by coursework: production of a portfolio of work completed during the course, and contributions to class discussions.

JM4013 - RADIO JOURNALISM
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *This module is being created to introduce radio journalism to the BA Journalism and New Media degree program, following recommendations by the external examiner and feedback from industry.*

Syllabus: The module will examine historical perspectives on the medium of radio and the current organisational structures of radio in Ireland and internationally. The impact of broadcast journalism on democracy will be examined. Areas such as podcasting and on-line streaming, and their impact on news media

and on democracy will also be explored. Lectures will also examine radio research techniques, interviewing for audio and on scriptwriting for the ear. Practical classes will focus on the development of skills for professional journalism practice for audio-based outputs, and will take place in studio and in a dedicated newsroom. Writing and presentation skills for radio, microphone technique, voice training, audio mixer operation, telephone recording procedures, the operation of portable recording devices and computer-based editing of audio reportage will be examined.

JM4014 - FEATURE WRITING
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *Feature Writing aims to develop students' writing skills in producing features of different types for a variety of publications.*

Syllabus: Students will learn how to generate ideas for features, pitch feature ideas at mock feature conferences, research using printed and web sources and face to face and telephone interviews, develop their ideas for specific target publications, and write lively material. They will work on feature structure and writing standfirsts. They will produce publishable features of different kinds, including an interview/profile, colour writing or reportage and an analytical researched feature. They will be encouraged and helped to get work published either in a student or professional publication, or on their own websites. Assessment will be by coursework: production of a portfolio of work completed during the course, and contributions to class discussions.

JM4018 - INDIVIDUAL JOURNALISM PROJECT
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *The individual project aims to help students in-depth reporting, broadcasting, writing and design skills through work on a substantial project of their own choice. It aims to help them produce an extended piece of journalism with appropriate research.*

Syllabus: Students will choose and research a subject of their choice using all available resources and personal interviewing. They will be guided by a supervisor to ensure their research will be adequate to produce a 4,500 word extended journalistic product, either as one piece, or a group of related pieces. Students will also be required to produce a 30-minute radio documentary OR 10-minute television documentary OR multimedia project on this or a related topic, or a series of shorter packages. A target publication and broadcast outlet must be identified and justified. The final work will be designed for print / web / edited for broadcast as appropriate and presented as part of a portfolio of publications produced while a BA student. Students should conduct a series of interviews as appropriate and follow ethical guidelines and use on-the-record sources. Students will demonstrate cognisance of news processes, evidence of research, ethical considerations and sound editorial judgement in the production of the project and portfolio.

JM4022 - INTRODUCTION TO SOCIAL MEDIA
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *This module aims to equip students with the web-based research, organisational and value judgement skills necessary to examine and understand critically the power of social media in a globalised world. It aims to enable students to become better critical thinkers and researchers by giving them the skills to understand social media, to question its relevance, its accuracy and its legitimacy; and to construct news in a social media format. It will equip students with communication skills that are appropriate to a first-year level and which will enable them to participate effectively in their university degree.*

Syllabus: This module is a foundation for new university students that will introduce them to thinking critically about social media. Taught elements will include concepts drawn from theoretical communications, social and media studies, as well as practical approaches including hierarchical news writing and information construction. The module will examine the changing nature of how news is disseminated through social media and investigate citizen engagement with news. It will give a practical introduction to the use of social media for the purposes of information gathering, as a source for news and as a potential agent of democratisation of media and society. Practical cases will be understood through recent theoretical perspectives on human collaboration and communication. The changing dynamic of news from the traditional (linear) model to the new media (circular) model will be explored. The course has a strong focus on both the use of social media for practical exercises and on evidence-based critical thinking.

JM4028 - CURRENT ISSUES IN IRISH MEDIA
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: ** To familiarise students with the key contemporary issues in Irish media.*
** To give students an overview of the diversity of Irish media contexts.*
** To introduce students to a range of media professionals from a range of different contexts and media.*
** To enable students to produce an in-depth study of a chosen media context.*

Syllabus: * The course is a seminar module. Each week a practising media professional will come to the University to talk to students about their particular working environment and the key issues facing them as media professionals and their particular organisations in contemporary Ireland.
* The range of seminar speakers will be as wide as possible, representing different media, different contexts (local, regional, national, public, private, voluntary) and different linguistic (Irish language and new allochthonous languages) and cultural environments.
* Students will write a brief synopsis of each of the seminars and will also choose to study one of the media contexts presented in the seminar series in depth in an extended essay.

JM4031 - SUB-EDITING AND DESIGN 1
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *This module aims to introduce students to key principles of sub-editing and design for journalism. It will develop students' theoretical understanding as well as skills and*

abilities by introducing them to the fundamentals of sub-editing practices including grammar, punctuation and syntax for news and feature journalism, for both print and online. It will also introduce students to the basic principles of news design using text and images for print and online.

Syllabus: Students will use a stylebook to understand basic elements of text editing, proofreading and sub-editing. They will learn the principles of professional editing, headline and standfirst writing, and cutting to length. They will be introduced to the basic principles of illustrating news, including taking photographs and generating graphics. They will learn print and website design and will create their own websites. They will analyse and compare design in national and local newspapers and websites, and will use these analyses to inform their own work. Assessment will be by sub-editing assignments, the production of a portfolio of work completed during the course, and a news website.

JM4034 - JOURNALISM AND WRITING 2: BREAKING NEWS AND FEATURES
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *Journalism and Writing 2 follows on from Introduction to Journalism from semester one. The course aims to delve deeper into journalistic theory while in the laboratory classes the course aims to develop students' writing skills in producing a variety of news articles including breaking news, short features, long form journalism and reviews for a variety of publications - print and online.*

Syllabus: In the lectures students will discuss theories of journalism including; journalism and ethics, normative theories of journalism, journalism in the digital age, citizen journalism, mass communication theory and political economy.

In the labs students will extend their knowledge of different journalistic forms, including breaking news, short features, long form journalism, profiles, vox pops, and reviews. Regular news writing workshops will continue, including one on a breaking news exercise and a wrap story exercise. They will be helped to begin writing for student publications, and will be encouraged to write their own blogs.
Assessment will be by the production of a portfolio of work completed during the course, and a final timed examination.

JM4058 - BROADCAST WEEK
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *The module is intended to give practical experience in a live broadcast situation to fourth year journalism students. The experience of working under deadline pressure to produce professional standard output from the University of Limerick in simulated radio, TV and online broadcasts will be an important training exercise for BA journalism and new media students.*

Syllabus: The module will enable the learner to put advanced radio, television and online broadcasting skills into practice in a real-world context, by planning and producing programming, in a range of categories, and operating an on-campus live web site. Students will adopt the roles of site editor and manager, head of news, head of sport, presenter, producer, researcher and reporter. The module will enable the learner to fully develop team-working skills in news and other programming roles, and to hone their editorial judgement in high-pressure, on-air situations. Students will be expected to ensure all programming complies with the relevant broadcasting legislation, as well as with the codes and standards set out by the Broadcasting Authority of Ireland (BAI). Learning will be via practice based learning.

LA4002 - JURISPRUDENCE
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *To acquire a variety of theoretical perspectives on law through an examination of its nature and operation and an analysis of key concepts and issues.*

Syllabus: Schools of jurisprudence: positivism, classical and modern. Kelsen's pure theory of law. Natural law theories. Historical and anthropological theories. Sociological jurisprudence. Legal realism. Marxist theories of law. Critical legal studies. Economic analyses. The operation of the law: precedent; statutory and constitutional interpretation. Theories of adjudication; Dworkin's rights thesis. Key legal concepts including theories of justice and Hohfelds analysis. Key issues such as morality and the law and the duty to obey the law.

LA4006 - MEDICAL LAW
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *The aim of this module is to provide students with an understanding of the legal and ethical issues associated with the practice of medicine. The interface between law and medicine has become increasingly controversial in recent years. Aside from traditional concerns such as those relating to medical confidentially and access to medical records, an increasing awareness of the need to recognise and respect the autonomy of patients has raised new concerns which the legal system must address. This module seeks to introduce students to the challenges posed in the legal regulation of medical practice by introducing them to the law relating to medical confidentiality, access to medical records, consent to treatment and end-of-life decision-making.*

Syllabus: This module covers: legal and ethical issues surrounding medical confidentiality and access to medical records; human rights and ethical perspectives on autonomy in healthcare decision-making; informed consent to medical treatment; capacity to consent in relation to minors and those with mental incapacity; refusal of treatment and; end-of-life decision-making.

LA4008 - COMPANY AND PARTNERSHIP LAW
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *To provide students with an understanding of the legal regulation of the primary forms of business organisation: the corporate entity and the partnership unit.*

This module will be offered on the programme Higher Diploma in Accounting (title to be changed to Professional Diploma in Accounting)

Syllabus: Corporate formation: types of companies, formalities, advantages and disadvantages of incorporation, corporate personality, piercing the veil, groups of companies; corporate governance; role of shareholders, directors, employees, directors' duties, AGM, accounts and audits; minority shareholder protection; protection of parties dealing with corporations: creditors, voluntary and involuntary, charges over companies; ultra vires contracts; capital integrity; minimum requirements, distributions out of profits, repayments of capital; corporate termination: liquidation, receivership, winding up, examinership, amalgamations and reconstructions. Partnerships; joint and several liability; formation of partnerships; dissolution of partnerships; limited partnerships.

LA4012 - COMPARATIVE LEGAL SYSTEMS
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *To show the evolution of some of the distinguishing features of the major legal families and to examine some alternatives offered by non-western cultures.*

Syllabus: The idea of law. Legal concepts. The historical development of common law. Early Irish law. Roman law. Civil law. Some fundamental concepts. German, French, Spanish and Scottish legal systems - introduction. How a Civil lawyer finds the law. American legal system. Other conceptions of law and the social order.

LA4032 - CRIMINAL PROCEDURE
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *This course will consider the procedures to be used in the criminal justice system from the earliest moment of investigation, right through to sentencing. The system as a whole will be evaluated from various value-based positions, encouraging critical reflection among students. Key areas such as policing, trial procedure, and the sentencing process will be considered in depth. The course will involve a mixture of legal detail and sociological theory to give a rounded appreciation of the issues addressed. By the end of the course students should have a strong, and critical, understanding of the how the criminal justice system operates.*

Syllabus: Criminal Justice Models, Adversarial System, Jury Trials, Due Process, Classifications of Crime, Delay, An Garda Siochana, The Irish Courts/ Prisons, Police Powers, Stop and Search, Arrest & Detention, Questioning and Legal Representation, Bail, Prosecutions & Trial Procedure, Initiating Court Proceedings, Indictments, Arraignments and Pleas, Evidence & the Jury, the Special Criminal Court, Principles of Sentencing, Sentencing Options, Appeals, Miscarriages of Justice.

LA4035 - LABOUR LAW
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *To familiarise the student with the legal regulation of contracts of and for employment, industrial relations and remedies thereto.*

Syllabus: Nature of Labour law, legal classification of the provision of labour, the role of statute in Labour Law. Protective legislation and conditions of employment, health and safety at work, sex discrimination, equal pay. Termination of employment, redundancy, minimum notice and unfair dismissal. Trade unions, legal regulation thereof, worker participation, EC developments. Courts and tribunals in Labour Law.

LA4036 - INTELLECTUAL PROPERTY LAW
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *Intellectual property (IP) is of great importance in modern society and the provision of legal protection to owners of intellecutal property is considered by many to be criticial to fostering ideas, rewarding innovation and stimulating economic growth. The significance of IP may be identified across a variety of sectors including the engineering, pharmaceutical, medical, entertainment, fashion and computer/software industries. The aim of the module is to give students an understanding of the various sources and forms of intellectual property (I.P.) rights including patent, trademark, copyright and design protection.*

Syllabus: This module will explore the various sources and forms of intellectual property (I.P.) rights including:
1) patents
2) trademarks
3) copyrights
4) designs

The source of these rights, their limitations, infringement and remedies available for breaches will also be covered.

The course will also examine common law protections available to protect intellectual property including the tort of passing off and breach of confidence.

The focus will be on Irish IP law but will also examine relevant EU directives and global IP treaties.

LA4038 - FAMILY LAW
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *The aim of the course is to familiarise students with the core concepts of Irish family law.*

Syllabus: The module will examine the following: nullity; domestic violence; child custody and access disputes; maintenance, separation agreements; judicial separation; divorce; preliminary and ancillary relief in judicial separation and divorce proceedings; and the non-marital family.

LA4042 - ADMINISTRATIVE LAW
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *To provide students with the mechanisms to test whether any decisions or actions taken by government or governmental agencies are lawful, and examine the redress available for aggrieved citizens.*

Syllabus: Historical political and administrative background to administrative law within Ireland;

relationship of administrative law with the Constitution of Ireland/ Delegated legislation, decisions, administrative acts, informal rules, circulars. The use of discretion. The principles and procedures of judicial review. Remedies.

LA4044 - LAW OF THE EUROPEAN UNION 2
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *This module will review and identify major developments in the substantive law of the European Union, its interpretation and development, with special reference to the foundations and common rules and policies of the Common Market and the realisation of an internal market. The policies dealt with will include i.e. the free movement of goods, persons, services, capital and payments, competition, social policy and animal welfare.*

Syllabus: The module covers, in the first instance, background to the single market/common market. The module proceeds to examine in detail the Four Freedoms: free movement of goods, the free movement of persons (including workers, families/dependents, students, retired citizens, the freedom of establishment and the provision of services. Competition Law, including restrictive agreements and abuse of a dominant position will be examined. Social policy, (Equal pay and treatment, same sex couples, transsexuals etc.) will be covered and the module will end with a discussion on the impact of European Law on the animal welfare with specific reference to Treaty developments form the 1960s and the initial connection between animals and agriculture to recognition of the sentience of animals in the Treaty of Amsterdam and Lisbon, recent development including the Cat and Dog Fur Regulation and the Cosmetics Directive.

LA4048 - ADVANCED LAWYERING 2
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *The aim of this module is to provide a detailed understanding of the operation and practice of the legal system in Ireland, paying particular attention to the necessary skills inherent in the process of law at all levels. It forms part of a sequential number of modules within which this aim is achieved.*

Syllabus:
Section A.
Working in small groups with a dedicated faculty advisor, students will complete study and participation in the topics outlined in Section A of Advanced Lawyering I, dealing with such issues as the PIAB and Commercial Court, including collaborative law, mediation and arbitration.

Section B.
Students will continue with their selection from Advanced Lawyering I: Business Law Clinic; e-Journal; Research Article; Conveyancing Problem;
Moot Trial; ADR process

LA4052 - INTRODUCTION TO LAWYERING 2
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *The aim of this module is to provide a detailed understanding of the operation and practice of the legal system in Ireland, paying particular attention to the necessary skills inherent in the process of law at all levels. It forms part of a sequential number of modules within which this aim is achieved.*

Syllabus: The objective of this module is to ensure that upon successful completion, students have begun to deal with core issues in the practice of law including logical reasoning, questioning, option generation, problem solving, oral argument and advocacy, together with client interviewing. The syllabus will focus extensively on self-directed learning and active exercises. In addition, students will be expected to explore the role of ethics and professional responsibility in the legal system, paying particular attention to comparative approaches.

LA4058 - HUMAN RIGHTS LAW
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *The aim of this module is to introduce students to the study of international human rights law.*

Syllabus: Upon successful completion of this model students will have a detailed knowledge of the international human rights law framework and will be familiar with the major universal and regional systems of human rights law and the legal value and authority of declarations, decisions, judgments and other output engendered by them. The syllabus will focus extensively on the Council of Europe structures for human rights protection and the United Nations treaty system with emphasis on the impact that the international system has on Irish law. Students will be expected to critically explore the development and expansion of this emerging field of law.

LA4082 - LAW OF EVIDENCE
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *To critically examine the rules and general principles governing the admissibility of evidence in criminal trials.*

Syllabus: Principles of criminal evidence; burdens and standards of proof; witness testimony; confession evidence and illegally obtained evidence; expert evidence; corroboration; rule against hearsay; identification evidence; similar fact evidence; privilege.

LA4122 - CONTRACT LAW 2
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *To examine the grounds upon which contracts may be discharged or avoided and the remedies available to ensure performance of contractual obligations.*

Syllabus: Vitiating factors: mistake, misrepresentation, fraud, duress, undue influence, unconscionability. Discharge of obligations: by performance, by agreement, by breach, by frustration. Remedies for breach of contract: specific performance, damages, rectification, rescission. Assignment of contract obligations. Agency. Quasi-contracts.

LA4222 - CRIMINAL LAW 2
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *By building on Criminal Law 1, to examine the principal criminal offences and elements of criminal procedure.*

Syllabus: Murder and manslaughter. Non-fatal offences against the person: assault and battery, aggravated assaults, false imprisonment. Sexual offences: rape, unlawful carnal knowledge of minors and others, sexual assault and aggravated sexual assault. Offences against property: arson, criminal damage, burglary, larceny, aggravated larcenies, robbery, obtaining by false pretences, embezzlement, fraudulent conversion, handling stolen property. Offences against the administration of justice: perjury, contempt of court. Offences against the public peace; Criminal Justice (Public Order) Act, 1994; criminal libel. Offences against the State; treason. Sentencing. Elements of criminal procedure: bail, extradition, and police powers.

LA4320 - LAW OF TORTS 2
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *To examine the tortious concepts of trespass, nuisance, defamation and economic torts. To evaluate remedies in the area of Tort Law and the assessment of damages.*

Syllabus: Trespass to the person, land and goods. Nuisance. Rylands v Fletcher liability. Damage by fire. Defamation. Economic torts: deceit, passing off, injurious falsehood, inducement to breach of contract, conspiracy. Remedies: general and special, judicial and extra-judicial, assessment of damages. Limitation of actions.

LA4440 - CONSTITUTIONAL LAW 2
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *Currently, the School of Law delivers lectures on the Irish Constitution to all our LLB degrees and to a number of FAHSS courses. These modules are entitled Public Law 1 and Public Law 2. The term Public Law is outdated and cumbersome. The two new modules being created will keep the content of the Public Law modules but will use the more commonly used name of Constitutional Law. It will be to the advantage of students, and professional bodies and employers with which they deal, as the term Constitutional Law bears the more commonly used term for the study of this area of law.*

Syllabus: The aim of this course is to examine the fundamental rights provisions of the Irish Constitution, considering always the obligations of the state under international law. Topics to be covered include fundamental rights theories, unenumerated rights and enumerated rights and directive principles of social policy under the Irish Constitution.

LA4540 - COMPANY LAW 2
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *Currently, the School of Law delivers two modules called Law of Business Associations 1 and 2. The name Law of Business Associations is outdated and cumbersome. The two new modules being created will keep the content of the Law of Business Associations modules but will use the more commonly used name of Company Law. It will be to the advantage of students, and professional bodies and employers with which they deal, as the term Company Law bears the more commonly used term for the study of this area of law.*

Syllabus: The module covers the administration of companies insofar as topics covered include; the, appointment, role and duties of Directors, the role and duties of the Company Secretary and the Annual return obligations of companies. The module also covers issues of dividends and the company law limitations on profit distributions. In addition, the module covers the various methods of enforcement of company law. The consequences of a company's secured borrowings are also considered in terms of the secured party enforcing security by appointment of a receiver. The statutory scheme and facility of examinership for a company in financial difficulty is reviewed and the duties of court appointed examiners analysed. Finally, the module covers the various methods of winding up of companies and the roles of different types of liquidators. The duties of liquidators are examined and the connections between those duties and the schemes and bodies of company law enforcement are reviewed.

LA4620 - LAND LAW 2
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *To familiarise the student with a detailed knowledge of the regulatory aspects of the use of real property, including landlord and tenant law and the law of succession.*

Syllabus: The laws relating to succession, statutory control of the right to devolve property upon death, wills and intestacies. Landlord and Tenant Law, nature and creation of the relationship, determination of the relationship, statutory control of tenancies, public welfare codes. Lesser interests in real property including licences and covenants. The distinction between leases and licences. Mortgages.

LA4828 - EQUITY AND TRUSTS 2
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *To inculcate in the student an understanding of the modern law of trusts, their creation and regulation.*

Syllabus: The trust, classification of trusts, express, implied, resulting, constructive and charitable trusts. The requirements of a trust, the constitution of trusts. General principles relating to trustees, their obligations and duties, powers of trustees, variations in a trust, fiduciary responsibilities of trustees. Breach of trust and remedies thereof.

LA4922 - SPORT AND THE LAW
ECTS Credits: 6

Law

Rationale and Purpose of the Module: *To examine the law relating to the governance and regulation of sport.*

Syllabus: Sport and the Law will examine the interaction between the law and sport. The course will examine a number of topics, including what is sport and the law, violence in sport, drug testing, contract and employment issues, administration and judicial review, commercial and competition law, arbitration and alternative dispute resolution.

LA6022 - COUNTER TERRORISM LAW AND INTERNATIONAL BUSINESS
ECTS Credits: 9

Law

Rationale and Purpose of the Module: *The aim of this module is to expose students to a comprehensive understanding of the global responses to terrorism as it impacts upon the legal environment in which international business takes place.*

Syllabus: This course will introduce students to the legal constraints on the operation of international business prior to the events of 9/11. Elements of UK counter-terrorism laws with respect to Northern Ireland, the use of customs and excise agencies and covert surveillance of business entities will be examined, including the wider European context of human rights issues.
The course will then look at the impact of 9/11, the London and Madrid bombings and the response of both the EU and the US in creating a legislative arsenal designed to disrupt and destroy a common terrorist threat.

The course will focus on three of the most important areas governed by this new legal environment.

First, the increased monitoring of financial transactions both domestic and international. It will examine the role and legal responsibility of various financial institutions in monitoring and reporting suspicious activities surrounding the movement of money and financial assets. It will look at the legal controls on the right to move money across borders and the powers of confiscation based on suspicion versus proof. It will look at various laws that seek to prevent money laundering through international business transactions. It will cover the serious consequences, including both financial and custodial sanctions for breaches of these responsibilities.

Second, the course will deal with the rapidly expanding surveillance of communications traffic and the collection and interrogation of information held by private individuals and corporations. It will contrast the competing legal obligations of privacy and security. It will examine differing approaches from both EU and US authorities as to the nature and scope of privacy rights and the obligations of private enterprise service providers such as mobile phone operators to retain and supply records belonging to third parties.

Third it will examine the regulation of bribery and corruption in international business transactions, the theoretical issues involved as to whether those bribery and corruption is best dealt with on the supply or the demand side and the cultural differences as to the definition of bribery and corruption. It will explore the increasing link between bribery and corruption and international terrorism. It will introduce the role of sanctions in such actions and the effectiveness of implementing them.

Finally the course will examine the role of EU and US enforcement agencies in the implementation of counter-terror law in a commercial context, the consequences for business people and the implications for private enterprise.

LI4212 - LINGUISTICS 2
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *This course is designed to serve as an introduction to basic concepts and theories in sociolinguistics. The various subfields and branches of sociolinguistics will be introduced and discussed in class lectures.*

The more specific objectives of this course are:
Recognize the fundamental relationship between language and society
Use the basic terminology and concepts of sociolinguistic subfields
To acquaint you with the basic concepts necessary to pursue sociolinguistic studies further, if you wish to.

Syllabus: The module comprises four distinct but also interrelated themes, each of which will be dealt with in sequential blocks over the twelve week module:
1. Sociolinguistics: In this first part, students will be introduced to basic concepts in sociolinguistics, including: accent, dialect, speech community.
2. Multilingualism: In this second part, students will learn about key features of multilingual societies.
3. Language and Media. In the third section, students will focus on the relationship between language and how it is used in the media.
4. Language and Gender: The final section of the module will focus on the relationship between language and gender.

Prerequisites: LI4211

MA4002 - ENGINEERING MATHEMATICS 2
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To develop the student's understanding of and problem solving skills in the areas of Integral Calculus and Differential Equations. To give the student an understanding of the Matrix Algebra and its application to solving systems of linear equations. To give the student an understanding of the Matrix Algebra and its application to solving systems of linear equations. To introduce the student to Multivariate Calculus.*

Syllabus: [The Indefinite Integral]: Integration techniques including integration of standard functions, substitution, by parts and using partial fractions.
[The Definite Integral]: Riemann sums, and the Fundamental theorem of calculus.
Application of integration to finding [areas, lengths, surface areas, volumes and moments of inertia].
[Numerical Integration]: Trapezoidal rule, Simpson's rule, other Newton-Cotes formulae and Gaussian quadrature. [Ordinary Differential Equations]: first order including variables separable and linear types. Linear second order equations with constant coefficients. Numerical solution by Runge-Kutta.

[Functions of several variables and partial differentiation.] Fitting a line or curve to a set of data points.
Matrix representation of and solution of systems of linear equations. Matrix algebra, invertibility, determinants.

Prerequisites: MA4001

MA4004 - ENGINEERING MATHEMATICS 4
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To provide students with an understanding of the fundamentals of probability and its relation to statistics. To introduce statistical inference through the concepts of estimation and hypothesis testing. To apply these concepts to problems from both daily life and engineering/science.*

Syllabus: The concept of variation - discrete and continuous variables.
Graphical representation of data - frequency tables, histograms, bar charts, piecharts, boxplots.
Descriptive statistics - measures of location and dispersion.
Basic concepts of probability - Frequency interpretation and axioms of probability. Probability of an event. Laws of addition and multiplication. Compound events. Conditional probability. Independence. Bayes Theorem.
Discrete and continuous random variables - expectation and variance, moments.
Discrete probability distributions - Binomial, Geometric, Poisson.
Continuous probability distributions - Exponential, Normal, Uniform distributions.
The central limit theorem.
Statistical inference - interval estimation and hypothesis testing, type I and type II errors, one and two-tailed tests.
Linear regression - testing for an association between two continuous variables.

MA4006 - ENGINEERING MATHEMATICS 5
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To introduce the student to elementary Vector Calculus. To give the student a broad understanding of analytical and numerical techniques for solving Partial Differential Equations.*

Syllabus: Vector Calculus: Scalar and vector fields, contour maps, directional derivative and gradient vector of a scalar field, divergence and curl of a vector field (line, surface and volume integrals), Integral Theorems (Gauss', Green's and Stokes').
Partial Differential Equations: Modelling and derivation of wave, heat and Laplace's equation. Solution of such equations by separation of variables. Numerical methods for the solution of partial differential equations using finite differences.

Prerequisites: MA4003

MA4104 - BUSINESS STATISTICS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To provide the statistical framework which will enable students in economics, accounting, finance, personnel management and marketing to perform statistical analysis within their subject disciplines.*

To equip students with the skills to interpret and summarise results generated by statistical packages.

Syllabus: The concept of a random sample, the sampling distribution of the sample mean with applications to confidence intervals, hypothesis testing, and sample size determination, the sampling distribution of the sample proportion with applications to confidence intervals, hypothesis testing, and sample size determination, comparing two means, comparing two proportions, the chi-squared test of independence, Simpson's Paradox, simple linear regression, correlation, residuals.

MA4114 - APPLIED BUSINESS STATISTICS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *This module contains the second half of MA4102 and the first half of MA4104.*

This course is designed to give students the statistical background required to apply statistical techniques to data both of general interest and of interest specific to business activity.

This involves
1) presenting data using descriptive measures and graphical means,
2) presenting hypotheses that can be tested statistically, together with an appropriate interpretation of the test results
3) providing an introduction to correlation, linear regression and time series analysis

Syllabus: 1. Sampling methods and descriptive statistics - collection and tabulation of data.
Summary measures and graphical presentation of data.
2. Basic concepts of probability - probabilities of the union and intersection of events, conditional probability and contingency tables.
3. Normal probability distribution and applications to control charts
4. Applications of the central limit theorem - interval estimation.
5. Hypothesis testing - one and two sample hypothesis tests and non-parametric tests for skewed quantitative data.
6. Chi-squared test for independence.
7. The Pearson and Spearman correlation coefficients and simple linear regression.
8. Introduction to Time Series Analysis - trends and seasonal variation, use of moving averages.

MA4128 - ADVANCED DATA MODELLING
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To ground the students in Applied Multivariate Analysis. The module serves business and mathematics students. It introduces the mathematical statistical ideas behind Principal Component Analysis, Factor Analysis, Cluster Analysis, Discrimination Function and the Multiple Linear Logistic function. The students learn how to implement these techniques in Minitab to become competent in the analysis of a wide variety of multivariate data structures.*

Syllabus: Principal Component Analysis, Cluster Analysis, Discrimination Function and the Multiple Linear Logistic function and Factor Analysis are introduced in this order. From the outset the Minitab (Statistical Package) is introduced. Different types of multivariate data structures are introduced. The analyses appropriate to each type of data structure are deduced from general principles and their implementation in Minitab described. Many different data structures are considered. Emphasis is placed on the integration of the different methods of analysis available in order to achieve an effective interpretation and simple summary of the multivariate data. Report writing, communicating the interpretation to non-technical business managers, is taught.

Prerequisites: EC4307, MA4125

MA4302 - APPLIED STATISTICS FOR ACCOUNTING
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *This course is designed to give students the statistical background required to apply statistical techniques to data both of general interest and of interest specific to business activity.*
This involves
1) presenting data using descriptive measures and graphical means,
2) presenting hypotheses that can be tested statistically, together with an appropriate interpretation of the test results and
3) analysing time series data and prediction. In order to deal with large data sets, the lectures are accompanied by computer laboratories using a statistical computer package (SPSS).

Syllabus: 1. Sampling methods and descriptive statistics - collection and tabulation of data. Descriptive measures and graphical presentation of data.
2. Basic concepts of probability - probabilities of the union and intersection of events, conditional probability, contingency tables.
3. Discrete probability distributions - the binomial distribution. Expected values.
4. Continuous probability distributions, the normal and Pareto distributions relevance to natural and economic phenomena.
5. Applications of the central limit theorem - interval estimation.
6. Hypothesis testing - one and two sample tests for population proportions and means. Tests of association.
7. The Pearson and Spearman correlation coefficient and simple linear regression.
8. Time Series Analysis. Trends and Seasonal Variation. Use of moving averages. Prediction.
9. Use of a statistical package (SPSS) for data input and transformation, as well as carrying out the statistical methods described above.

MA4402 - COMPUTER MATHS 2
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To develop some of the foundations of mathematics. To introduce the students to mathematical ideas of crucial importance in computer science. Symbolic mathematics packages will be used to demonstrate many of these ideas.*

Syllabus: Real-valued functions: a geometrical approach to calculus through the graphs of functions of one or two variables (use will be made of symbolic maths packages).

Convergence of sequences.

Simple numerical methods. Iteration of functions.

Matrices: addition, multiplication and scalar multiplication. Matrices as linear transformations in computer graphics.

Graph theory: basic concepts of vertices, edges, paths, circuits, connectedness and trees. Computer representation of graphs. Graph algorithms.

MA4602 - SCIENCE MATHEMATICS 2
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To develop the fundamental concepts and basic tools of calculus.*
To introduce applications of calculus in science and technology.
To develop and integrate the basic scientific mathematical skills.

Syllabus: [Integration and applications:] indefinite integral as antiderivative; integration by substitution; definite integral as area; Fundamental Theorem of Calculus; integration by parts; calculation of areas; applications in science. Introductory treatment of Simpson's Rule.
[Functions of the Calculus:] domain and range; inverse trigonometric functions, hyperbolic functions, their graphs and derivatives.
[Curve sketching:] symmetries; intercepts; restrictions on range; discontinuities; uses of first and second derivatives; turning points; behaviour for large and small x ; asymptotes.
[Series:] sequences; arithmetic and geometric series; infinite series and convergence; ratio and comparison tests; power series; Maclaurin and Taylor series; addition, multiplication, differentiation and integration of power series; use as approximation of a function; limits, l'Hopital's rule.

Prerequisites: MA4601

MA4604 - SCIENCE MATHEMATICS 4
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *This is a module designed for students of the life sciences and chemistry to equip them with the mathematical skills necessary for their core subjects and the ability to understand the mathematical language used in research papers in these areas.*

Syllabus: [Complex Numbers:] necessity and definition; algebra including multiplication, conjugate, division, absolute value; Argand diagram representation; polar form, argument; exponential form; de Moivre's theorem, powers and roots.
[Modelling with Differential Equations:] Derivation of differential equations of exponential growth and decay. Application to population growth, radioactive decay and other problems from science.
[First Order Ordinary Differential Equations:] First order equations of variables separable and linear types;

applications including chemical reactions, mixing problems, Newton's Law of Cooling, radioactive decay. [Second Order Ordinary Differential Equations:] Second order homogeneous equations with constant coefficients. Application to damped harmonic oscillators.
[Partial Derivatives:] Functions of several variables; partial derivatives, definition and examples (e.g. from thermodynamics); higher partial derivatives; optimisation and Second Derivative Test for functions of two variables.
[Linear Algebra]: Review of matrices and determinants (3X3). Lines and planes in three dimensions. Systems of equations as intersections of lines and planes. Matrices as linear transformations: scale, shear, rotation. Eigenvalues and eigenvectors. Matrix diagonalisation. Powers of a matrix. Possible applications include crystallography, forest management (sustainable yield); age-specific population growth; genetics.

Prerequisites: MA4602, MA4601

MA4702 - TECHNOLOGICAL MATHEMATICS 2
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To develop the fundamental concepts and basic tools of calculus.*
To introduce applications of calculus in science and technology.
To develop and integrate the basic mathematical skills relevant to technology.

Syllabus: Functions of the Calculus: graphs and functions, domain and range, inverse trigonometric functions, hyperbolic functions. Curve sketching: symmetries, intercepts, restrictions on range, discontinuities, turning points, behaviour for large and small x, asymptotes; Series: sequences, series as sum of sequence, sums of arithmetic and geometric series, infinite series and convergence, ratio and comparison tests, power series, Maclaurin and Taylor series, manipulation of power series, differentiation and integration of power series, use as approximation of a function, limits, l'Hopital's rule; Integration and applications: indefinite integral as antiderivative, integration of standard functions, definite integral as area, integration by substitution, integration by parts, applications to: area, volumes, surfaces of revolution, numerical integration including Simpson's rule; Partial derivatives: functions of two variables, partial derivative, definition and examples, differential and total differential, higher partial derivatives, application to small errors.

Prerequisites: MA4701

MA4704 - TECHNOLOGICAL MATHEMATICS 4
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To introduce students to the fundamental ideas of uncertainty through probability.*
To lay a good foundation for the stream of statistically oriented modules in the fourth year.
To introduce students to the most widely used statistical distributions and applications thereof.
To introduce statistical inference through the concepts of estimation and hypothesis testing.

Syllabus: [Variables] - continuous and discrete.
[Representation of variables] - frequency tables, histograms, bar charts, etc.
[Reduction of variables] - measures of location and dispersion, mean, variance, range, median, quartiles, etc.
[Introduction to the fundamentals of probability]. Experiments, sample spaces, events. Laws of probability - addition and multiplication, conditional probability. [Bayes theorem], prior and posterior distributions. [Introduction to random variables], probability density functions.
[Special distributions]
[binomial, Poisson, geometric, uniform, exponential, normal].
[Statistical inference], point and interval estimates, standard error of an estimator, hypothesis testing, one and two-tailed tests. One and two sample problems for the mean, variance and proportion.
[Non-parametric tests] - sign test, rank tests.
[Correlation and Regression] - method of least squares.

Prerequisites: MA4702, MA4701

MA4708 - QUALITY CONTROL
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *to develop skills in the use of the appropriate statistical techniques in quality control*

Syllabus: history and development of techniques statistical process control charts: capability: Cp,Cpk, R&R studies, control charts {Shewart}, variable and attribute, control & out of control,specifications,short and long run applications, proportion deffective, ARL, PPM
cusum, multivarial acceptance sampling : AQL, CQL, risks, construction of sampling plans , various international standards

Prerequisites: MA4707

MA6001 - DATA ANALYSIS FOR BUSINESS DECISIONS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To give students a conceptual introduction to the field of statistics and its applications.*
To enable students to apply statistical methodologies in their own organisations.
To provide students with a full understanding of how statistical inference provides sound evidence for business decisions.

Syllabus: Data and Statistics - various types of data, qualitative and quantitative data, sources of data. Graphical presentation of data - bar charts, pie charts, histograms, ogive curves, box plots. Measures of location and spread - mean, median, mode, range, standard deviation and variance. Introduction to probability - discrete and continuous distributions e.g. Binomial, Poisson and Normal. Sampling and Sampling Distributions - populations and samples, various sampling methods. Point and Interval estimation for means, variances and proportions in one and two sample applications. Hypothesis testing - One and two tailed tests, type I and type II errors, p - values. Analysis of qualitative data - contingency tables, goodness - of - fit tests. Correlation and Linear Regression - scatter plots,

method of least squares, use of residuals to validate model. Analysis of Variance. Multiple Regression - multicollinearity, dummy variables, model assumptions, variable selection procedures. Applications of statistics - forecasting, quality control, index numbers, decision analysis. Non- parametric Statistics - sign test Wilcoxon signed - rank, Mann - Whitney and Krusaal - Wallis tests. Spearman-s test for linear correlation.
The course will be underpinned by extensive use of
Case studies
Statistical software packages
Student organisation based assignments.

MB4002 - ALGEBRA 2
ECTS Credits: 6

School of Education

Rationale and Purpose of the Module: *To promote an understanding of basic algebraic concepts of discrete mathematics.*
To examine the use of transformations in geometry.
To apply discrete mathematics in the solution of various applied problems.

Syllabus: Mathematical logic: statements, sentences, truth tables, quantifiers, proof; Sets: notation, definition, set operations; Relations: equivalence relation, partitions, congruence; Mappings: injective, surjective, bijective maps, composition, inverse; Mappings in the plane: projections, transformations; Matrix representation; Algebra of sets: De Morgan's law, principle of duality; simple applications to switching theory.

Prerequisites: MB4001

MB4008 - GROUPS AND ALGEBRAIC STRUCTURES
ECTS Credits: 6

School of Education

Rationale and Purpose of the Module: *To develop a broad understanding of algebraic structures especially group structure.*
To study realizations of group structure in geometry.
To study selected applications in Science and Engineering.

Syllabus: Sets and operations: review of sets, operations; Groupoids and semi-groups: equality, commutativity, associativity, inverses, order; Groups: axioms, properties, sub-groups, cyclic groups, p-groups, permutation groups; Lagrange's theorem: applications to number theory, kernel, isomorphisms, normal subgroups, quotient groups; Sylow's theorems; Group of isometries; group of transformations, enlargements; Group of similarities; Rings: definition; integral domain, fields.

Prerequisites: MB4001, MB4002

MB4018 - DIFFERENTIAL EQUATIONS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To develop and understanding of the theory of differential equations.*
To study standard solution techniques.
To apply differential equations to real situations.

Syllabus: Basic concepts: order, degree, solution, boundary and initial conditions, graphs of solutions; Mathematical modelling: examples from mechanics and population growth; Classical mechanics: velocity, acceleration, motion of a rigid body; Newton's Laws, simple harmonic motion, elastic strings and springs; Projectile motion and orbital motion; First order ODEs: variable separable, homogeneous ,linear and exact with applications; Second order differential equations: linear with constant coefficients, trial method and D-operator method with applications; Numerical solution of first order differential equations: Euler to Runge-Kutta.

Prerequisites: MA4702

MD4004 - PRACTICUM 4A - MAIN PERFORMANCE INTEREST
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *Development of the students' primary performance interest, whether instrumental, vocal or dance. Students will be encouraged to engage in a dynamic self-critical process conducive to development and related to the principle of 'reflective practice'. Also the development of musicianship and body-awareness skills.*

Syllabus: This module is divided into two parts. The first is the development of the students' performance practice will occur in the stylistic context most common to the performance practice of the student. However tutors will begin to encourage students to look to other styles and repertoires current within a primarily Irish context. This will take place in the context of one-on-one classes and develops from the progress in Practicum 1a, 2a and 3a.

The second part of these modules will be related to performance skills and again this element will be divided into two separate streams for musicians and dancers. Musicians will take Keyboard Skills and Aural Training which will include keyboard harmony (vamping, chordal analysis and application, both aural and written), aural skills (transcribing tunes and songs, awareness of traditional forms and styles, sight reading and sight singing). It is important to emphasise that the orientation of this stream of multi-skill development will be towards the needs and realities of traditional Irish music and musicians but with a wider context in mind. Dancers will take Movement Awareness. This will include practical dance workshops to introduce some of the movement principles that inform other dance practices today. It will also include an introduction to techniques and practices designed to promote the release of tension in the body in order to facilitate greater ease of movement. It will also include an introduction to the use of visual imagery as a way to develop an understanding of the correct alignment in movement. Finally an introduction to supplementary practices used by dancers as part of their training e.g. Yoga, Feldankrais, Alexander technique and Pilates. Improvisation will be undertaken in practical workshops to introduce the concept of improvisation as a means of exploring movement possibilities and also expanding movement vocabulary. Improvisations will include working with movement themes, dramatic themes, props, text and visual stimuli.

MD4008 - PRACTICUM 7A MAIN PERFORMANCE INTEREST

ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: The development of a final extensive performance. Syllabus: In this module students, with relevant tutors and under the direction of course director, will design and undertake an extensive, hour long recital which will be representative of both their own stylistic interest but also a range of diverse music and / or dance styles (in the case of dance, two to three smaller performances over a similar number of days will be considered).

MD4012 - PRACTICUM 2B SECONDARY PERFORMANCE INTEREST
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *To broaden the base of performance skills of the students to include other instrumental, vocal and dance aspects of the tradition*

Syllabus: In this module students will be introduced to the practice of a broad range of instrumental, vocal and dance skills they will otherwise be unfamiliar with. Dancers and singers will not be required to undertake elements of this module that relate to their primary performance interest. Instrumentalists will be required to study an instrument apart from their main performance interest. Outside of these requirements students will pursue one hour of instrumental, dance and song classes per week (3 in all). This will be assessed through performance (50%) and continuous assessment (50%)

Also as part of this module, students will undertake ensemble work assessed continuously. Students will be encouraged to develop a creative approach to group work as well as to develop the interpersonal and musical skills necessary for the successful function of an ensemble.

This module will be a development of progress made in Practicum 1b

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MD4016 - PRACTICUM 5B - SECONDARY PERFORMANCE INTEREST
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *To broaden the base of performance skills of the students to include other instrumental, vocal and dance aspects of the tradition*

Syllabus: In this module students will be introduced to the practice of a broad range of instrumental, vocal and dance skills they will otherwise be unfamiliar with. Dancers and singers will not be required to undertake elements of this module that relate to their primary performance interest. Instrumentalists will be required to study an instrument apart from their main performance interest. Outside of these requirements students will pursue one hour of instrumental, dance and song classes per week (3 in all). This will be assessed through performance (50%) and continuous assessment (50%) Also as part of this module, students will undertake ensemble work assessed continuously. Students will be encouraged to develop a creative approach to group work as well as develop the interpersonal and musical skills necessary for the successful function of an ensemble.
This module will be a development of progress made in Practicum 1b, Practicum 2b, Practicum 3b and Practicum 4b.

MD4034 - CONTEXTUALISING AND VOCATIONAL STUDIES 3
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This module is designed to help competent musicians and dancers to come to an understanding of what it means to be involved in music and dance education contexts.*

Syllabus: There are three main components: Music and Dance Curriculum studies, Professional Studies and School Based Work. The first priority is to help the development of expertise in a variety of educative situations. These range from classroom activities for various age groups and abilities to instrumental teaching, classroom teaching, ensemble, choral, band and orchestral rehearsals, and the passing on of traditional and/or ethnic and world musics and dance. There is also an introduction to Community Music and Dance which involves the development of acquired skills in a community music and dance context and as community musicians and dancers

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MD4038 - CONTEXTUALISING AND VOCATIONAL STUDIES 7
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *To introduce the professional disciplines of music psychology and therapy to the students and to develop a vocational project relevant to the potential future professional experience of the student, involving one or a combination of educational, community music / dance, technology, business orientations.*

Syllabus: In the first part of the module an overview of the principles and research base relating to the psychology and sociology of music and dance will be presented through lectures and seminars; in particular, human responses to music and/or dance in affective, physiological, emotional and psychological domains. Current research relating to dance participation and performance, music listening, music preference, music for relaxation, music and dance in public spaces, responses to participation and observation of dance and

ambient music, will be presented and critiqued.

In the second part of the module students will engage in a self-directed project relating to the application of vocational aspects of performance that have been addressed through the course (education, community music / dance, technology, business)

MD4044 - TRAVELLER MUSIC STUDIES
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This module will examine the music traditions of nomadic communities immediate to the Irish experience (i.e. Irish, Scottish travellers and Romany Gypsies) but in a wider European context. Students will engage these music cultures in a wide cultural and physical context and develop an understanding of the contribution of these music cultures to those of the 'so-called' settled community. The inclusion of this module will contribute to the mainstreaming off this area to the curricular activities of the Irish World Academy of Performing Arts.*

Syllabus: Students will study the music traditions of Irish, Scottish travellers and Romany Gypsies. For these communities issues such as Ethnicity, origin, language and Nomadism will be addressed especially as they are manifest through the musical traditions of these communities. The module will also address the historical treatment of these traditions by collectors and musicologists. Case studies will be presented to contextualise these issues addressing the role of the Irish travelling community in the piping, song and fiddle traditions of this island, the song tradition of the Scottish traveller community and its appearance in Ireland and the fusion of Gypsy music with other music cultures across Europe.

MD4046 - IMPROVISATION AND COMPOSITION (VOICE / MUSIC / DANCE)
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This module will introduce students to creative processes, using improvisational and compositional exercises. Students will investigate the use of movement, instrumental and vocal concepts as motives for creative practice.*

Syllabus: Students taking this module will engage a number of different improvisatory and compositional practices from western and `world music and dance traditions as well as their own genres. They will understand these practices in context but also engage them in the context of their own performance practices. Students will develop performances that will be produced from an engagement and development of these practices in a meaningful and creative manner. Students will be provided with written feedback according to BA Irish Music and Dance policy.

MD4066 - ETHNOMUSICOLOGY AND ETHNOCHOREOLOGY WORLD MUSIC AND DANCE SURVEY / DIGITAL MEDIA TECHNOLGOY

ECTS Credits: 6
Humanities

MD4066 is divided into two sections. The World Music and Dance Survey, and a Digital Media Technology (each worth 50% of the module). The whole module is worth 6 ECTS credits.

Rationale and Purpose of the Module
To introduce students to aspects of sounds and movement from around the world. Asking questions of what is 'World Music and Dance' in the 21st century digital age. Digital audio and visual technologies associated with music and dance performance, with a focus on professional audio and video recording and editing software.

Syllabus
One half of this module will examine a selection of music and dance expressions from diverse places round the globe. The other half of the module examines the creative and analytical possibilities of digital technologies associated with music and dance performance, with a focus on audio/video editing techniques.

MD4068 - SOMATICS AND RITUAL PERFORMANCE
6 *ECTS Credits: 6*

Humanities

Rationale and Purpose of the Module: *This module will provide each student with the opportunity to continue to develop skills to research and develop an informed and intelligent approach to own specific technical needs so they can develop healthy and sustainable practices in preparation for performance; it will also provide the opportunity to develop skills and confidence to create innovative new models for ritualising performance; students will specialise in creating a project within a specific context and begin to focus on their preferred options for professional practice.*

Syllabus: This module will provide each student with the opportunity to continue the study and practice of Authentic Movement, Feldenkrais and Alexander techniques to develop skills to research and develop an informed and intelligent approach to own specific technical needs and also so they can develop healthy and sustainable practices in preparation for professional practice; students will continue to develop their final year project within a specific context and continue to focus on their preferred options for professional practice.

MD4076 - SOMATICS AND PERFORMANCE PRACTICE
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This module is one of five modules (three new, one existing and one elective from existing modules) put in place to provide the option of a UL based semester six for this programme. Currently there is a compulsory exchange semester that is no longer viable. This module will provide each student with the opportunity to continue to develop skills to research and develop an informed and intelligent approach to own specific technical needs so they can develop healthy and sustainable practices in preparation for performance; it will also provide the opportunity to develop skills and confidence to create innovative new models for performance; students will specialise in creating a project within a specific context and begin to focus on their preferred options for professional practice. This is particularly focused on the development of final performance programmes*

Syllabus: Students will attend workshops during which they will study how somatic practices can support them in developing an enhanced awareness of embodied movement. These workshops will be based on principles drawn from practices such as Pilates, Yoga, Feldenkrais, Alexander technique Body-Mind Centering and Tai Chi. Students will be required to use these methodologies to develop and extend their performance practice.

MD4078 - VOICE AND DANCE SKILLS FOR PERFORMANCE 6
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *The ability to select and design a programme which shows an understanding of technique principles and practices and their application to a specific context will prepare student to develop an informed and intelligent method to sustain their on-going and evolving practice. This will support students to develop a sustainable practice in professional performance based contexts.*

Syllabus: Students will be required to specialise in voice or dance, and through regular technique classes and workshops they will continue to study and practice the basic technical principles of both western and world dance and voice traditions and to further study methods of analysing movement and sound and methods of reflective practice in order to develop critical awareness of technique training; they will also complement the reading/singing skills through the learning of musical analytical systems and through the study of non-western notational systems; also, each student will be required to design a technique-training programme to reflect their own specific technical needs and interests.

MD4086 - VOICE AND DANCE SKILLS
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This module is one of five modules (three new, one existing and one elective from existing modules) put in place to provide the option of a UL based semester six for this programme. Currently there is a compulsory exchange semester that is no longer viable. In this module students will develop the ability to select and design a programme which shows an understanding of technique principles and practices and their application to a specific context will prepare student to develop an informed and intelligent method to sustain their on-going and evolving practice. This will support students to develop a sustainable practice in professional performance based contexts. Students in this module will look to other, less mainstream performance practices available for examination.*

Syllabus: Students will be required to specialise in voice or dance, and through regular technique classes and workshops they will continue to study and practice the basic technical principles of both western and world dance and voice traditions, broadening their stylistic experience. They will engage further study methods of analysing movement and sound and methods of reflective practice in order to develop critical awareness of technique training. Students will also complement their reading/singing skills through the learning of musical analytical and other notational systems. Students will also complement their choreographic skills through analytical approaches to movement composition.

MD4087 - ADVANCED ENSEMBLE
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This is a module for fourth year BA Irish Music and Dance Students who wish to develop their ensemble skills further and who show a propensity to do so in their assessment for module MD4016.*

Syllabus: Students in this module will concentrate on developing their knowledge of ensemble skills taken from a number of musical contexts. These skills will be developed in the context of their own performance practices.
Students will attend a number of lectures that engage a systematic examination of the musical processes involved in the creation of ensemble. Such processes will then be utilised in performance laboratory classes, which will result in a public performance, developed in the context of a reflective journal.

MD4088 - REPERTOIRE, IMPROVISATION AND COMPOSITION 6
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *To support students to develop the skills to understand and the artistic and technical requirements necessary to develop and produce performances in a range of contexts, this in order to prepare the students for entry into the professional performance contexts and also expand their career options in other aspects of performance including costume, lighting design and stage management, publicity.*

Syllabus: Students will be required to specialise in voice or dance, and will work under the direction of guest tutors and the course directors to create and design and produce a number of performance projects, including solo and ensemble works, to be presented in a range of performance contexts featuring the student's own work in addition to the works from the repertories they have studied.

MD4094 - MUSIC, LANGUAGE, SIGN AND TEXT
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *To develop the students' critical understanding of the relationship of language, signs and symbols to music. This will allow students to engage their academic studies in the field of performing arts in a more critical and informed manner.*

Syllabus: In this module students will be introduced to the broad twentieth-century traditions of structuralism, post-structuralism, post-modernism and cognitive linguistics. They will examine the application of theoretical structures from these traditions, in particular those promoted by Saussure, Barthes, Fauconnier, Bahktin, Kristeva, Lakoff, Turner and Foucault, in the contexts of understanding roles of meaning and the interaction of sign, text and language in musical and musicological contexts. Students will be encouraged to examine these theoretical constructs in the constructs of their own performance practices. Students will be provided with written feedback according to BA Irish Music and Dance policy.

MD4096 - CONTEMPORARY MUSIC AND DANCE REPERTOIRES
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This module is one of five modules (three new, one existing and one elective from existing modules) put in place to provide the option of a UL based semester six for this programme. Currently there is a compulsory exchange semester that is no longer viable. This module is to support students to develop the skills to understand and the artistic repertoires from a range of contexts. The students will address a number of repertoires. This diverse engagement is in order to prepare the students for entry into the professional performance contexts and also expand their career options in other aspects of performance.*

Syllabus: Students will be required to specialise in voice or dance, and will work under the direction of guest tutors and faculty to create, design and produce a number of performance projects, including solo and ensemble works. This work will be presented in a range of performance contexts featuring the student's own work in addition to the works from the repertories they have studied. Students will be encouraged to engage contemporary and alternative repertoires.

MD4098 - COMPOSITION AND ARRANGEMENT IN IRISH TRADITIONAL MUSIC 2
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *To develop the students' skills and knowledge of composition and arrangement in popular and classical music idioms and apply them in the context of traditional music fusions with these forms.*

Syllabus: Students will examine some of the dominant forms of ensemble making in western music today. These will specifically be examined in the context of western art music (in particular string writing) and the contemporary use of studio techniques in popular music culture. Students will develop these skills in lectures, composition and studio laboratories, Assessment will be through continuous assessment and the submission of scores and recordings. Students will be provided with written feedback according to BA Irish Music and Dance policy.

MD4104 - MUSIC THEORY AND PRACTICE SKILLS 1
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This is an elective module intended for undergraduate students with dance as a first area who wish to have more instruction in music theory, ear and notation practice and keyboard skills in order to further develop skills introduced to the student from first semester of first year, increasing his/her employability as a music teacher.*
Syllabus: Piano skills including sight-reading, accompaniment technique, basic arrangements, right hand ornamentation; music theory and practice, including dictation (melodic, rhythmic and harmonic) understanding modes and scales and their operations in Western harmony and in Irish contexts; tune composition; basic modulation and chordal accompaniment; music analysis.
Prerequisites: MD4001, MD4002, MD4003

MD4108 - CHOREOGRAPHIC SKILLS 1
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This is an elective module intended for undergraduate students with dance as a first area who wish to further develop and deepen their choreography and notation skills.*

Syllabus: This module has two elements creating and documenting solo and /or duet dance works. Students in this module will concentrate on further developing their choreographic abilities drawing on choreographic tools and techniques from a multitude of dance genres and contexts. The students will create and perform new solo and/or duet works. They will also be taught a variety of skills to assist with the development of strategies to record and document their creative processes. A number of notation systems including Labanotation, Newcastle notation, a variety of journal reflections as well as video and audio recordings will all inform the choreographic practice.

MD4122 - AERIAL DANCE CREATIVE LAB
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *The aim of this module is to introduce students to this core aspect of aerial dance. This module forms part of a suite of aerial modules designed to create an aerial dance strand within the MA Festive Arts programme. This responds to the demand for third level training in the field, combined with the management and research elements of the MA Festive Arts programme. Creative Lab is an integral part of aerial dance as it uses the performance skills and tools developed to create an aerial solo or group piece. This module focuses on creativity within choreography, and on building and working towards aerial acts, including individual, duo and trio performance pieces.*

Syllabus: Creative Lab is an integral part of aerial dance as it uses the performance skills and tools developed to create an aerial solo or group piece. This module focuses on creativity within choreography, and on building and working towards aerial acts, including individual, duo and trio performance pieces. Students learn sequences and then improvise with it, using other choreographic skills for working on material. Students will also learn how to move with the trapeze or cocoons spinning, circling, swinging and changing heights. This module develops ease in moving in and out of the floor and in an out of the aerial apparatus as it spins and swings. It also develops each student's creative ethos and thinking by working through different exercises originating in theatre, dance and clowning to overcome blocks and fears in performance.

MD4132 - HIP-HOP DANCE ELECTIVE 2
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *To provide students with the opportunity to become competent in hip hop dance so that they can develop the skills and confidence to work towards the creation of Hip-Hop compositions in a range of performance contexts, which will broaden their career options in Dance.*

Syllabus: Over this elective, students will learn, in studio, the roots of Hip-Hop and its evolution from the streets of New York City in the 1970s. Emphasis will be placed on learning about roots of Hip-Hop through class participation and learning the choreography of these dances and origins. By utilizing contemporary chorographic techniques, dancers will create new works for performance. This elective will lead on from Hip-Hop dance elective 1 and will require a greater complexity of choreography and of choreographic tasks.

MD4142 - IRISH DANCE PERFORMANCE SKILLS 2
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *To enable students whose first area of practice is not Irish dance to continue to develop their Irish dance skill set.*

Syllabus: Continued development of Irish dance skills to include travel steps, foot work, rhythm and an understanding of interpreting the music. Basic posture, footwork and musicality will be addressed relevant to the students' ability.

ME4008 - ORTHOPAEDIC BIOMECHANICS AND MECHANOBIOLOGY
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *This module will provide the student with an understanding of the role of mechanics in regulating orthopaedic tissue development and homeostasis at both the organ and cellular level.*

Syllabus: Development and structure of bone; Bone biomechanics; Composition and structure of cartilage; Cartilage biomechanics; Structure and mechanics of the ligament and tendon; Computational models in orthopaedic biomechanics; Cell mechanics; Models of cell mechanical behaviour; Cellular mechanotransduction; Bone mechanobiology; Cartilage mechanobiology; Ligament and tendon mechanobiology; Techniques in mechanobiology; Mechanical stimulation of cells; Orthopaedic tissue engineering; Bioreactors in Tissue Engineering;

ME4104 - AIRCRAFT SYSTEMS ENGINEERING
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *The primary purpose of this module is to introduce students to the design principles and operation of the systems incorporated in modern aircraft. Aeronautical engineers are engaged in design, operation and maintenance of aircraft systems through the whole lifecycle of aircraft. The role of the different systems in safety and operational characteristics and performance of aircraft is covered in this module. Moreover, the regulatory requirements and constraints in system design/re-design/modification and certification are covered, providing an integrated and holistic understanding of the technical and non-technical considerations involved.*

Syllabus: Introduction to systems engineering principles: Systems integration and interaction
Aeroplane and Rotorcraft Systems: Flight Control Systems, Fuel Systems, Engine Control Systems, Hydraulic Systems, Electrical Systems, Pneumatic Systems, Environmental Control Systems, Emergency Systems, Rotary Systems, Avionics
Advanced Systems: Civil and military advanced technology systems
System Design and Development: System design, major safety processes, requirements, environmental considerations, failure analysis and reliability, ETOPS, regulatory requirements and certification

ME4113 - APPLIED MECHANICS
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *The objective of this module is to develop an ability to apply the principles of engineering mechanics in solving common problem involving mechanisms such as linkages, cam/followers and gear trains.*

Syllabus: 1. Kinematics of Simple Mechanisms and Linkages:
* Four-bar linkages and straight line mechanisms.
* Position, velocity and acceleration analysis of linkages.

* Problem solving using velocity and acceleration vector diagrams.
* Analysis of linkages influenced by Coriolis effects.

2. Cam/Follower Systems:
* Kinematic analysis of follower motion; velocity and acceleration.
* Graphical cam design.

3. Gear Trains:
* Gear kinematics and dynamics
* Simple and compound trains.
* Epicyclic gear trains
* Torque and power transmission.

4. Balancing:
* Balancing of rotors; static and dynamic balancing.
* Balancing of reciprocating masses.

5. Oscillatory Motion:
* Free and forced vibration of particles.
* Rigid body vibration.
* Vibration analysis of mechanisms.

6. Gyroscopic Motion:
* Steady-state gyroscopic precession.
* Applications of the gyroscopic principle.

Prerequisites: ME4112, ME4111

ME4116 - AIRCRAFT VIBRATIONS
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To provide an appreciation of the critical design issues associated with vibrations in structures and devices, with an emphasis on applications in aircraft. To enable students to analyse vibrational problems with standard mathematical tools for linear systems, and design simple vibration absorption and isolation systems.*

Syllabus: Oscillatory motion; free vibration of single degree of freedom systems; harmonically excited vibration; transient vibration; vibrations under general forcing conditions; systems with two or more degrees of freedom; modal analysis; introduction to aeroelasticity.

Prerequisites: ME4111, ME4112

ME4226 - MECHANICS OF SOLIDS 2
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To understand and analyse and measure the state of strain at a point in a 2D strain field.*
To analyse stresses and deformation in circular plates under symmetrical loading. To be able to determine yielding under multiaxial loading. To be able to predict the maximum deflection of a beam subjected to simple and complex loading in a plane. To predict the buckling load and maximum stress in a strut. To understand the factors influencing fatigue life and be able to predict the life of simple engineering components. To understand the basics of LEFM. To analyse the stresses in beams of unsymmetrical section.

Syllabus: Infinitesimal strain at a point in a 2D stress field and Mohr's strain circle. Selection of strain gauges for measurement on metals. Thin circular plates. Criteria of failure for isotropic homogeneous materials (Rankine, Tresca and Von Mises). Deflection of beams. Buckling of struts (Euler and Rankine-Gordon). LEFM. Fatigue. Unsymmetrical bending.

Prerequisites: ME4213

ME4306 - BIOCOMPATABILITY
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To give a basic appreciation of the Cellular-Material Interactions that occur when a Material is used for different Biomedical Applications*

Syllabus: Discussion of Pathological Changes and Approaches to repair. Classification of medical device interactions and methods of assessment. Relevance of testing to medical device design strategy, regulation, validation and post market surveillance. Evolution of the regulatory environment and its implications.

ME4308 - BIOMATERIALS 2
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To gain appreciation for hard tissue replacement materials in current use; to enable students to understand material selection and design criteria for hard tissue replacement applications; Gain understanding of regulatory environment.*

Syllabus: Materials for hard tissue orthopaedic materials, survey of applications (TJR, substitution, fixation) alloys bone cements, substitutes (bioactive and resorbable). Dental implant applications and materials Dental restorative materials Regulatory affairs: 93/42/EEC, MDD, FDA, EN46000, AIMDD, IVDD and related standards.

ME4412 - FLUID MECHANICS 1
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To introduce the nature of fluids, the dynamic behaviour of fluids and application of the principles of continuity, energy and momentum to viscous fluid flow.*

Syllabus: Characteristics and Properties of Fluids.
Fluid Statics and Manometry.
Principles of Continuity, Momentum and Energy conservation applied to fluid dynamics, e.g. drag of a Two-Dimensional Body.
Boundary Layer theory with applications to smooth and rough pipes.
Effect of pressure gradient on boundary layer.
Flow over flat plate and airfoil sections.
Drag, lift and dependence on Airfoil Section geometry.

ME4414 - FLUIDS MECHANICS 2
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To apply the principle of Continuity, Energy and Momentum covered in Fluid Mechanics 1 to dimensional analysis and similarity,*

viscous flow, inviscid flow, circular motion, hydraulic machines and compressible flow.

Syllabus: Dimensional analysis and dynamic similarity with applications; inviscid flow theory and applications; vortex motion; analysis and performance evaluation of turbines, fans and pumps; selection of hydraulic machines from specific property requirements; Navier-Stokes equations with applications, lubrication theory; compressible flow. Channel flow.

Prerequisites: ME4412

ME4516 - THERMODYNAMICS 2
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To provide an understanding of the mode of operation for actual heat pump and refrigeration systems and to analyse their performance characteristics.*
To provide an understanding of the mode of operation of Rankine, superheat, reheat and regenerative steam power cycles and to analyse their performance characteristics.
To analyse the power output characteristics of pure impulse turbines and impulse-reaction axial flow turbines. To relate the performance and characteristics of the latter to steam enthalpy change in multi-stage operation.
To analyse the power input requirements, volumetric efficiency and heat loss characteristics for single stage and multi-stage compressors.
To provide an understanding of the mode of operation for actual 2-stroke and 4-stroke spark ignition and compression ignition engines and to analyse their performance characteristics with reference to mean effective pressure, indicated power, brake power, specific fuel consumption, volumetric efficiency, thermal.

Syllabus: Axial and Radial Flow Turbines and Compressors.
Reciprocating expanders and compressors.
Vapour Power Cycles.
Gas Turbine Cycles.
Performance of Internal Combustion Engines.

Prerequisites: ME4523

ME4526 - INTRODUCTION TO HEAT TRANSFER
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To provide a basis to students in the concepts and solution methods of conduction, convection and radiative heat transfer, and the measurement techniques utilised in heat transfer*

Syllabus: Fourier's Law of Heat Conduction
The Convection Equation
Thermal Resistance's and their Application
Two-dimensional Heat Conduction: An Analytical Example
Numerical Methods in Heat Conduction
Time Varying Heat Transfer: The Lumped Heat Capacity Method
Forced Convection: Standard Heat Transfer Correlation's and their Application
Free Convection: Standard Heat Transfer Correlation's and their Applications
Thermal Radiation: An Introduction
Heat Exchange Design Equations: The Log Mean Temperature Difference

Prerequisites: ME4412

ME4528 - PROPULSION SYSTEMS
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To provide students with fundamental knowledge about aircraft propulsion systems, particularly the air-breathing jet engine. Students should attain understanding of the thermodynamics and mechanics of the engine as a whole as well as individual components.*

Syllabus: An overview of propulsion systems and the development of thrust. A review of the conservation equations of fluid mechanics. The thrust equation. Propulsion efficiencies and implications for system design. A review of compressible fluid flow covering isentropic flow through ducts, constant area heat transfer and shock wave formation. The thermodynamic design of air-breathing engines covering the ramjet, the turbojet, the turbofan and the turboprop. Typical engine performance and aircraft matching. Detailed aerothermodynamic design of intakes, combustion chambers and exhaust nozzles. Detailed internal design of compressors and turbines covering two-dimensional blade row velocity diagrams, boundary layer flow and performance limitations.

ME4718 - FLUID PROCESS CONTROL
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To provide the student with a very good knowledge of advanced process control with emphasis on fluid & thermal processes.*

Syllabus: Advanced Control Strategies
Control of Multi-Input-Multi-Output (MIMO) Processes
Development of Discrete-time Models
Dynamic Response of Discrete-Time systems
Analysis of Sampled-Data systems
Design of Digital Controllers

ME4736 - PHYSIOLOGICAL FLUID MECHANICS 1
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To introduce the students to the field of physiological fluid mechanics, develop their knowledge of physiological fluid flows including airflow, blood flow and urology, study these flows in straight, rigid and compliant tubes and examine transport phenomena in biological systems, viscous flow, inviscid flow.*

Syllabus: Viscous and inviscid flow theory and applications. The role of transport phenomena in biological systems and the definition of these processes, including momentum, convection, diffusion and binding interactions. Introduction to the primary physiological convective transport systems: cardiovascular system, respiratory system, urological and lymph systems. Properties of physiological fluids and constitutive relations; Newton’s law of viscosity, non-Newtonian rheology and time dependant viscoelastic behaviour. The derivation of the conservation relations for fluid

transport, dimensional analysis and scaling. Introduction to Mass Transfer, Fick's law of diffusion. Transport of Gases between blood and tissues: oxygen-haemoglobin equilibria and the dynamics of oxygenation of blood in lung capillaries.

Prerequisites: ME4412

ME4746 - PHYSIOLOGICAL FLUID MECHANICS 2
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To advance the knowledge of students physiological fluid mechanics; specifically introducing concepts and applications in mass transport and heat transport.*

Syllabus: The role of transport phenomena in biological systems and the definition of these processes, including momentum, convection, diffusion and binding interactions. Introduction to the primary physiological transport systems: cardiovascular system, respiratory system, gastrointestinal tract, liver and kidneys. Extension of fluid mechanics of capillary flow into oscillating flow. Introduction to mass transport, derivation of the relevant conservation equations, dimensional analysis and scaling. Estimating mass transfer coefficients using correlations. Ficks law of diffusion (dilute solutions), the Stokes-Einstein equation and estimation of frictional drag coefficients. Osmosis and mass transport through membranes. Introduction to thermal transport, conduction, convection and radiation and derivation of the conservation equations. Estimation of heat transfer coefficients. Thermal regulation of biological systems

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ME4818 - MECHANICAL DESIGN
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To expose the student to the practical application of design, materials, mechanics and strength of materials theory. The work will focus on the appropriate use of Standards, Charts and Design Guides illustrating the oft times empirical nature of applied engineering tasks. Underpinning each topic will be constant reference to the evolution of the practices and their relationship to current theory. In particular, there will be constant reference to the life and reliability to be expected from solutions.*

Syllabus: [Integration of machine elements into design.] Overview of common engineering materials and their functional properties. Review of steels and heat treatment processes relevant to transmission design. Practical aspects of stress analysis as used in industrial applications. Stability of design elements. Aspects of component life, cost and reliability.
Introduction to bearings, types and selection criteria. Rolling Contact Bearing selection using catalogue data. Shaft design as an example of a simple component. Shaft couplings and keys. Flat, V, Wedge and Polyvee belts and chain drives. Review of the history of gear design showing the relationship to fatigue theory. Advantages of helical and spiral bevel gears in relation to noise, wear and strength. Clutches and brakes - selection considerations. Electric motors – types and control options. Starters and protection devices. [Design for Fatigue Life] Use of fatigue data, load and environment factors in design and selection. [Pressure vessel design.] Use of standards. Materials and life considerations. Corrosion protection. Safety and the work environment. Testing and certification. [Hydrostatic Transmission Systems.] Design of circuits for simple tasks. Linear and rotary actuation devices. Pump and motor types and selection, Circuit safety and calculation considerations. Control and speed circuits and devices.

ME6032 - ADVANCED AIRCRAFT STRUCTURES
ECTS Credits: 6

School of Engineering

Stress analysis of aircraft components: Tapered wing spars and box beams; beams having variable stringer areas; cut-outs in fuselages; fuselage frames and wing ribs, principles of stiffener/web construction.
Fatigue of aircraft structures: Safe life and fail-safe structures; designing against fatigue; fatigue strength of components; prediction of aircraft fatigue life; crack propagation. Aeroelasticity: Load distribution and divergence, control effectiveness and reversal, introduction to flutter.
Structural and loading discontinuities: shear stress distribution in beams; shear lag.
Structural Stability: Unstable behaviour; beam columns; slender column buckling; column imperfections and load misalignment; inelastic buckling; Approximate methods; thin plate buckling; crippling stresses.
Crashworthiness: Bird strike on aircraft, hard debris/hail impact, certification.
Composite Structures: Bolted composite joints; stresses in open hole and filled hole coupons, single/double lap joints, multi-bolt joints, load distribution, bearing/bypass stresses, joint failure; bonded joints; thin walled composite beams.
Damage Evaluation Techniques; A-, B- and C-scan, X-ray, microscopy.

ME6052 - FRACTURE MECHANICS
ECTS Credits: 6

School of Engineering

Definition of strain energy density, strain energy, energy release rate and compliance. Determination of elastic crack tip K field. Definition and use of crack opening displacement COD. Determination of K in infinite and finite bodies. Concept of K dominance, KIC testing, relationship between K and energy release rate. Concept of cleavage fracture. Examination of fracture under mixed mode conditions and crack branching.
Definition and use of the J integral in non-linear fracture mechanics. Determination of elastic-plastic crack tip HRR field. Relationship between J and energy release rate. Definition of limit load and its application in fracture mechanics. Use of factors in carrying out fracture toughness tests. J estimation schemes. Concept of J dominance and size requirements for JIC testing.
Concept of ductile fracture and the competition between cleavage and ductile fracture.
Derivation of Failure Assessment Diagrams and use of British Standard BS7910 in fracture assessments.
Definition and use of C* in creep fracture mechanics. Determination of elastic-creep crack tip C* field.
Prediction of crack initiation and growth under creep conditions. Mechanisms of creep fracture.

ME6071 - NON-LINEAR FINITE ELEMENT ANALYSIS
ECTS Credits: 6

School of Engineering

Nonlinear behaviour of solids and structures: geometric and material nonlinearities; problems involving contact; nonlinear dynamics; mathematical idealisation of nonlinear problems; nonlinear continuum mechanics;

solution strategies for nonlinear problems, finite element software, experimental verification.
Finite element (FE) equations in nonlinear analysis: weak and strong forms; general FE equations; incremental form of FE equations; total and updated Lagrange framework.
FE solution strategies: linearization of FE equations, incremental-iterative methods; convergence criteria; tangent stiffness matrices.
FE solution of geometrically nonlinear problems: stability problems, Riks algorithm,
FE solution of problems involving material nonlinearities: continuum quantities and approaches; principle of objectivity; displacement-pressure formulations; implicit and explicit integration; consistent tangent stiffness matrices; radial return algorithm.
FE solution of contact problems: frictionless problems; finite element equations; penalty and Lagrange multipliers approaches; frictional problems.
Computer implementation of nonlinear FE algorithms: commercial packages; user-subroutines.

ME6072 - ENGINEERING MECHANICS OF PLASTICS AND COMPOSITES
ECTS Credits: 6

School of Engineering

Provide the foundations for analysing stress and strain in Polymers and Composite Materials. Identify how to use physical and mathematical models to describe the stress/strain response of polymers over time creep, relaxation and recovery. The fatigue, fracture and creep rupture of plastics. Introductory concept of micromechanics to estimate the elastic constants of a unidirectional orthotropic composite. Experimental measurement of principal strains on an orthotropic composite coupon. Hierarchy of deformation processes for sheet-forming of composite component: Resin flow, Transverse flow, Interply slip and Intraply shear. Rheology including resin viscosity/fibre suspensions and infusion processing window dependency on time-temperature-shear rate, fibre preform permeability, Darcy flow. Advanced manufacturing techniques being developed within the Composite Research Centre including autoclaving, liquid composite moulding (LCM) RTM, RFI, VARTM; Hot-drape forming. Filament winding/tape-placement. Engineering design guidelines when using composite materials.

ME6092 - RENEWABLE ENERGY TECHNOLOGIES
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To provide students with knowledge of renewable energy technologies.*

Syllabus: From the following Renewable Energy topics, 3 areas will be addressed in detail each year
Topics: Wind Turbines, Solar, Hydro, Wave, Tidal, Geothermal, Biomass, Fuel Cell
Hydro Power: Introduction; Principles; Assessing the resources for small installations; An Impulse Turbine; Reaction Turbine; Hydroelectric systems; Social and environmental aspect
Biomass: Processes for the use of biomass: Drying, Gasification, Fluidized Beds; Feedstock/Fuel: Particle characterisation, Flow through packed Beds, Carmen-Koseny equation, Ergun equation, Geldart classification, Grace-Reh diagram; Fluidization: flow through fluidized beds, minimum fluidizing velocity, regimes of fluidization; Elutriation of fine particles and pneumatic transport.
Wind Power: Wind Characteristics and Resources; Aerodynamics of Wind Turbines: Momentum theory and the Betz limit, Horizontal Axis Wind Turbine, Aerofoils, Blade element theory, Effect of drag and blade number on optimum design; Wind Turbine rotor dynamics; Wind Turbine Design: Topologies, Materials, Machine Elements, Wind Turbine loads, Design Evaluation, Powel Curve Prediction; Wind Turbine Control; Wind Turbine Siting; Wind Energy System Economics; Environmental Aspects and Impacts of Wind Energy Systems
Wave Power: Introduction, principle of wave motion, wave energy, power and resources, wave patterns, wave conversion devices, social and environmental aspect.
Tidal Power: Introduction, the cause of tided, enhancement of tides, tidal current/stream power, tidal range power, world range power sites, social and environmental aspect of tidal power,
Geothermal: Physics of geothermal resources; Technologies: Steam power plants, Ground source heat pumps, hot dry rock technology; Environmental Implications & Economic potential; Geothermal Energy in Ireland ground temperatures, soil types.
Solar: Thermal Energy: Active Solar Heating, Passive Solar Heating, Solar thermal engines and electricity generation, Economics, potential and environmental aspects
Electricity Generation Photovoltaic: Semiconductors and Doping, Monocystalline silicon cells, Polycrystalline silicon, electrical characteristics of PV, remote power, grid connected PV systems, cost of PV, environmental impact & safety, Fuel Cell: Fuel Cell principles: Thermodynamics, Charge Transport, Mass Transport, Fuel Cell Modelling and Characterisation; Fuel Cell technology: Fuel Cell types, System integration and subsystem design, Environmental impact of fuel cells

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ME6122 - MICROFLUIDICS
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To provide the students with an understanding of the main theoretical concepts, measurement and manufacturing methodologies for microfluidic devices.*

Syllabus: Relevance of microfluidics in Lab-on-a-Chip, BioMEMs and Process Intensification
Scale effects on mass, momentum and thermal transport
Poiseuille flow in rectangular channels, developing microflows, prediction using hydraulic resistance, slip effects in gaseous flows (1st and Deissler 2nd Order), Tangential Accomodation Coefficients
Measurement Techniques (Pressure, Flow, Velocity, Mass Transport, Temperature)
Introduction to Microfabrication Techniques for microfluidic devices (DRIE, Stereolithography, Embossing etc.)

MF4728 - OCCUPATIONAL PSYCHOLOGY
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *Engineers usually have to accept managerial positions, for which skills, knowledge and methods of occupational psychology are useful.*

Syllabus: Students are encouraged to present and reflect on their own work experience, including co-op, and to be able to present relevant research to their peers.

MF4733 - MANUFACTURING INFORMATION SYSTEMS
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *The development of large-scale complex manufacturing software-based systems proceeds from analysis through design and implementation to system verification and validation. This module covers the analysis and design phases of the software development cycle with particular emphasis on the use of manufacturing performance-oriented approaches to system specification.*

Syllabus: - Software lifecycles: review of the waterfall model, prototyping, spiral, and object-oriented (OO) development models.
- Focus on understanding the Unified Enterprise.
- Characteristics of good software design - modules, cohesion, coupling or dependency, encapsulation, abstraction, etc.
- Requirements investigation.
- Requirements classification: functional and non-functional requirements.
- Entity Relationship Modelling, Requirements Engineering: use case diagrams and use case descriptions.
- Relational Database Design and Development.
- Other methodologies - DSDM, Agile approaches, Extreme Programming.

Integration with, and data capture from, metrology equipment and bar-code readers. Interfacing with, and control of, stepping motors and programmable logic controllers. Use of application program libraries and integration with other software applications. File format conversion between computer-aided design, manufacturing systems and other Manufacturing applications, e.g. Shop floor data acquisition systems.

MF4756 - PRODUCT DESIGN AND MODELLING
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *3D parametric modelling systems are an integral part of the product design process. They are typically used to control key aspects of a product such as its design, communication, management, presentation, documentation and validation.*
The aim of this module is to introduce students to these six key product design areas using SolidWorks in the context of generic best practice modelling strategies. In addition students will:
Understand the primary issues and considerations involved in designing a new product and develop a creative approach to the solution of design problems.
Understand the concepts and practices associated with 3D parametric modelling and visualisation technology.
Model and develop products and components in contemporary computer modelling software.
Be able to create comprehensive product models and specifications in the context of the total development of a product.
Develop cognitive modelling/visualisation, problem-solving and decision-making skills.

Syllabus: Problem definition and clarification - design briefs; New Product Development (NPD) Concurrent Engineering NPD vs Traditional NPD; The deliverables of processes of design; design processes and the role of parametric CAD; Modelling strategies from cognition to prototype; Creative Design Methods; Product Concepts Surface modelling and solid modelling techniques; design intent: planning parts for design flexibility; relations and equations; parametric dimensions; design and modelling for manufacture and assembly; assembly modelling; drawings; drawing documentation; BOMs; creating design tables using Excel for multiple part and assembly configurations; Library features: SolidWorks Toolbox of fasteners and components; importing and exporting files; CAD standards for data exchange; STL files and the FDM rapid prototyping system; linking with SolidCAM. FEA analysis and design validation; rendering and presentation techniques; product animation.

Prerequisites: MF4722

MG4037 - STRATEGIC MANAGEMENT
ECTS Credits: 6

Management and Marketing

Rationale and Purpose of the Module: *To provide students with a significant understanding of the role and importance of strategic management in contemporary organisations.*
To enable students to integrate functional specialisms into an appreciation and application of strategy processes in both the private and public sector.

Syllabus: Multi-perspective nature of strategy, strategic dimensions, strategy processes, theories of business level competitive advantage - market positioning, resource-based and the dynamic capabilities approach. Strategic options and decision making, implementation issues: resource allocation, stakeholder management, strategic control, and change management. Strategic cultures and paradigms, the role of the strategist. Corporate-level strategy, multi-business structures and coherence, Organisational and Environmental Turbulence, Scenario Planning and future thinking.

MG4058 - MANAGEMENT CONSULTING
ECTS Credits: 6

Management and Marketing

Rationale and Purpose of the Module: *Contemporary management practice is a novel and action orientated module on the minor option in management for the BBS Degree. This module has is a deep purpose: to deliver a transformational experience to BBS students minoring in management in the broad area of strategy as practice. There has been a movement in recent times to address the missing link of strategy; i.e. the strategist. The class are introduced in a structured and academically legitimate way to the life, times and strategic challenges faced by arguably the greatest global strategist of all time in the Western World: Alexander the Great. Through an interactive and engaging experience the class will see how rarely but significantly one person can make all the difference in strategically difficult times that resonate with the intense complexity of the business world that graduates will face and need to navigate.*

Syllabus: Strategy Dimensions, Competitive Dynamics, Leadership, Strategy Process, Stakeholders, Resilience, Capabilities, Creativity, Strategic Innovation.

MG4604 - AIR TRANSPORTATION
ECTS Credits: 6

Management and Marketing

Rationale and Purpose of the Module: *To provide students with an appreciation and analysis of the air transport industry structure, competition, technical and*

commercial issues facing companies involved in the sector, complimenting existing knowledge of aeronautical engineering:

Syllabus:
Overview of the international aviation industry including air transport, airports, aerospace manufacturing, maintenance and other aviation services. History of aviation including the development of national and international regulations of civil aviation. The advent of deregulation and liberalization of air transport markets to produce open skies. The characteristics of airline operations, airline costs, passenger demand, marketing strategies and pricing fare policies. The use of gantt charts, bills of material (BOM) and the principles of FIFO within the air transport sector. Air transport in Ireland and the current international air transport industry structure, competition, emerging trends and future prospects

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MI4408 - STRATEGY AND KNOWLEDGE MANAGEMENT
ECTS Credits: 6

Management and Marketing

Rationale and Purpose of the Module: *To provide a strategic perspective on the role of knowledge, information and technology in organisations.*
Develop the role played by technology in market and organisational transformation.
Develop planning processes for the strategic use of the information resource.
Provide students with an appreciation of the need to manage knowledge as an organizational resource and the infrastructural requirements to facilitate this.

Syllabus: The role of technology, information and knowledge in a strategic context; technological change and the transformation of organisations and markets in the networked economy; techniques and frameworks for strategic planning of the information resource; the nature of knowledge as an organizational capability; models and conceptual frameworks for knowledge management; knowledge management systems; knowledge codification; the transfer of knowledge at an individual, group, organizational and inter-organizational level; cross cultural knowledge management; changing use of systems due to knowledge intensity; communities of knowing; implications for knowledge systems in support of non-traditional/emerging organizational structures. The above concepts will be reinforced and developed through the use of various software packages including web, intranet and knowledge portal software systems.

Prerequisites: MI4407

MK4002 - MARKETING
ECTS Credits: 6

Management and Marketing

Rationale and Purpose of the Module: *This module is designed to introduce students to the philosophy and historical underpinnings of marketing. As such, it will help students to position marketing both as an organisational discipline and as a societal force. The module will trace the development of marketing as a business philosophy and will assess the role of marketing within the international business organisation. Students will also explore what it means for organisations to be market-led. Finally, the module will delineate the rights and responsibilities of marketers and customers, and identify the role and impact of marketing in society.*

Syllabus: The syllabus provides coverage of the nature of marketing and, in particular, offers an historical backdrop to the development of the discipline. Next, students are introduced to the cornerstones of the discipline in the guise of the marketing concept and the marketing mix. Issues relating to marketing as organisational culture are considered with specific reference to marketing orientation and the barriers to developing such an orientation. The process of marketing in different contexts (service, industrial, international etc.) is discussed and differences highlighted. The consumer is introduced as the core target of marketing activity and relevant issues such as consumer sovereignty; consumer rights and the consumer movement are debated. On a macro level, issues relating to social responsibility and ethics are delineated. Finally, the module addresses the thorny issue of how marketing adds value and what its contribution might be.

MK4004 - CONSUMPTION AND CONSUMER CULTURE
ECTS Credits: 6

Management and Marketing

Rationale and Purpose of the Module: *This course aims to provide coverage of the nature of consumer culture.*
** To reflect the general shift within consumer culture in the basic emphasis of economic systems from exchange or production to consumption.*
** To define the domain of consumer behaviour, including some areas of interest to consumer behaviour researchers, policymakers, and marketers.*
** To provide coverage of the circle of consumption and how consumption relates to other technological and economic processes.*
** To explore contemporary theories of consumption.*
** To encourage students to critically reflect upon their own consumption.*

Syllabus: The Circle of Consumption; Motivational Dynamics; Culture; Cultural Values; Myths & Symbols; Cultural Rituals; Types of Meanings; Meaning Transfer; Strategic Analysis of Consumers; Self Concept; Subcultures of Consumption; Lifestyles; Embodiment & Consumption; Classic Theories of Motivation; Consumer Motives in Cultural Perspective; Involvement; Consumer Experience; Consumer Learning; Purchasing; Gift Exchange; Organisational Consumption; Family & Household Consumption; The Social Context of Personal Consumption; Tools of Influence; Reference Groups; Innovation; Adoption and Diffusion; Resistance; Compulsive Consumption; The Disposition Process; Profiles of Disposition Behaviours; Factors Affecting Disposal Choices.

Prerequisites: MK4002

MK4006 - MARKETING MANAGEMENT (NON BUSINESS)
ECTS Credits: 6

Management and Marketing

Rationale and Purpose of the Module: *This module will provide non business students with an understanding of the key knowledge and skills involved in marketing management. The module will examine the strategic importance of marketing and explore the key challenges*

and contemporary issues surrounding the management of marketing.

The key objectives are:
1. To explore the role of marketing management in the contemporary environment and investigate how marketers can manage environmental changes
2. To evaluate marketing's contribution in the creation of sustainable competitive advantage for different business contexts
3. To investigate the importance of marketing within the firm and the challenges surrounding the management of the marketing function
4. To provide students with an understanding of the role of marketing planning and implementation.

Syllabus: Building upon the foundations of marketing, this module takes a strategic approach to the theory and practice of marketing. The module introduces the concept of the marketing vision and explores the process of strategic analysis based on an assessment of key external and internal forces affecting the firm. An exploration of marketing strategy and the sources of competitive advantage follow with key competitive positioning strategies presented. The module focuses on understanding the management of the marketing function, the development of the marketing mix and the practice of marketing in terms of maximising value to customers and other stakeholders. Core areas to marketing management such as customer behaviour, brand management, services management and relationship marketing are examined. Key models and theories related to marketing planning and implementation are explored.

Prerequisites: MK4603

MK4008 - APPLIED MARKETING 2
ECTS Credits: 6

Management and Marketing

Rationale and Purpose of the Module: *The emphasis of this module will be the development of planning, implementation and communication skills.*
To foster an ability to produce effective customer communications through a range of media.
To enhance oral and written marketing communication skills.

Syllabus: Developing an Integrated Marketing Communications Plan, Developing a Creative Brief, Creative Executions in Marketing Communications, Copywriting, Direct Marketing, Sales Promotions, Campaign Management, Media Choice, Trade Shows and Exhibitions, Experiential Marketing, Internet Marketing Campaign, Search Engine Optimization, New Media Opportunities, Personal Selling, The Psychology of Selling, The Changing Nature of Sales and Its Implications, Overview of Personal Selling Process, Sales Responsibilities and Preparation, Personal Selling Skills, Networking, Negotiation Techniques, International Selling.

MK4018 - INTERACTION, RELATIONSHIPS AND NETWORKS
ECTS Credits: 6

Management and Marketing

Rationale and Purpose of the Module:
1. To introduce relational approaches to marketing.
2. To understand the nature and importance of interaction in service, intra-organisational and mass marketing contexts.
3. To understand the process of relationships development and to appreciate relationship success variables and how they might be fostered.
4. To consider approaches to relationship management including CRM.
5. To understand competitive and collaborative networks and the strategic implications for individual organisations.
6. To appreciate the implications of marketing when viewed as interaction, relationships and networks.

Syllabus: Motivation for the development of relational approaches to marketing. Relationship life-cycle models. Interaction and Relationships in service contexts. Intra-organisational and inter-organisational interaction and relationships. Relationships success variables including trust, commitment and shared values. Cultural dimensions to relationships. Collaborative and competitive networks. Relationship marketing strategy and Customer Relationship Management.

MK4025 - MARKETING COMMUNICATIONS
ECTS Credits: 6
Management and Marketing

Rationale and Purpose of the Module: *To introduce students to communications theory.*
To establish the fundamentals of marketing communications.
To explore the nature and influence of the institutions of consumer culture
To consider different marketing communications techniques and be cognisant of contemporary trends in the field.
To investigate alternative understandings of advertising.
To demonstrate how different communications techniques can be combined and interrelated to form the basis of positive international marketing communication strategies.
To appreciate the impact which marketing communications have on our lives.

Syllabus: Role of communications, communications theory, audiences, how advertising works, the management of marketing communications, the advertising industry, creative aspects of advertising, media aspects of advertising, ethics and advertising standards, communication vehicles- (sponsorship, public relations, direct marketing, consumer sales promotions, trade shows and exhibitions, internet marketing communications tool, internal marketing communications), integrated marketing communications, the planning and management of an integrated marketing communications plan, the effects and effectiveness of marketing communications, future developments in marketing communication.

MS4014 - INTRODUCTION TO NUMERICAL ANALYSIS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *This module provides an introduction to the basic concepts of numerical analysis.*

Syllabus: Propagation of floating point error;

Zeroes of nonlinear functions: Bisection method, Newton's method, Secant method, fixed point method; convergence criteria, rate of convergence, effect of

multiplicity of zero; introduction to the use of Newton's method for systems of nonlinear equations.

Systems of linear equations: Gauss elimination, LU and Cholesky factorisation, ill-conditioning, condition number; iterative methods: Jacobi, Gauss-Seidel, SOR, convergence criterion.

Interpolation and Quadrature: Lagrange interpolation, error formula;

Newton-Cotes and Romberg quadrature.

Numerical solution of ordinary differential equations: initial and boundary value problems, Runge Kutta and Adams Moulton methods, application to systems of ordinary differential equations.

Prerequisites: MS4022, MS4403

MS4018 - DYNAMICAL SYSTEMS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To demonstrate to the student how dynamical techniques can be applied to the analysis of nonlinear and chaotic models, data and systems.*

Syllabus: One dimensional flows: flows on the line, fixed points and stability; bifurcations, flows on the circle.

Two dimensional flows: Linear systems, classification of fixed points; phase plane, linearisation, stability and Lyapunov functions. Limit cycles, oscillators. Bifurcations in the plane, Hopf bifurcations, global bifurcations of cycles, quasi-periodicity. Poincare maps.

Chaos: Lorenz equations; strange attractors; control of chaos.

One dimensional maps: fixed points, periodic points and stability; bifurcations, the logistic map - numerics and analysis, period-doubling and intermittency; Lyapunov exponents, renormalisation and Feigenbaum numbers.

Introduction to time series applications.

Fractals: dimensions; strange attractors revisited.

Prerequisites: MS4403

MS4022 - CALCULUS 2
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *This module introduces the student to sequences and series, integral calculus, ordinary differential equations and functions of several variables. It develops problem solving skills in these topics.*

Syllabus: - Sequences and series: Limit of a sequence, convergence of a sequence; series, convergence, tests for convergence, absolute and conditional convergence. Power series.

- MacLaurin and Taylor series: Order notation, big-O, little-O notation, asymptotic equivalence, Taylor's Theorem and remainders, applications.

- Indefinite Integral: Integration of standard functions, techniques including integration by parts, substitution and partial fractions.

- Definite Integral: The limit of a Riemann sum, fundamental theorem of calculus, Area between two curves, Volumes of revolution, Improper integrals.

- Introduction to ordinary differential equations: Definition of an ODE, linearity, first order variables separable, solution technique by integration.

- Introduction to functions of two real variables: Continuity, partial derivatives and their geometrical interpretation, Leibniz's rule, conditions (without proof) for maximum, minimum, saddle-point.

Prerequisites: MS4021

MS4028 - STOCHASTIC DIFFERENTIAL EQUATIONS FOR FINANCE
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *Methods of stochastic dynamics applied to finance, and with reference to problems involving stochastic differential equations from physics and engineering.*

Syllabus: Introduction to Monte Carlo simulation: Numerical simulation of paths; ensemble averaging and connections to partial differential equations. Examples from Finance and Physics. Stochastic differential equations and Langevin equations. Fokker-Planck/Kolmogorov equation and relation to Black-Scholes equation. Numerical methods for SDEs and Langevin equations: Euler-Maryuma method and higher-order schemes. Pricing barrier options and first-passage problems, including multiple stochastic factors.

Trinomial trees and finite difference methods: Pricing on trinomial trees. Analytical methods for partial differential equations. Explicit, implicit, Crank-Nicholson, and ADI implementations for numerical solution of partial differential equations, including options on multiple assets.

Modelling markets with stochastic differential equations: Comparison of modelling methods for stochastic dynamics problems in Finance, Physics, and Engineering. The Ito/Stratonovich dilemma. Non-Gaussian distributions and fat tails in the markets. Long-memory effects. Coloured noise and the Ornstein Uhlenbeck process. Autocorrelation functions and spectra of noise sources. Wiener-Khinchin theorem.

Prerequisites: MS4213, MS4217

MS4034 - APPLIED DATA ANALYSIS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *[Module replaces Numerical Computation MS4024]*

This is a new module the aim of which is to give the students experience building and using statistical models to analyse real data and formulate conclusions based on interval estimates, hypothesis testing, model selection and comparison.

The module serves to integrate the practice and theory of statistics.

The instructor and students are expected to analyse the data provided with each lab in order to answer a

scientific question posed by the original researchers who collected the data.

To answer a question, statistical methods are introduced, and the mathematical statistics underlying these methods are developed.

Syllabus: Descriptive statistics; quantile plots, normal approximation.

Simple random sampling; confidence intervals. Stratified sampling; parametric bootstrap allocation.

Estimation and testing; goodness-of-fit tests, information, asymptotic variance.

Contingency tables; experimental design. Poisson counts and rates; Mantel-Haenszel test.

Regression; prediction, replicate measurements, transformations, inverse regression, weighted regression.

Multiple linear regression; model checking, projections.

Analysis of variance; unbalanced designs, indicator variables, factorial designs.

Prerequisites: MS4222

MS4122 - FURTHER LINEAR ALGEBRA
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *Course re-structuring in response to Project Maths.*

The aim of this module is to build the student's understanding of Linear Algebra to a more advanced level.The module includes a formal treatment of Vector Spaces and Inner Product Spaces followed by a careful treatment of the properties of vectors and matrices on R^n and C^n.

Syllabus: Axiomatic treatment of Vector Spaces and Inner Product Spaces.
Linear Independence, spanning sets.
Bases & Dimension.
Inner products/norms.
Angles/orthogonality in Inner Product Spaces.
Orthonormal bases/Gram Schmidt Orthogonalisation.
Linear transformations/change of basis.

Properties of matrices.
Rank, row space, column space, null space.
Vector norms on R^n and C^n.
Existence and uniqueness of matrix inverse/relation to matrix rank.
Fredholm Alternative.
Unitary and Hermitian properties of matrices.

Eigenvalue & Eigenvector Topics.
Eigenvalue decomposition for Hermitian matrices.
Algebraic & Geometric Multiplicity.
Defective Eigenvalues and Matrices.
Similarity Transformations.
Diagonalisation/Unitary Diagonalisation.

Induced matrix norms.

Applications of the above topics.

Prerequisites: MS4131

MS4218 - TIME SERIES ANALYSIS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *This course introduces students to the statistical basis behind model identification, model fitting and model criticism of time series probability models in both time and frequency domains.*

Syllabus: Components of a time series; smoothing methods; trend projection; deseasonalising a time series, autocorrelation; autoregressive models; integrated models; estimation in the time domain; the Box-Jenkins approach; spectral analysis, the spectral distribution function, the spectral density function, Fourier analysis, periodogram analysis, the fast Fourier transform; forecasting methods, extrapolation, Holt-Winters, Box-Jenkins, prediction theory; bivariate processes, the cross-correlation function, the cross-spectrum; applied time series analysis using suitable software packages.

MS4222 - INTRODUCTION TO PROBABILITY AND STATISTICS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *This module replaces existing module MS4212 Introduction to Data Analysis.*
The focus of the previous module MS4212 was the analysis of data without a formal background in probability. The philosophy underpinning this approach was to introduce students to real data, which was entirely absent from Leaving Certificate mathematics in the 1990s, and begin to lay the foundations for the elements of data modelling necessary for the years three and four modules in the statistics options. Probability and Statistics account for 20% of the new Project Maths syllabus. Students now entering first year have had prior exposure to elementary data handling skills and experience applying the some basic ideas of probability. Consequently, it is not obvious that it is still necessary or desirable to adopt a teaching approach that separates the subject areas statistics and probability. As things stand, probability is totally absent from MS4212. One consequence of this omission is that statistical tools are introduced without proper formal theoretical justification based on probability models. Likewise, students are not as well prepared as they could be for the (rather packed) follow-on module MS4213. The intention in the revised (and renamed) first year introductory module is to include some probability in the syllabus. The strategy is to give students time to explore some of the many classical/famous problems that often arise in introductory probability. Discrete random variables and probability mass functions will be covered. As well as relieving some of the pressure in the congested semester 3 module MS4213, students will now be required to engage in more algebraic manipulation and basic mathematics. The statistical content of the module has been reconfigured to allow the inclusion of the material on probability.

Syllabus: Elementary Probability: permutations and combinations; axioms, rules of probability; conditional probability; independent events; probability trees; law of total probability; Bayes' rule.

Discrete Random Variables: probability mass functions (Bernoulli, binomial, Poisson, geometric); expected value, variance; Poisson approximation to the binomial; law of total expectation (discrete form).

The Normal Curve: the normal curve as an idealised

histogram; areas under the normal curve; normal probability plot; illustrating the sampling distribution of the mean through applications in statistical quality control; precision of an estimate; the foundations of hypothesis testing and confidence intervals.

Gathering Data: sample surveys; designed experiments and observational studies; randomized control trials. Exploratory Data Analysis: frequencies; histogram; empirical density curve; percentiles; measures of centre; measures of spread; outliers; boxplots; scatterplots; correlation; contingency tables, Simpson's Paradox.

Regression Models: least squares line; transforming to linearity; out-of-sample prediction.

MS4303 - OPERATIONS RESEARCH 1
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *The module will introduce OR and various standard techniques for decision-making. Linear programming will be covered in some depth. The student will be able to apply these techniques to realistic problems.*

Syllabus: Model building and the methods of operational research.

Linear programming - graphical interpretation, simplex method and sensitivity analysis. Duality and the dual simplex method,

Applications of linear programming - Transportation and assignment algorithms, zero-sum games.

Critical path analysis - minimum completion time, resource constraints and resource levelling, probabilistic task durations.

Decision analysis - decision trees, expected value, utility, Bayesian approach.

Prerequisites: MS4213

MS4327 - OPTIMISATION
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To give students a broad understanding of the theoretical and numerical aspects of non-linear optimisation*

Syllabus: Criteria for Optimality. Conditions for linear equality- and inequality-constrained problems. First-order and second-order Karush-Kuhn-Tucker (KKT) conditions for general non-linearly constrained problems.

Unconstrained Optimisation. Univariate Functions: Line Searches.
Multivariate Functions: Steepest Descent and Newton's Method,
Modifications of Newton's Method including Levenberg-Marquardt Method.
Conjugate Gradient Methods.

Constrained Optimisation. Penalty and Barrier Function Methods.
Computational limitations of penalty function methods ill-conditioning. Exact Penalty Function Methods.

The module will include at least one computer-based project requiring students to select and implement a suitable algorithm for the solution of a non-trivial optimisation problem using either FORTRAN or Matlab.

MS4404 - PARTIAL DIFFERENTIAL EQUATIONS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To introduce the partial differential equations of applied mathematics and physics with some standard solutions and applications.*
To introduce the theory and applications of first order linear and nonlinear partial differential equations of mathematical physics.

Syllabus: [Introduction to PDEs:] Introduction to the partial differential equation of physics; classification of second order linear partial differential equations (hyperbolic, parabolic, elliptic).
[Wave equation:] Derivation of wave equation for strings and membranes; solutions by separation of variables; harmonics; d'Alembert's solution; applications to light and sound.
[Laplace's equation:] steady state heat flow; cylindrically symmetric solutions and Bessel functions; spherically symmetric solutions and Legendre functions; flow in porous media.
[Diffusion equation:] Derivation of heat/diffusion equations in one dimension; relation to Brownian motion (random walk) in two and three dimensions; application to chemical diffusion; solutions by separation of variables.
[First order PDEs:] Linear and quasilinear first order partial differential equations; characteristics; applications in chromatography, glacial flow, sedimentation; breaking waves and shocks; diffusion and dispersion (Burger's and KdV equations).

Prerequisites: MS4403

MS4408 - MATHEMATICAL MODELLING
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To learn the techniques of advanced mathematical modelling or real phenomena with examples from the physical, biological, chemical and financial sciences.*

Syllabus: Review of modelling skills, applications from: classical models (e.g. heat transfer), continuum models, financial models, statistical models, mathematical biology, advanced models.

Prerequisites: MS4404, MS4407, MS4403

MS4414 - THEORETICAL MECHANICS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *To introduce students to the fundamental concepts of theoretical mechanics.*

To prepare students by developing the basic mathematical skills in theoretical mechanics.

To emphasise applications of vector calculus and ODEs.

Syllabus: Kinematics: reference frames, motion in one dimension, motion with constant acceleration, kinematics in three dimensions, uniform circular motion, centripetal acceleration

Dynamics: mass, force, Newton's laws of motion, friction, Newton's Law of Gravity, planetary motion

Conservation laws: momentum, angular momentum, energy (kinetic energy, potential energy as gradient of force)

Oscillatory motion: free and forced pendulum, resonance, parametric resonance

Introduction to the Hamiltonian and Lagrangian mechanics

Prerequisites: MS4403, MS4613

MS4528 - MATHEMATICAL AND STATISTICAL MODELS OF INVESTMENTS
ECTS Credits: 6

Mathematics & Statistics

Rationale and Purpose of the Module: *The aim of this module is to equip the student with the necessary analytical and quantitative skills required for the pricing and hedging of contingent claims, as well as of interest rate products, credit default swaps, and analyse the risk and return of individual assets and portfolios.*

Syllabus: -The Black-Scholes Model as a limit of the Binomial Model. Definition and Properties of Brownian motion. Stochastic Integration, Ito Calculus and Stochastic Differential Equations for continuous-time models in finance.
Option pricing and hedging in the Black-Scholes model.
-Fixed Income securities and interest rate derivatives, including Swaps,
Caps, Floors, and Black's Formula.
-Credit risk and Credit derivatives such as Credit default swaps,
Collateralised debt obligations. Credit spreads, implied default probabilities and the pricing of simple derivatives.
-What is volatility? Black-Scholes implied volatilities, realized volatilities,
Volatility Swaps. Time Series models for volatility estimation and forecasting (e.g. using GARCH).
-Portfolio optimization with the Markowitz approach. The Capital Asset
Pricing Model.

MT4002 - MATERIALS 1
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *This is a course in Engineering Materials for students with no previous back-ground in the subject. It is designed to meet the needs of engineering, science and design students for a first materials course, emphasizing design applications.*

Syllabus: Introduction to engineering materials and their properties.
Price and availability of materials
The Elastic moduli (bonding between atoms, packing of atoms in solids, physical basis of Young's modulus
Yield strength, tensile strength and ductility (dislocations and yielding in crystals, strengthening methods and plasticity of polycrystals)
Fast fracture and toughness (micromechanisms of fast fracture)
Fatigue failure (fatigue of cracked and uncracked components, mechanisms, design against fatigue)
Creep and creep fracture (kinetic theory of diffusion, mechanisms of creep and creep-resistant materials)
Design with materials
Case Studies and laboratory experiments incorporating examples of mechanical testing, failure analysis, design and materials selection.

MT4208 - MATERIALS SELECTION AND DESIGN
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *The student should be able to assess engineering components with regard to the design function.*
The student should be able to determine and use quantitative and qualitative materials selection criteria.

Syllabus: [The interaction between material properties and engineering design criteria, in designing components and products for manufacture]
Basic principles of materials selection. Assessment of design function. Constraints on property requirements. Selection procedures. Selection for mechanical properties including stiffness, strength, fracture toughness and fatigue resistance. Selection for surface durability. Design considerations. Computer aided materials selection.

MT4518 - SURFACE TECHNOLOGY
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To acquaint engineers and technologists with the concepts of corrosive degradation and wear processes and to give methodologies by which these processes can be decelerated by the use of electrochemistry coatings heat treatments or mechanical working.*

Syllabus: Wet corrosion, E-i curves, over potential effects, Pourbaix diagrams, corrosion mechanisms, mechanically aided corrosion: Corrosion protection cathodic protection, anodic protection, coatings, paints, inhibitors: Friction & wear, wear mechanisms, gouging, ploughing etc.: hard material coatings, multi-layered coatings: Heat treatments & mechanical working processes for wear resistance.

MU4002 - CRITICAL ENCOUNTERS WITH POPULAR MUSIC AND DANCE
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This module is an introduction to the growing field of popular music and dance studies and will give the student an overview of some of the important features of these contemporary practices as well as current areas and modes of research in this context. The investigations presented in these modules will be particularly informed by the international disciplines of Arts practice research. Students here will*

also be introduced to responsible and accountable academic and research practices

Syllabus: In this module students will be introduced to the academic field of popular music and dance studies, examining popular music and dance movements, particularly those relevant to Irish contexts. Here students will seek to develop a vocabulary to think, talk, and write about the world of popular music/song/dance in order that we might better understand the purpose, meaning, and values associated with its forms. By examining case studies and key writings about popular music, song, and dance, students are introduced to the theoretical models developed within the field to account for the development of popular music and dance (and the very concept of 'popular' itself), the role of commodification in popular arts and how that shapes its aesthetics, and the meaning of popular forms in identity politics and in our everyday lives. Students will be develop writing and presentation skills associated with such academic engagement and be introduced to concepts of research as a creative, scholarly practice.

MU4012 - CRITICAL ENCOUNTERS WITH WESTERN ART MUSIC AND DANCE
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This module is an introduction to the field of classical music dance studies, with a particular focus on contemporary practices. Students will be exposed to a selection of classical music and dance practices in an academic and performative context, providing them with an insight into some of the diversity of music and dance practices within these traditions. The investigations presented in this module will be particularly informed by the international disciplines of Arts practice research. Students here will also be introduced to responsible and accountable academic and research practices.*

Syllabus: This module will act as an introduction to the historical development of Western Art Music from its roots in medieval church and secular music to its contemporary forms. Its historical relationship to traditional musics in Europe and beyond will be discussed.
Dance traditions will also be explored, referencing classical, neo-classical, contemporary and post-modern dance artists and practices. The course will include aspects of the history of dance performance in other locations and environments, for example site specific works, choreography for camera and the influence of new technologies on the development of choreography and performance. Students will be develop writing and presentation skills associated with such academic engagement and be introduced to concepts of research as a creative, scholarly practice.

MU4018 - SECOND INSTRUMENT STUDIES TWO
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *This module allows students on the BA Performing Arts to further develop performance skills in a second instrument. Students will have the opportunity to critically engage embodied expressions of performance practice on an instrument and or practice other than that in their core Practicum A module. Students will engage these studies in an environment informed by recent principles in arts practice research. This module will give students invaluable new perspectives on their creative and artistic potential. This is an elective module to be offered throughout the BA in Performing Arts programme and is subject to the Irish World Academy being able to source appropriate expertise and resources.*

Syllabus: Students in this module will continue to develop a second instrumental performance area in small group and one-on-one contexts. Students will develop and document an appropriate practice regime as well as use reflective tools such as auto-ethnographic journals.

MU4022 - INTRODUCTION TO SONGWRITING 2
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *Students will build on skills and experiences, composing within a group as well as developing their individual practice as songwriters.*

Syllabus: Through weekly workshops, students will experiment with different methods of developing original songs, considering simple elements of melody, lyrics and structure of song. Through weekly lectures and engagement with post-graduate students of MA Songwriting, students will be exposed to a range of different songwriters of varying genres and styles. They will be encouraged to locate their own creative practice within the wider experience of songwriting, engaging in reflective practice through group discussion, and individual journaling and self-evaluation. Moving on from Introduction to Songwriting 1, students will now be expected to produce individual as well as group compositions for performance.

MU4136 - IRISH TRADITIONAL MUSIC 2
ECTS Credits: 6

Humanities

Rationale and Purpose of the Module: *To introduce the students to the history and structures (musical and in a wider cultural sense) of traditional Irish music and dance.*

Syllabus: Issues addressed in this module will be instrumental and dance style, Irish language song tradition, nineteenth-century collections, contemporary issues, sean-nos and set dancing.

NS4002 - SCIENCE FOUNDATION 2: GENETICS
ECTS Credits: 3

Nursing & Midwifery

Rationale and Purpose of the Module: *The aim of this module is to enhance the student students' knowledge and understanding of the causes of hereditary linked disorders*

Syllabus: Cell biology Prokaryote and eukaryote cells Cell divisions; Biological basis of heredity; the clinical significance of Mendelian inheritance in humans. The nature of DNA genes; Genes; Alleles; Chromosomes; Autosomes and sex chromosomes; How genes function, autosomal dominant; Predictions of genetic outcomes; Autosomal recessive inheritance, Autosomal dominant inheritance, X linked recessive inheritance including common disorders, X linked dominant for each; Mitochondrial inheritance including common disorders,; Multifactorial inheritance including disorders; Comparative analysis of single gene conditions;

Chromosomal disorders - autosomal abnormalities, sex chromosomal abnormalities, changes in chromosome structure, changes in chromosome number; karyotyping; Genetics of common mental and disorders; Genetics of common physical disorders, polygenic inheritance; Some basic concepts in population genetics.; Genetic screening; New born screening for genetically inherited conditions including phenylketonuria, maple syrup urine disease, homocystinuria, galactosaemia, cystic fibrosis; Factors influencing teratogenesis; Genes and cancer; Genetic counselling.

NS4022 - PHARMACOLOGY FOR NURSES AND MIDWIVES
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *The purpose of this module is to provide the student with knowledge and understanding of the principles of pharmacology and the role of the nurse and midwife in safe medication management.*

Syllabus: Pharmacology, pharmacokinetics, Drug groups and their application to nursing and midwifery management of patients/clients across healthcare settings.
Pharmacodynamics; legal, regulatory, ethical considerations, guidelines and policies, drug development, generic medications and sources of medication information; Medication classifications, indications, mechanism of action, therapeutic application and monitoring; drug interactions, adverse effects. The role of health professionals in medication management. Self-medication - medication concordance.
Clinical skills:
Principles of safe medication administration applied to national and local medication guidelines
Medication administration routes and techniques
Medication calculations
Preparation and care of the patient/ service user receiving intravenous therapy
Introduction to transfusions of blood and blood products.

NS4072 - MIDWIFERY PRACTICE AND NORMAL BIRTH
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *The module will give students the knowledge and skills to assess, plan and implement midwifery care for women and their families experiencing normal childbirth.*

Syllabus: Birthing Environment; Assess, plan and implement midwifery care for women and their families experiencing normal childbirth throughout the intranatal and postnatal period; Physiology and care of women in the 1st, second stage, third stage of labour, care of the pelvic floor in childbirth; The physiology of pain; The role of pain in normal birth; Non-pharmacological methods of pain relief; Principles of drug administration for pain relief in labour including inhalation and epidural analgesia. Physiology and care in the puerperium. Bereavement and loss in childbirth. Communicating and recording clinical practice.

Clinical skills:
Recognition of the onset of normal spontaneous labour
Assessment and care of a woman on admission and throughout labour
Vaginal examination
Introduction to K2 Medical Systems Fetal Monitoring Training Systems
Demonstrates positions for labour and birth
Principles of elimination management; micturition and catheterisation
Demonstrates the normal mechanism of labour
Assisting a woman giving birth
Maintaining a safe environment for normal birth
Management of the third stage of labour
Examination of the placenta and membranes
Assessment and care of a woman and her baby in the postnatal period
Documentation to include partograph

NS4074 - SEXUAL AND REPRODUCTIVE HEALTH IN MIDWIFERY
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *This module will enable the student to promote gynaecological and reproductive health and well-being and provide care for women with related gynaecological and reproductive problems.*

Syllabus: Gynaecological health and wellbeing. Wellbeing and care for women with related problems, to include endometriosis, poly cystic ovarian syndrome, cervical cancer screening, breast awareness, gynaecological cancers. Topics addressed will include fertility/, infertility and its impact on women's well-being, pre-conception care, sexuality and childbearing, sexual and reproductive health needs of diverse groups e.g. teenagers, travellers,. Cultural issues which impact impacting on sexuality, fertility and childbearing e.g. female genital mutilation. Health promotion strategies appropriate within maternal health, use of complementary therapies in childbirth, reproduction and childbearing. The role of the midwife in family planning and contraception, Impact of substance abuse on childbearing, sexually transmitted infections, consequences of childbearing. Childbearing including morbidity and mortality, pregnancy and perinatal mental health, domestic violence/abuse. Applied pharmacology.

NS4084 - CARE OF THE AT RISK AND ILL NEONATE
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *This module will enhance the students' role and responsibilities in relation to the care of the at-risk and ill neonate.*

Syllabus: Systematic care for the at risk and ill neonate e.g. management of cardiovascular and respiratory disorders, neonatal jaundice, metabolic transient disorders, endocrine disorders and congenital anomalies, infections in the neonate, trauma in the neonate,; complications arising with low birth weight, preterm and post term infant; breastfeeding management under difficult circumstances, midwives role within the multidisciplinary team; neonatal resuscitation and rapid midwifery intervention; perinatal and infant morbidity and mortality; adoption and fostering; child protection issues; support in the context of bereavement and loss
CLINICAL SKILLS:
Introduction to the Neonatal Resuscitation Programme
Assessment and management of the at risk and ill neonate
Nutritional support for the at risk and ill neonate (feeding practices oral, nasogastric)
Care of baby in an incubator and under phototherapy
Administration of medication to the neonate

NS4202 - BIOLOGICAL SCIENCES 2, ANATOMY, PHYSIOLOGY AND EMBRYOLOGY
ECTS Credits: 3

Nursing & Midwifery

Rationale and Purpose of the Module: *The aim of this module is to provide students with the foundation for understanding normal human anatomy and physiological functioning and embryology so as to assist in the study of the effects of illness and disease on the individual.*

Syllabus: Structure and function of the Circulatory system. Structure and function of the Respiratory system. Structure and function of the Lymphatic system. Innate and adaptive immunity. Contribution of each system to the maintenance of homeostasis. Embryology: pre-embryonic, embryonic and foetal development and growth; congenital abnormalities

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NS4204 - RESEARCH FOR NURSES AND MIDWIVES
ECTS Credits: 3

Nursing & Midwifery

Rationale and Purpose of the Module: *The module aims to develop knowledge, attitudes and skills to critically review research literature, and understand the contribution of research to nursing and midwifery practice is promoted*

Syllabus: Ways of knowing in Nursing, Midwifery and health care pratice. Accessing sources of knowledge: searching, reading, critiquing literature. Philosophical and theoretical under pinning of research: philosophy and research paradigms, ethical issues, the research process: developing a research concept, statement, design. Introduction to methodologies: qualitative, quantitative, action research. Data collection and analysis, writing up research

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NS4212 - COMMUNICATIONS AND THERAPEUTIC RELATIONSHIPS
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *The module will introduce the skills and knowledge necessary for the development of effective communication in nursing and midwifery practice. The module will facilitate the development of students' communication and interpersonal skills so as to enhance professional and therapeutic relationships with patients, clients, women, service users and their families, members of the public, colleagues and other members of the health care team.*

Syllabus: Communication: theories, models, techniques and styles of communication. Communication skills: verbal and non-verbal, counselling skills. Group communication. Therapeutic and professional relationships in nursing. Self-awareness and Assertiveness. Bridges and barriers in the development of therapeutic relationships.

Communicating with persons with disability/impairments. Trans-cultural issues in communication. Communication in conflict management. Bereavement.
Communicating in special circumstances e.g. breaking bad news. Communicating Nursing information.

Clinical Skills
Communication skills: self-awareness, verbal, non-verbal; listening, explaining, questioning, assertiveness, interviewing skills, recording clinical practice
Development of therapeutic relationships: therapeutic use of self
Group communication and group dynamics
Communication with persons with a disability/impairment
Communication: breaking bad news, conflict situations, admission, assessment and documentation Trans-cultural awareness
Relaxation Skills

NS4214 - ENDOCRINE AND REPRODUCTIVE NURSING
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *This module will address the nursing care and management of individuals' endocrine and reproductive disorders and the provision of appropriate nursing care for individuals with such condition(s) in the acute and community setting*

Syllabus: Integrate professional values and nursing roles through nursing assessment and management of endocrine disorders: e.g. diabetes, thyrotoxicosis and hypothermia. Nursing assessment and management of reproductive disorders: e.g. benign/malignant breast disorders, dysfunctional uterine bleeding, cervical carcinoma; menopause, sexual health problems: e.g. infertility, endometriosis, and sexually transmitted infections within primary, secondary and tertiary healthcare settings. Nurse's role and responsibilities in the investigative and diagnostic procedures within the healthcare team. Applied pharmacology. Clinical Skills

Clinical Skills
Insulin administration, techniques
Women's health - breast awareness, cervical screening,
Men's health - testicular examination

NS4222 - RESPIRATORY AND CIRCULATORY NURSING
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *This module will address the nursing care and management of individuals with respiratory, circulatory, blood and lymph disorders. The nurse's role in the supportive-educative process will be explored in respect of acute or progressive respiratory and circulatory disorders. The aim of this module is facilitate students understanding of respiratory, circulatory, blood and lymph disorders so that they may provide appropriate nursing of an individual with such condition(s).*

Syllabus: Nursing care and management of individuals with respiratory disorders e.g. infection, chronic obstructive pulmonary disorders, asthma, carcinoma, airway obstruction. Nursing care and management of a patient with a tracheotomy/tracheostomy. Nursing care and management of individuals with cardiovascular disorders e.g. hypertension, myocardial infarction, congestive cardiac failure, shock. Nursing care and management of a patient receiving a blood transfusion. Disorders of blood and lymph: anaemia, leukaemia. Nurses role in the collaborative process of care with individuals and the family/carer. Related pharmacology.

Nurses role and responsibilities in investigative, diagnostic procedures

Clinical Skills Syllabus:
Oxygen therapy
Suctioning techniques
Nebulisers/inhalers
Peak flow
Active and passive limb exercises.
Tracheostomy management: dressings, removal, cuff inflation/deflation
Emergency Intra pleural drainage: underwater seal drain,
Postural drainage
Intravenous infusions
Introduction to blood transfusion

NS4224 - NEUROLOGICAL, SENSORY AND MUSCULA-SKELETAL NURSING
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *The purpose of this module is to facilitate students' understanding of neurological, sensory and musculo-skeletal disorders and to provide appropriate nursing care to an individual with such condition(s) across all healthcare settings.*

Syllabus: Neurological disorders: e.g. head injuries, increased intracranial pressure, cerebral vascular accident, epilepsy, meningitis, multiple sclerosis, Alzheimer's and Parkinson's disease; nursing care and management. Nursing care and management of individuals with auditory and visual disorders: Musculo-skeletal disorders: e.g. osteoporosis, fractures, amputation, spinal injuries; arthritis, nursing care and management. Nurses role and responsibilities in investigative and diagnostic procedures. Applied pharmacology.
Fracture management and care e.g. cast care, traction, external skeletal fixation, limb elevation
Positioning and mobilising after orthopaedic surgery
Eye care
Ear care
Stroke positioning
Glasgow coma scale and other neurological assessments
Assisting patients with mobility

NS4322 - NURSING THE CHILD WITH INTELLECTUAL DISABILITY
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *The module aims to introduce students to the nature and manifestations of conditions associated with intellectual disability. A person centred approach which places children and their families at the centre of care is espoused at all times*

Syllabus: Peri and post-natal development; screening tests at birth and premature reflexes. Intellectual disabilities: incidence, causation, manifestations nursing care and management of a child presenting with an intellectual disability e.g. Down syndrome, cerebral palsy, autism, genetic conditions, hydrocephalus. Complex and continuing health care needs e.g. epilepsy, contractures and restriction in movement. Communication and language needs of the child. Play and music as a developmental process and therapeutic activity. The function and role of movement and physical fitness in the acquisition of social skill and self-help development. Education and integration into mainstream facilities. Concept of child protection; recognition and consequence of child abuse, procedures and guidelines for reporting abuse. Applied pharmacology

Clinical Skills Syllabus:
Assist babies/children at mealtimes and bathing
Use and care of nebulisers, peak flow measurement, inhalers/chambers, oxygen therapy, and suctioning technique
Principles in performing active and passive limb exercises
Assess levels of consciousness
Basic instrumental/music skills

NS4324 - NURSING THE INDIVIDUAL WITH MULTIPLE NEEDS
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *The aim of this module is to introduce the student to the care and management of persons with an intellectual disability with associated physical and sensory impairment.*

Syllabus: The nursing care and management of acute and chronic physical illness. Senses and their functions and sensory impairment: care and management. Physical disability, nursing care and management. Preparation and care of persons with an intellectual disability undergoing investigative and diagnostic procedures. Functions and promotion of sleep. Applied pharmacology

Clinical Skills Syllabus:
Breast awareness
Testicular examination
Cervical screening
Monitoring of blood glucose and administration of insulin
Wound management and associated dressing techniques

NS4422 - MOOD AND EMOTIONAL DISORDERS AND MENTAL HEALTH NURSING
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *The purpose of this module is to introduce the student to common anxiety and mood related disorders and the consequent impact of these disorders on individuals' biopsychosocial well-being and functioning. The role of the nurse in delivering evidenced based interventions that facilitate recovery of persons experiencing mood and anxiety related disorders across primary, secondary and tertiary health care settings will be discussed.*

Syllabus: Disorders related to anxiety and mood disturbance. Aetiology of mood and anxiety disorders. Pre-disposing, precipitating, perpetuating and protective factors associated with mood and anxiety, disorders, Characteristic features and biopsychosocial effects of anxiety and mood disorders. Comprehensive, person-centred, biopsychosocial, mental state and risk assessment of persons experiencing anxiety and mood disorders. Care planning and evidenced-based interventions including pharmacological and non-pharmacological approaches that promote recovery for persons experiencing mood and anxiety disorders Strategies to evaluate interventions. Introduction to cognitive and behavioural therapies. Application of cognitive behavioural therapy in the management of anxiety and mood disorders. Role of the nurse in somatic therapies e.g. electro-convulsive therapy.

Clinical Skills:
Communication and therapeutic relationship skill

development to work with persons with mood and emotional disorders
Interview and assessment skills
Care plan documentation
Skills in Cognitive Behavioural Interventions for anxiety and mood disorders e.g. anxiety management techniques, relaxation training, activity scheduling.
Peri-operative care in relation to ECT.
Suctioning technique positioning of service user

NS4424 - NURSING THE OLDER PERSON WITH INTELLECTUAL DISABIL
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *To module aims to develop students' knowledge regarding the ageing process and the specific needs of older persons with an intellectual disability.*

Syllabus: Ageism, concepts and theories of ageing, physiological social and psychological changes associated with generic ageing and the older person with an intellectual disability. Nursing care and management of support for the older person with an intellectual disability. Person centred planning and the concept of choice and quality of life in older adulthood. Nursing process applied to the older person with an intellectual disability associated with age related illness. Living arrangements and service provision for the older person with an intellectual disability. The following concepts related to the older person with an intellectual disability; retirement, recreational and leisure pursuits, spiritual care, pastoral care and palliative care. Applied pharmacology.

Clinical Skills Syllabus:
Central Nervous System (CNS) examination
Facilitative communication skills: reality orientation, reminiscence and art therapy
Assisting an older person with mobility and engagement in activities of living
Environmental comfort and last offices

NS4434 - PSYCHOTIC AND PERSONALITY DISORDERS AND MENTAL HLTH
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *The purpose of this module is to develop the students' knowledge and understanding of the role of the nurse in the care and management of an individual experiencing personality or psychotic disorders*

Syllabus: Disorders of thought and perception; e.g. schizophrenia, presentation, aetiology, types, classifications, epidemiology, and socio-cultural aspects. Personality disorders; theories, classifications, characteristics. Nursing assessment and management of persons with a schizophrenia and personality disorder. The role of the nurse in providing effective therapeutic interventions which facilitate recovery and well-being in persons with schizophrenia or personality disorders and their families\carers. Related pharmacology. Contemporary research findings and relevant health policy.

Clinical Skills Syllabus:
Engagement and facilitation when communicating with persons with psychotic and personality disorders.
Observation, recording and eliciting information in the assessment of persons with psychotic disorders
Introduction to cognitive behaviour therapy for schizophrenia and dialectic behaviour therapy for persons with personality disorders

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NS4444 - PSYCHOTHERAPEUTIC ENGAGEMENT IN MENTAL HEALTH
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *The aim of this module is to build upon the skills of communication learned in year one of the programme. The student will develop their knowledge and application of counselling skills applicable to mental health/psychiatric nursing clinical practice.*

Syllabus: Therapeutic relationship in mental health nursing; Introduction to models and theories of counselling and nursing interpersonal theory. Exploration and application of the core concepts of therapeutic engagement in/to nursing practice (trust, empathy, congruence, unconditional positive regard, hope). The use of 'self' as therapeutic tool, equality, self-determination dignity and recovery within the relationship. The counselling process in nursing practice, application of counselling skill in one to one and group settings (organisation, facilitation, interpersonal conflict, disclosure). Crisis intervention; modalities, types, nursing care and management. Support systems, peer support, clinical supervision reflection. Contemporary research findings and relevant health policy.

Clinical Skills:
Facilitation of group therapy
Counselling skills and processes
Crisis intervention strategies
Central Nervous System (CNS) examination
Active and passive limb exercises
Assisting with mobility

NS6038 - PROMOTING QUALITY AND SAFTEY IN HEALTHCARE
ECTS Credits: 12

Nursing & Midwifery

Rationale and Purpose of the Module: *Nurses are increasingly being recognised as key stakeholders within health service organisations. At specialist and advanced practice levels, nurses are expected to contribute to safe effective healthcare provision and promote quality care. This module explores the concept of quality and safety in healthcare in promoting quality patient outcomes.*

Syllabus: Principles of promoting quality, safety and clinical governance in shaping global healthcare practice; safety culture; quality systems and regulations; patient focus within healthcare; sources and levels of evidence underpinning practice; current national and international projects in evidence based practice; critical thinking; factors influencing clinical decision-making; hierarchies of evidence; strategies to promote quality and safety in promoting quality patient outcomes.

NS6040 - INTERCULTURAL CARE
ECTS Credits: 9

Nursing & Midwifery

Rationale and Purpose of the Module: *The purpose of this module is to examine the knowledge, skills and attitudes required by health care professionals to care for individuals from diverse cultural, ethnic and linguistic backgrounds.*

Syllabus: Globalisation and the changing demographic profile within healthcare; opportunities and challenges of living and working in culturally diverse societies globally, concepts of culture, race and ethnicity; theories and Models promoting transcultural health and cultural competence; cultural identity and self-awareness, ethnocentrism and stereotyping, National and international legislation and influences related to immigration, human rights, discrimination and healthcare/service provision, policy developments that promote cultural sensitivity at an individual, organisational and society level, cultural generic and cultural specific knowledge, intercultural communication, challenging racism, discrimination and inequalities.

NS6042 - THERAPEUTIC ENGAGEMENT
ECTS Credits: 9

Nursing & Midwifery

Rationale and Purpose of the Module: *This module will build on previous knowledge/skills to facilitate practitioners to use therapeutic engagement at specialist/ advanced levels in nursing/midwifery practice. Therapeutic engagement is an essential means through which healing and personal growth and development are achieved within nursing and midwifery practice.*

Syllabus: Theoretical foundations of therapeutic engagement and counselling. Person centred/humanistic; cognitive and behavioural; and psychodynamic approaches to the therapeutic process and counselling Therapist qualities and needs. Therapeutic use of self. Levels of Therapeutic Engagement. The Elements of Therapeutic Dialogue. Directive and Non Directive approaches in Therapeutic relationships. Brief Interventions. Narrative approaches. The counselling process. Stages of engagement and disengagement. Ethical issues in the therapeutic relationship and process. Dealing with specific client needs; working with adults; children and adolescents; bereavement and loss; addiction; psycho educational practice and therapeutic engagement. Clinical Supervision and support systems for practitioners. Collaborative and autonomous practice issues.

NS6122 - PERINATAL BEREAVEMENT AND LOSS
ECTS Credits: 9

Nursing & Midwifery

Rationale and Purpose of the Module: *The aim of this module is to facilitate midwives and other health care professionals to work more effectively with bereaved parents and their families experiencing perinatal loss. The quality of perinatal bereavement care delivered during the parents grieving journey can have long-lasting consequences. It may have a significant impact in shaping their healing process and may directly influence how they cope following their baby's death. The module is designed to facilitate all health care professionals to work more effectively with bereaved parents and their families (National Standards for Bereavement Care Following Pregnancy Loss and Perinatal Death 2016).*

Syllabus: The module provides midwives and health care professionals with a comprehensive understanding of perinatal bereavement and care. Scope of perinatal grief and various theories of grief. Critical exploration of effective compassionate care following pregnancy loss and perinatal death and loss associated with infertility. Appraisal of compassionate and evidence based perinatal bereavement care for parents. Professional skills development to work more effectively with bereaved families. Insight into the parents grieving journey and consequences, both positive and negative. Factors that significantly impact on shaping their healing process. Support for families considering subsequent pregnancy after a perinatal loss. Perinatal death and its effects on health care professionals and the importance of adequate support. Exploration of evidence based perinatal palliative care.

NS6302 - INFECTION PREVENTION AND CONTROL IN HEALTHCARE
ECTS Credits: 9

Nursing & Midwifery

Rationale and Purpose of the Module: *Infection prevention and control is a critical concern for patients, clients, health care employees, health care administrators and government agencies. This module explores infection control measures necessary to prevent and manage the spread of illnesses and identify appropriate infection control measures. The clinical and financial consequences of healthcare associated infections are increasingly recognised. The Health Service Executive (HSE) is committed to a National Infection Control Action Plan which includes a 20% reduction in health care associated infections, a 30% reduction in MRSA infections and a 20% reduction in antibiotic consumption. In order to deliver on the vision of improved infection prevention and control outcomes the focus is on the development of a culture of quality of care, process and outcome measurement, education and high quality research. All healthcare employees are required to have an in-depth knowledge of the infection prevention and control processes involved in caring for patients. There is evidence that there is a significant shift in health care workers compliance with infection prevention and control practices and guidelines, following educational programmes. An education module for healthcare professionals on infection prevention and control will contribute to the achievement of identified targets in the reduction of healthcare associated infections and excellence in patient care in Primary, Acute, Community and Continuing Care settings.*

Syllabus: Microbiology: Chain of infection, infection control standards and guidelines, modes and mechanisms of transmission of pathogenic organisms in the health care setting. Communicable diseases and multi resistant organisms. Antibiotic use and resistance. Strategies for prevention and control of infection. Invasive medical devices and care bundles. Creation and maintenance of a safe environment for patient care in all health care settings through application of infection control principles and practices for cleaning, disinfection and sterilisation. Audit, surveillance and research. Includes sourcing up to date information, surveillance of health care associated infection and how surveillance is used to improve patient care.

PA4018 - THE PUBLIC POLICY PROCESS
ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *Aim:*
This course aims to provide students with an overview of the theory and practice of policy analysis. The process of public policy making in the modern democratic state will be explored with particular reference to the socio-political environment of policy making and organisationally based decision processes within public administration.

Objectives:
- To build an understanding of what policy is, nature of policy problems and the role of problem definition in structuring policy
- To focus on theories of the public policy process and explore the variety and complexity of decision making processes
- To identify a classification of approaches to the analysis of public policy
- To investigate and understand how information about public policies is made available and is accountability for outcomes clear
- To evaluate the policy process in government and public bureaucracies through the analysis of case study material
- To promote career development skills

Syllabus: What is public policy?; stages approach to the policy process; power approaches - elitism, pluralism, corporatism; agenda setting; models of decision making - Simon, Lindblom, Allison, Etzioni, Dror; institutional approaches; rational choice theory; policy networks; policy transfer; policy implementation; evaluation, accountability; Europeanisation

Prerequisites: PA4021

PA4022 - INTRODUCTION TO PUBLIC ADMINISTRATION II
ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *Awareness of different systems is essential for explanation, theory and practice in Public Administration. This module explores how new national and international realities shape administrative practices and systems and draws on examples from throughout the world. It examines public service systems in different contexts, the roles and functions they fulfil and the administrative traditions that shaped them. It explores how common administrative problems are dealt with and the processes used to deal with contemporary challenges. It also identifies trends in public sector reform and the role of international institutions, such as the OECD, in promoting public sector modernization.*

This module will be offered on the new BA Arts programme.

Pre-requisite module for this modules is Module ID 1548 Introduction to Public Administration I.

Syllabus: -Major functions of the modern democratic state
-Postmodern public management
-Organizing the civil and public service - different approaches, different roles
-Structures, processes and institutions in different contexts
-Coordination of public policy and administration - towards joined-up government
-Links between administrative and political systems
-Decentralization, devolution and the hollowing out of the State
-Reform trends
-The influence of supranational organisations
-Contemporary Issues in public administration e.g., the challenges and potential of technology for public service systems; accountability; gender; ethics

Prerequisites: PA4001

PA4038 - PUBLIC ADMINISTRATION IN DEMOCRATIC STATES
ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *All states distinguish between those activities that are best carried out on behalf of the people by the state, those that are best left to markets, and those that are most appropriately the responsibility of individuals, families and other civic organisations. In this module we examine the alternative views about where best to draw these lines, with a view to more fully comprehending the choices that face all governments and citizens.*

Syllabus: The exposition is largely chronological. We begin with an introduction to the precepts of classical political economy, the challenges presented to these views by the development and growth of social democracy, and alternative explanations for the relationship between markets and welfare. We proceed by examining the historical development of welfare states in Europe, their growth and contraction and associated political movements and look at the impact of these on state administration. Towards the end of the module, we will attempt to apply the ideas and concepts that we have explored at a more general and European level specifically to the Irish case. We end with a series of contemporary Irish case studies which critically examine the most recent (alleged) 'transformation' of the Irish state.

PD4004 - DESIGN VISUALISATION
ECTS Credits: 6

School of Design

Rationale and Purpose of the Module: *The aim of this module is to build upon the learning outcomes from ID4811/2 in first year where students learn to represent their design ideas graphically through the traditional media of pens, pencils markers etc. This module will develop skills of product representation using design CAD software (Adobe Creative Suite). The students will be able to:*
Understand the needs and practices of presentation in design
Project the meanings behind the concepts through visual methods
Graphically represent concepts using the Adobe Illustrator as a drafting tool.
Undertake visualisations of products that are photo-realistic representations in 2D using Adobe Photoshop graphic software tool.
Undertake Product/systems presentations using Adobe InDesign graphic design tool.
Photography and digital editing.
Contextualisation of products (graphically place in-situ).

Syllabus: Interpretation of 3D forms and detail design in 2D rendering.
Develop a visualisation skill-set in computer-based visualisation.
CAD used as a tool in the processes of design

visualisation (product renderings) and representation to convey product form, finish, texture and meaning.
Contextualisation of products in environments of use.
Communication of design concepts.
CAD used as a design tool in graphic design and presentation.
Project-based-learning in Design visualisation underpins the Studio learning method.

Prerequisites: ID4811, ID4812

PD4104 - DESIGN STUDIO 4
ECTS Credits: 6

School of Design

Rationale and Purpose of the Module: *To effectively experiment, analyse, innovate and plan a design project from inception to completion.*
Understand and develop design ideation.
Implement a variety of design tools and methodologies.
Engage in multidisciplinary teams.
Collaborate with industry partners.
Improve teamwork skills.
Improve primary design research skills.
Collate, analyse and synthesise research findings for design ideation.
In-depth user testing and analysis.
Improve concept development skills through exploration of idea generation techniques.
Develop an ability to effectively progress concepts through iteration.
Critique and evaluate concepts.
Develop an appreciation for design detailing.
Develop knowledge of design manufacturing processes and materials.
Advance design communication skills.
Utilise leading edge technologies in communication of designs.
Develop an ability to reflect on personal design work.
Application of this theory to their own work through project based studio classes.

Syllabus: The following is an outline of topics covered in project based studio classes:
Evaluation and filtering methods for concept selection.
Idea generation techniques.
Implementation of entire design process from research to design detailing.
Design ideation.
Engagement with industry partners through sponsored design projects.
Visual communication tools.
Advanced design skills development.
Usability principles - testing and analysis.
Graphical user interface interaction.
Product design focused manufacturing techniques and materials.

PD4124 - CONTEMPORARY DESIGN CULTURE
ECTS Credits: 6

School of Design

Rationale and Purpose of the Module: *To allow students to place their design practice in an international, cultural and historical context, to introduce contemporary trends, concepts and philosophies, to allow students to develop an appreciation for design and professional practice*
Syllabus: Contemporary design approaches. International trends. Design Philosophy, Sociology and Psychology. Trend forecasting. Design History & Theory. Professional Practice. Presentation skills. Visual Communication. Forecasting & Trends. Field trips.

PE4012 - INTRODUCTION TO DESIGN FOR MANUFACTURE
ECTS Credits: 6

School of Engineering

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

PH4012 - PHYSICS FOR ENGINEERS 2
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *Continuation of an introductory course in physics (PH4011) for engineering students.*

Syllabus: Properties of Matter: Elastic and thermal properties of solids: stress and strain, thermal expansion, Hooke's law, Young's modulus, shear modulus, bulk modulus. Fluid mechanics: pressure, variation of pressure with depth, pressure measurements. Buoyant forces and Archimedes' principle. Fluid dynamics: Bernoulli's equation, other applications of fluid dynamics. Heat: The kinetic theory of gases: molecular model of an ideal gas, non-ideal gases, equipartition of energy. Heat transfer: conduction, convection and radiation. Oscillations and simple harmonic motion: transverse and longitudinal waves, superposition, speed, reflection, harmonic waves; sound waves, sound intensity, Doppler Effect. Light: EM Spectrum, Sources of light; Geometrical optics, reflection, refraction, dispersion, achromatic optics; Physical optics, interference; diffraction; diffraction gratings; polarisation; Optical systems, the microscope, the telescope, the eye.

Prerequisites: PH4011

PH4018 - MEDICAL INSTRUMENTATION
ECTS Credits: 6

Physics

Rationale and Purpose of the Module:
** To introduce the special considerations for electric/electronic instruments attached to patients for the purposes of diagnosis or therapy.*
** To introduce the medical device directive and the regulatory environment.*
** To give the student a working knowledge of the operation of some medical equipment*
** To introduce the student to the scientific basis of the well-known radiological equipment commonly in use in our hospitals and medical research institutes.*
** To provide a working knowledge of the operation of this equipment.*

Syllabus: Introduction to regulatory bodies in the EU and US: CE, FDA etc.; 21 CFR, 510k, Medical Device Directive, Investigational Device Exemptions; Electrical isolation standards, implementation options; Laser Safety - EN 60825. Measurements in biological systems: obtaining a reference, ratiometric analysis, clinical requirements,
Physiological monitoring; Invasive/non-invasive, Probes - Electrical, fibre optic, non-contact. Vital signs monitoring: ECG- Electro cardio gram, electrical function of the heart; EEG- Electro encephalo gram, electrical function of the brain; EMG- Electro myelo gram, electrical function of the muscle; Pulse Oximetry, optical

measurement of arterial blood oxygen saturation; MAP-mean arterial pressure. Introduction to radiation transport in tissue: absorption/scattering theory (Mie, Rayleigh Gans), bulk scattering and bulk absorption, anisotropy, typical values for radiation transport properties, Monte Carlo modelling. X-RAY/CT: X-RAY generation and propagation, Introduction to tomography, Computed Tomography - Slicing the living human body. Ultrasound: Doppler Effect, high frequency ultrasound, limitations.
MRI/MRS: Magnetic Resonance basics, the hydrogen nucleus, proton spin and quantum mechanics; 3D map of hydrogen atoms and hence content of the sample volume, Properties and amount of water in tissue, distinction between contrast and content imaging.

PH4022 - Physics for Environmental and Biosciences
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *To provide an understanding of the basic principles of mechanics, heat, fluids, waves, optics, sound, the atom and nucleus, and how these are relevant to our daily life.*

Syllabus: Measurement and units: The SI system, basic and derived.
Mechanics: Displacement, velocity, acceleration, Newton's laws of motion, force, mass momentum, work, energy, power. Heat: Temperature, calorimetry, specific heat capacity, latent heat, heat transfer, thermal conductivity, u- value. Properties of Fluids: density, pressure due to a liquid and gas, Boyle's law, Charles Law, fluid flow and viscosity, Pascal's Principle, liquid flow in pipes. Optics: Geometrical optics, properties of optics, reflection, laws of reflection, refraction, laws of refraction, mirrors, lenses, total internal reflection, critical angle, optical instruments. Waves: Properties of waves, wave nature of light, Huygen's principle, double-slit experiment, diffraction, interference, diffraction gratings, Young's polarisation of light, the electromagnetic spectrum, ultraviolet, visible light, x-rays, ?-ray, infrared radiation.
Sound: Nature of sound, The speed sound, speed of sound in different media, the temperature dependence of the speed of sound in air frequency spectrum, audible region, ultrasonic region, infrasonic region, sound intensity level, the decibel scale, sound phenomena. The atoms and Nucleus: Sub-atomic particles, nuclear radiation, radioactivity measurement of radiation, radiation and health.

PH4032 - PHYSICS FOR GENERAL SCIENCE 2
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *To introduce the student to general wave motion, optics and acoustics. To introduce the student to the mechanical and thermal properties of matter.*

Syllabus: Review of the basic concepts of force and energy. Oscillations and simple harmonic motion: transverse and longitudinal waves, superposition, speed, reflection, harmonic waves, sound waves, sound intensity, Doppler Effect. Light: EM spectrum, sources of light, Geometrical optics, reflection, refraction, dispersion, achromatic optics. Physical optics: interference, diffraction, diffraction gratings, polarisation. Optical systems: the microscope, the telescope, the eye. Elasticity: Hooke's law. Fluids. Heat: temperature, laws of thermodynamics, heat capacities. Heat transfer: conduction, convection and radiation. Kinetic theory, the ideal gas. Heat engines.

PH4038 - ENERGY STORAGE
ECTS Credits: 6

Physics

Fundamentals of advanced energy conversion and storage.

Electrochemical energy storage. Review of electrochemical cells. Electronic and ionic conductivity. Overpotential and ohmic losses. Types of cells. Batteries, fuel cells and supercapacitors. Primary, secondary and redox flow batteries. Lead-acid, nickel-cadmium, nickel-metal-hydride and lithum ion batteries. Vanadium redox flow batteries. Solid oxide, molten carbonate and proton exchange membrane (PEM) fuel cells. Water electrolysis. Hydrogen storage. Gravimetric and volumetric energy density and power density. Energy efficiency and coulombic efficiency. Grid and local energy storage. Batteries for electric vehicles. Environmental and safety considerations.

Flywheel energy storage. Principles. Components: rotor, magnetic bearings.
Parasitic losses: Friction, hysteresis and eddy currents. Energy efficiency and energy density.

Hydroelectric energy storage. Principles. Fundamentals of hydroelectricity. Reversible hydroelectric turbines. Reservoirs and storage capacity. Comparison of storage by conventional hydroelectric plants, tidal hydroelectric plants and pumped storage. Response times.

Compressed air energy storage. Adiabatic, diabatic and isothermal systems. Heat exchangers. Energy density and efficiency. Mobile, underground and underwater storage.

PH4042 - THERMAL PHYSICS
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *The purpose of this module is to enhance students understanding of key concepts and models associated with thermal physics. The objectives are to first present a general thermodynamics framework, then to introduce statistical concepts followed by analysis of specific physical models.*

Syllabus: Temperature: thermal equilibrium; the zeroth law; equations of state; temperature scales. [First law of thermodynamics]: internal energy; heat and heat capacity; reversible processes and work; free expansion and Joules law. [Second law of thermodynamics]: Carnot cycles, efficiency; thermodynamic temperature scale. [Entropy]: Clausius inequality and entropy; principle of increasing entropy; central equation of thermodynamics; entropy of an ideal gas. [Thermodynamic potentials and Maxwell relations]: internal energy U; enthalpy H; Helmholtz free energy F; Gibbs free energy G; energy equations; availability A and useful work; mechanical, magnetic & electrolytic systems. [Change of phase]: chemical potential; Clausius-Clapeyron equation; nucleation; Gibbs phase rule.
[Microstates and macrostates]: statistical weight of a macrostate; Boltzmann definition of entropy; entropy and disorder. [Equilibrium of an isolated system]: magnetic dipole lattice; Schottky defects. [Equilibrium of a system in a heat bath]: the partition function and the Boltzmann distribution; equivalence of

thermodynamic and statistical quantities; the classical gas; heat capacities of solids; perfect quantal gas; Planck's law; thermodynamics of black body radiation. [Equilibrium of a system with variable particle number]: Gibbs distribution; Fermi-Dirac and Bose-Einstein distributions; Bose-Einstein condensation; Fermi energy; density of states; electrons in metals.

Prerequisites: PH4131

PH4058 - TRANSPORT
ECTS Credits: 6

Physics

The history of transportation, transportation modes, the need for transport in Ireland. Strategies to avoid transport (broadband, video conferencing). The use of Irelands large wind power capacity to innovate and develop new type of electric based vehicles (Hybrid, Hydrogen, Ultra Battery, Super Capacitor...), Storage technology for vehicles (NiMh, Li-ion, Sodium-Sulfure...), application of second generation biofuel to long haul flights and aviation in general, possible development of Ocean Thermal Energy Conversion to power ferries and ships, sustainable transportation networks, system-optimisation versus user-optimisation, the classic urban transportation problem, congestion, infrastructure demand, modelling and use of data to predict transportation problems, engine technology (diesel, common rail, petrol, electric, hybrid...), greenhouse effect, carbon emission, trend of buying oversized vehical, American versus European trend.

PH4062 - NANOTECHNOLOGY 2
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *The purpose of this module is to enhance the students' understanding of key concepts of mechanics, optical and electronic transport properties of nanostructured materials and to develop an understanding of the importance of mechanical and electro-optical properties in applications of nanostructured materials.*

Syllabus: Nanotribology and Materials Characterization Studies Using Scanning Probe Microscopy: Description of AFM/FFM, Friction and Adhesion, Scratching, Indentation and wear, Phase, electrostatic and related scanning probe microscopies. Surface Forces: Types of Surface Forces; Methods Used to Study Surface Forces; Adhesion and Capillary Forces; Different Modes of Friction and the Limits of Continuum Models. Friction and Wear on the Atomic Scale: Friction Force Microscopy in Ultra-High Vacuum, The Tomlinson Model, Friction Experiments on Atomic Scale, Thermal Effects on Atomic Friction, Geometry Effects in Nanocontacts. Nanomechanical Properties of Solid Surfaces and Thin Films: Modes of Deformation, Thin Films and Multilayers. Mechanics of Biological Nanotechnology: Scales at the Bio-Nano Interface, Viruses as a Case Study. Optical Properties of Nanostructures: Collective oscillation (Gustav-Mie explanation), surface plasmon polaritons, subwavelength optics, nonlinear optical properties, Electron Transport in Nanostructures: Electronic transport in nanostructures, density of states in nanocrystals. Electronic Nanodevices: Quantization of resistance, single-electron transistors, resonant tunnelling diodes, organic molecular electronics. Magnetic Nanodevices: Spintronics. Photonic Nanostructures: Photonic crystals, metamaterials, disordered photonic media.

Prerequisites: PH4081

PH4072 - ELECTROMAGNETISM
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *The purpose of this module is to enhance students understanding of key concepts associated with electromagnetism. The objectives are to first present a general vector analysis, then to introduce electric and magnetic field concepts followed by analysis of specific physical problems using vector calculus. Secondly, the students will be introduced to the fundamental properties of electric and magnetic materials. The final objective is to introduce the students to the unified theory of electromagnetic waves and its application in matters and simple physical systems.*

Syllabus: Vector methods: div, grad, curl; line, surface and volume integrals; Electric field E: electric charge, Coulombs law, electric field E, Gauss law, divergence of electric field, the Dirac delta function; Magnetic field: magnetic field B, Biot-Savart law, Amperes law, Lorentz force; Electromagnetic induction: emf, Faradays law, generators and motors; Maxwells equations in vacuum: integral and differential form, monopoles; Energy and potential: energy density in E and B fields, scalar potential V and vector potential A; Dipoles and multipoles: electric dipole p, magnetic dipole m, electric multipoles; Conductors: conductivity, Ohms law, Hall effect; Dielectrics: polarisation P, displacement D, permittivity, electric susceptibility, dielectric constant; Magnetic materials: diamagnets, paramagnets, ferromagnets; magnetic intensity H, magnetisation M, magnetic susceptibility, inductance, transformers; Maxwells equations in matter: Maxwells equations in terms of H and D; Boundary value problems: Poissons equation, Laplaces equation, uniqueness theorem, images; Circuits: transients, reactance, power, and impedance.

Prerequisites: PH4131

PH4092 - SEMICONDUCTOR DEVICES
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *To introduce the student to the physics of solid state electronic devices and to their application*
To introduce the student to semiconductor devices, electronic logic and digital devices

Syllabus: Conduction in solids: elementary band theory of conductors, semiconductors and insulators, doping; donor and acceptor impurities, intrinsic and extrinsic conduction, majority and minority charge carriers. The PN junction: junction diode and applications, Zener diode, the bipolar transistor; transistor action, applications the emitter amplifier, early effect; the field effect transistor, JFET, MOSFET, characteristics and application in simple circuits. Combinational Logic: Binary Logic, Logic functions; AND, OR, NOT; Truth table; Boolean Algebra; Boole Boolean postulates and theorems, De Morgan; Logic gates - complete set; NAND and NOR implementations of logic functions; Multiple-input gates. Sequential Logic: Memory, feedback, synchronous/asynchronous, Flip-flops, Latches; basic SR latch, gated SR Latch, D-type, Master-slave latch, JK Latch; Shift Registers, Counters, UART (block diagram). Operational and Instrumentation amplifiers: desirable characteristics, comparators, voltage reference, virtual earth, voltage follower, NyquistShannon sampling theorem.

Prerequisites: PH4131

PH4102 - WAVES/LIGHT/MODERN PHYSICS
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *To introduce the student to general wave motion, optics and acoustics and to provide the student with a general introduction to special relativity and to atomic and nuclear physics.*

Syllabus: Oscillations and simple harmonic motion: transverse and longitudinal waves, superposition, speed, reflection, harmonic waves. Sound: sound waves, sound intensity, Doppler Effect. Light: EM Spectrum, Sources of light, Geometrical optics; reflection, refraction, dispersion, achromatic optics; Physical optics; interference, diffraction, diffraction gratings, polarisation; Optical systems; the microscope, the telescope, the eye. Special Relativity: Einstein's Postulates, time dilation, length contraction, the Lorentz Transformation, relativistic momentum and energy conservation. Atom: Classical models, Planck's quantum hypothesis, the Bohr atom, The photoelectric effect; quantized energy; the de Broglie wavelength.The nucleus: nucleons; isotopes; nuclear structure; binding energy. Radiation: x-rays, alpa, beta and gamma radiation, the law of radioactive decay. Fission and fusion; nuclear reactors. Detection, dosage.

Prerequisites: PH4131

PH4111 - SEMICONDUCTORS 2
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *The purpose of the module is introduce advanced CMOS process technology and the problems associated with device fabrication as the technology moves towards 30 nm features and below.*

Syllabus: CMOS process flow: CMOS fabrication steps, active region formation, shallow trench isolation, n and p well formation. Gate formation: threshold voltage, control of Vth in n and p channel MOS devices, tip or LDD formation (hot electrons), side wall spacer. Source and drain formation: contact and interconnect formation, multilevel metal formation for ULSI, RC time delay. Surface contaminants: particles, metallic contaminants, organic contaminants, native/chemical oxide, moisture. Cleaning processes: surface characteristics, wet cleaning, dry cleaning,supercritical fluid cleaning, lamp cleaning-surface refreshing. Cleaning /Etching Chemistries]: contamination reduction, gettering (intrinsic and extrinsic). Chemical Mechanical Polishing (CMP): SiO2 inter-level dielectric layers planarisation, tungsten plug formation and shallow trench isolation. Dual Damascene: trench first approach, via first approach, optical proximity correction. High and low K dielectrics: silicon on insulator, ultra-thin oxides, gate dielectrics, degradation mechanisms, nitroxides, fluorinated oxides, shallow junction formation, transient enhanced diffusion. Electrstatic discharge (ESD): basics of ESD, principles of ESD control.
Semiconductor Metrology: CD and overlay measurements, electrical and optical measurements. Assembly: frontend assembly, backend assembly. Semiconductor failure analysis: implant metrology, interconnect process metrology, ellpsometry, reflectrometry, sheet resistance measurements.

Prerequisites: PH4071, PH4805

PH4132 - MODERN PHYSICS
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *This module will develop the student's understanding of fundamental concepts and ideas in modern physics, specifically the use and application of the Schroedinger equation, and the principles of special relativity.*

Syllabus: Wave mechanics: De Broglie's hypothesis, wave functions and probability amplitudes, the Heisenberg Uncertainty principle. The Schroedinger wave equation: simple solutions in one dimension, transmission, reflection and penetration at a barrier, tunnelling, potential wells, the harmonic oscillator. The Schroedinger equation in three dimensions: the hydrogen atom, quantisation of angular momentum, spatial quantisation, the Zeeman Effect.
Spin: the fourth quantum number, the Pauli Exclusion Principle.
Special Relativity: Relativistic dynamics, relativistic mass and momentum, total energy, mass/energy equivalence. Spacetime: spacetime diagrams, introduction to four-vectors. Application of relativistic dynamics to particle beam devices and collision experiments.
Nuclear Physics: Nucleons and nuclear models, nuclear spin, nuclear reactions and cross-sections. Introduction to elementary particles and the Standard Model.

Prerequisites: PH4102

PH4142 - INTRODUCTION TO PHYSICS
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *Physics is a fundamental discipline for all Science & Engineering students.*

Studying physics helps teach students how to think rationally and logically, how to interpret the physical world around them, and how to quantitatively assess and predict what happens in the world using the tools of mathematics to do so.

The specific purpose of Introduction to Physics is to introduce students to the basic principles of measurement, mechanics, heat, fluids, waves and optics. The aim is teach students how to understand the relationship of these principles to the real world and through rational thought use this understanding to interpret, solve physical problems and question the meaning of their solutions.

Syllabus: Measurement and units: The SI system, basic and derived.
Mechanics: Displacement, velocity, acceleration, Newton's laws of motion, force, mass, momentum, work, energy, power.
Heat: Temperature, calorimetry, specific heat capacity, latent heat, heat transfer, thermal conductivity.
Optics: Geometrical optics, properties of optics, reflection, laws of reflection, refraction, laws of refraction, mirrors, lenses, total internal reflection, critical angle, optical instruments.
Waves: Properties of waves, wave nature of light, Huygen's principle, double-slit experiment, diffraction, interference, diffraction gratings, polarization of light, the electromagnetic spectrum, ultraviolet, visible light, x-rays, -ray, infrared radiation.

PH4608 - SOLID STATE PHYSICS 2
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *The purpose of this module is to enhance the students' understanding of key concepts in solid state physics, magnetism, superconductivity and low dimensional systems.*

Syllabus: Magnetism: paramagnetism, diamagnetism, exchange interaction and ferromagnetism, Weiss model of ferromagnetism, Neel model of antiferromagnetism, domains and Bloch walls, giant magnetoresistance. Insulators: dielectrics and susceptibility, pyroelectrics, ferroelectrics and piezoelectrics. Quantum transport: ballistic transport, tunnelling and Coulomb blockade. Low dimensional systems: two dimensional electron/phonon gas, density of states, quantum Hall effect. Superconductivity: Type-1 and Type-2 superconductors, magnetic properties, thermodynamics of superconducting transition, London equations, energy gap and Cooper pairs, tunnel junctions and Josephson Effect.

Prerequisites: PH4607

PH5092 - SEMICONDUCTOR PROCESSES 2
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *The purpose of the module is to introduce advanced CMOS process technology and the problems associated with the device fabrication as the technology moves towards 30 nm features and below.*

Syllabus: CMOS process flow: CMOS fabrication steps, active region formation, shallow trench isolation, n and p well formation. Gate formation: threshold voltage, control of Vth in n and p channel MOS devices, tip or LDD formation (hot electrons), sidewall spacer. Source and drain formation: contact and interconnect formation, multilevel metal formation for ULSI, RC time delay. Surface contaminants: particles, metallic contaminants, organic contaminants, native/chemical oxide, and moisture.
Cleaning processes: surface characteristics, wet cleaning, dry cleaning, supercritical fluid cleaning, and lamp cleaning-surface refreshing. Cleaning /Etching Chemistries]: contamination reduction, gettering (intrinsic and extrinsic). Chemical Mechanical Polishing (CMP): SiO2 inter-level dielectric layers planarization, tungsten plug formation and shallow trench isolation. Dual Damascene: trench first approach, via first approach, optical proximity correction. High and low K dielectrics: silicon on insulator, ultra-thin oxides, gate dielectrics, degradation mechanisms, nitroxides, fluorinated oxides, shallow junction formation, transient enhanced diffusion.
Electrostatic discharge (ESD): basics of ESD, principles of ESD control.
Semiconductor Metrology: CD and overlay measurements, electrical and optical measurements. Assembly: front-end assembly and backend assembly. Semiconductor failure analysis: implant metrology; interconnect process metrology, Ellipsometry, reflectrometry, sheet resistance measurements.

PH5095 - NANOSCIENCE AND TECHNOLOGY 2
ECTS Credits: 6

Physics

Rationale and Purpose of the Module: *The purpose of this module is to enhance the students' understanding of key concepts of mechanics, optical and electronic transport properties of nanostructured materials and to develop an understanding of the importance of mechanical and electro-optical properties in applications of nanostructured materials.*

Syllabus: Nanotribology and Materials Characterization Studies Using Scanning Probe Microscopy: Description of AFM/FFM, Friction and Adhesion, Scratching, Indentation and wear, Phase, electrostatic and related scanning probe microscopies. Surface Forces: Types of Surface Forces; Methods Used to Study Surface Forces; Adhesion and Capillary Forces; Different Modes of Friction and the Limits of Continuum Models. Friction and Wear on the Atomic Scale: Friction Force Microscopy in Ultra-High Vacuum, The Tomlinson Model, Friction Experiments on Atomic Scale, Thermal Effects on Atomic Friction, Geometry Effects in Nanocontacts. Nanomechanical Properties of Solid Surfaces and Thin Films: Modes of Deformation, Thin Films and Multilayers. Mechanics of Biological Nanotechnology: Scales at the Bio-Nano Interface, Viruses as a Case Study. Optical Properties of Nanostructures: Collective oscillation (Gustav-Mie explanation), surface plasmon polaritons, subwavelength optics, nonlinear optical properties, Electron Transport in Nanostructures: Electronic transport in nanostructures, density of states in nanocrystals. Electronic Nanodevices: Quantization of resistance, single-electron transistors, resonant tunnelling diodes, organic molecular electronics. Magnetic Nanodevices: Spintronics. Photonic Nanostructures: Photonic crystals, metamaterials, disordered photonic media.

PH6031 - PHYSICS OF MEDICAL INSTRUMENTATION
ECTS Credits: 6

Physics

Rationale and Purpose of the Module:
** To introduce the special considerations for electric/electronic instruments attached to patients for the purposes of diagnosis or therapy.*
** To introduce the medical device directive and the regulatory environment.*
** To give the student a working knowledge of the operation of some medical equipment*
** To introduce the student to the scientific basis of the well-known radiological equipment commonly in use in our hospitals and medical research institutes.*
** To provide a working knowledge of the operation of this equipment.*

Syllabus: Introduction to regulatory bodies in the EU and US: CE, FDA etc.; 21 CFR, 510k, Medical Device Directive, Investigational Device Exemptions; Electrical isolation standards, implementation options; Laser Safety - EN 60825. Measurements in biological systems: obtaining a reference, ratiometric analysis, clinical requirements,
Physiological monitoring; Invasive/non-invasive, Probes - Electrical, fibre optic, non-contact. Vital signs monitoring: ECG- Electro cardio gram, electrical function of the heart; EEG- Electro encephalo gram, electrical function of the brain; EMG- Electro myelo gram, electrical function of the muscle; Pulse Oximetry, optical measurement of arterial blood oxygen saturation; MAP-mean arterial pressure. Introduction to radiation transport in tissue: absorption/scattering theory (Mie, Rayleigh Gans), bulk scattering and bulk absorption, anisotropy, typical values for radiation transport properties, Monte Carlo modelling.X-RAY/CT: X-RAY generation and propagation, Introduction to tomography, Computed Tomography - Slicing the living human body. Ultrasound: Doppler Effect, high frequency ultrasound,

limitations.
MRI/MRS: Magnetic Resonance basics, the hydrogen nucleus, proton spin and quantum mechanics; 3D map of hydrogen atoms and hence content of the sample volume, Properties and amount of water in tissue, distinction between contrast and content imaging.

PI4024 - PHILOSOPHY AND ETHICS IN HEALTH STUDIES
ECTS Credits: 3

Nursing & Midwifery

Rationale and Purpose of the Module: *The module does to introduce students to standard philosophical and ethical approaches that guide nursing and midwifery practice.*

Syllabus: Contemporary philosophical theories enlightening underpinning nursing and midwifery practice with particular reference to developments in such schools as existentialism; phenomenology; philosophy as therapy; understanding the body, the person (holism vs. dualism), relationships and desire; critical thinking and ethical decision-making. Theoretical approaches to ethics: deontological, utilitarian, and rights-based views. The role of oaths, declarations and codes in medical ethics;Key principles: patient: of Nursing and Midwifery ethics including, autonomy, advocacy, beneficence and primum non nocere, truth-telling, confidentiality and justice; traditional distinctions[1]for example, between acts and omissions and ordinary and extraordinary means; the double-effect criterion; selected issues etc. Ethical conflicts in specific case studies, and the process of ethical decision making involved in their resolution. Issues relating to life and death arising from nursing and midwifery practice for example, i.e. the definition and medical management of death;, abortion;, assisted human reproduction, challenging care:, physical and intellectual disabilities, those in need of intensive care; the elderly. Health, the goal of therapy older person. Main traditional ethical theories (utilitarianism, deontology, virtue ethics) and contemporary advancements upon them (principlism, narrative ethics, ethic of care, feminist ethics) and their relevance for practical decision making in nursing and midwifery practice

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PL4013 - COMMUNITY DEVELOPMENT
ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *To provide familiarity with and critical appraisal of theories and concepts of Community Development (CD); the practice of CD in Ireland; and to evaluate the impact of community based strategies in Ireland.*
Syllabus: Images and ideas of community; origins and development of CD as a field of action and study; the classical model of CD; evolving theories and concepts of CD-spatial, categorical, structural-functional and continuum approaches to the study of CD. State and community in modern Irish society; origins and evolution of CD in Ireland; consensus and conflict models of CD in the Irish context. CD and local area based development. EU, national and local strategy in respect of local and community development; CD and the "partnership process". The strengths and weaknesses of CD as a strategy of development.

PM4008 - EMPLOYMENT RELATIONS PRACTICE
ECTS Credits: 6

Personnel & Employment Relations

Rationale and Purpose of the Module: *Explore the key operational practices in the conduct of employee relations.*
Examine the issue of conflict in the context of the employment relationship.
Expose students to theory and practice of negotiation and conflict handling.
Appreciate the role of negotiation in the conflict resolution process.
Allow for a knowledge of the key 3rd party institutions in the context of workplace conflict resolution.

Syllabus: Understanding of sources of conflict in the workplace and possibilities for resolution; managing collective and individual issues; applying the regulatory framework to conflict issues; the nature of negotiation; integrative and distributive bargaining; strategy and tactics of distributive bargaining; negotiation planning and strategy; negotiation breakdown; communication and persuasion processes in negotiation; power in negotiation; third party intervention; analysing a moot labour court hearing; negotiation exercise and case study.

PM4014 - HUMAN RESOURCE DEVELOPMENT
ECTS Credits: 6

Personnel & Employment Relations

Rationale and Purpose of the Module: *This module is designed to provide students with a conceptual appreciation and practical understanding of Human Resource Development in organisations. There is a focus on integrating HRD activities with the range of HR policies and systems enacted by organisations and on perceiving HRD as a strategic organisational activity.*

Syllabus: This module is designed to provide students with a conceptual appreciation and practical understanding of Human Resource Development (HRD) in organisations. There is a strong focus on integrating HRD activities with the range of HR policies and systems enacted by organisations and on perceiving HRD as a strategic organisational activity. The lectures are designed to provide students with a framework for evaluating the contribution that HRD can make to organisational functioning and for reflecting on the role that the HR practitioner plays in this scenario.

Prerequisites: PM4013

PM4022 - PRINCIPLES OF ORGANISATIONAL BEHAVIOUR
ECTS Credits: 6

Personnel & Employment Relations

Rationale and Purpose of the Module: *This module is designed to give students an understanding of key concepts in Organisational Behaviour. It seeks to describe the complex work organisation from a behavioural perspective and it evaluates the methodologies available for analysing organisational behaviour. In an attempt to provide some answers to the why of human behaviour in the workplace, selected individual, group and organisational processes are introduced and explored*

Syllabus: Organisational Behaviour in perspective: Introduction to the field and paradigms of study; Defining the concept; disciplinarily and interdisciplinary nature of the field; dominant methodologies for understanding the social world. Personality: Defining

personality; sources of personality difference; the nature/nurture debate. Perception and Cognition: The nature of perception; perception and perceptual influences; the process of perception. Motivation; theories of motivation; Learning & the Individual: Defining learning and theories of learning. Stress & Psychological Wellbeing: stress at work; stress and performances; psychological well-being and self-esteem. Groups & Team Roles: What is a group in psychological terms; function of groups; Hawthorne studies; the group formation process. Power, Politics and ethics: Interrelated concepts; sources of power; the use of power; political tactics and their use and legitimacy in organisational life. Leadership: theories of leadership; Organisational culture; diagnosing organisational culture; Schein's typology; formation and maintenance

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PM4054 - APPLIED ORGANISATIONAL BEHAVIOUR
ECTS Credits: 6

Personnel & Employment Relations

Rationale and Purpose of the Module: *The purpose of this module is to enhance students understanding of key concepts and issues associated with behaviour in organisations. The specific objectives are to focus on the role of individual behaviour, specifically on personality, perception and motivation, and to increase students understanding of group dynamics in the international workplace, paying particular attention to the dynamics of communication, groups, conflict, and leadership. Participants will become acquainted with theories, concepts and methods through both didactic and experiential learning techniques.*

Syllabus: The syllabus allows for the treatment of a small number of critical dimensions of organisational behaviour. Building on material covered in an earlier organisational behaviour module, the module explores a number of processes and issues associated with individual and group behaviour in organisations. It explores the following areas: the development of the individual: personality and individual difference, perception, attitudes, the psychological contract and individual motivation. Group development: structures and roles, the dynamics of groups and teams, communication processes particularly in an intercultural context. Organisational leadership and organisational citizenship behaviour are also examined.

PM4064 - EMPLOYMENT RELATIONS
ECTS Credits: 6

Personnel & Employment Relations

Rationale and Purpose of the Module: *To outline the role of the State, Trade Unions and Employers in industrial relations. To enable students to understand the various theoretical perspectives on employee relations and develop the ability to think critically about the subject. This module will demonstrate to students that conceptual analysis has practical outcomes and consequences. It will also show the historical and economic context in which these perspectives arise and how they are made operational. Students will be able to evaluate the practical consequences of such approaches and the demands they may place on management.*

Syllabus: The role and function of trade unions and employer organisations in a societal and comparative context. The role and operation of state institutions. Voluntarism and legalism in Irish employment relations. The practical operation of dismissals and equality legislation in the workplace. Public sector employment relations. The nature of conflict in employment relations, including strikes. National and workplace partnership, including the role and performance of national pay agreements. Recent legislation on trade disputes and trade unions. The impact of the 1937 Constitution. Contemporary national and international developments in employment relations.

PM4078 - HUMAN RESOURCE MANAGEMENT: CONTEXT AND STRATEGY
ECTS Credits: 6

Personnel & Employment Relations

Rationale and Purpose of the Module: *One of the core aims of this module is the development of students' analytical and conceptual ability in the domain of HRM. The purpose of the module is to integrate knowledge and competence from other previous HR modules and from work experience and to integrate them in a way that requires students to be able to analyse key HR issues in the wider national and international context . Students will be required to critically evaluate key contemporary issues in Human Resource Management literature and to examine trends and developments in HRM/employment relations in the international and Irish context. There will be a focus on more strategic aspects of HRM*

Syllabus: Introduction to course; Introduction to key concepts; Work routines; Work systems and changing priorities of production; The changing context of work; Contemporary influences on HRM; Strategy and strategic HRM; Models of strategic HRM; HRM and industry dynamics; Changing labour markets; segmentation; internal and external labour markets; flexibility and labour markets; organisational flexibility and HRM; International HRM; annual Lovett lecture; diversity; strategic HR planning; strategic rewards; performance management; live case study from Irish or international context.

PM4098 - CONTEMPORARY HUMAN RESOURCE MANAGEMENT: CONTEXT AND STRATEGY
ECTS Credits: 6

Personnel & Employment Relations

Rationale and Purpose of the Module: *This module seeks to develop analytical and conceptual capabilities in the domain of human resource management (HRM). The purpose of the module is to integrate knowledge and competence from previous modules (both within and beyond HR, e.g. strategic management, financial planning, etc.) and from work experience and to integrate them in a way that enhances students' capacity to analyse key HR issues in a wider national and international context. Students are required to critically evaluate key contemporary issues in HRM literature and to examine recent research on trends and developments in HRM/employment relations within both an Irish and international context. The module is strongly focused on strategic aspects of HRM, its application in practice and critical evaluation thereof, using an evidence-based perspective.*

Syllabus: Introduction & course overview; Introduction to key concepts of HRM The changing context of work and HRM; Contemporary influences on HRM; Strategy and strategic HRM; Models of strategic HRM; HRM and industry dynamics; Changing labour markets; International HRM; Annual Lovett lecture; diversity; strategic HR planning; rewards; performance management; talent management; guest lectures addressing recent research findings and evidence-based HRM.

PN4014 - PREPARATION AND PLANNING FOR TECHNOLOGY TEACHING (MATERIAL AND ENGINEERING TECHNOLOGY)
ECTS Credits: 6

School of Education

Rationale and Purpose of the Module: *This module will provide students with the opportunity to plan and prepare for their specific school placement. The focus of the module is to consolidate the discipline knowledge and skills with pedagogical knowledge in preparation for engaging and developing school context knowledge. Following the preliminary school placement visit, the module will focus on three distinct aspects of specific planning and preparation: Consolidation, audit and mastery of core skills and processing techniques, tailored pedagogical resources and the provision of a safe environment to support effective learning. The synergistic relationship between effective planning, delivery, discipline, pedagogy, learning, reflection, management and health and safety will be reinforced supporting the development of a construct of teacher professional knowledge.*

Syllabus: Junior cycle syllabus. Topic and Task analysis generation. Learning task selection and development. Teaching resource development. Integration of numeracy and literacy. Classroom matrices. Schemes of work. Lesson Planning
Skills Audit: Measurement, Marking out, Bench Skills, Soldering, Vacuum Forming, Riveting, Drilling and Turning. Health and safety: Classroom layout and size, Class size, Fire safety, Electrical safety, Machinery safety (Provision and audit), Environmental Hazards (noise, dust, thermal jointing, etc.), Housekeeping (organisation, obstructions and cleanliness), Manual handling, Lighting, Signage, Personal Protective Equipment (PPE). Planning for safety, hazard identification and risk assessment.

PN4318 - MACHINE CONTROL
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To introduce the student to open and closed loop control systems.*
To introduce the student to NC/CNC programming methods and CNC machine elements.
To introduce the student to CNC machine power systems and position control.
To introduce the student to sensors and pneumatic applications in automation.
To introduce the student to PLCs and PLC programming.

Syllabus: Control systems for NC/CNC machines. Tool movement systems.
CNC machine power systems. Position control transducers for CNC machines
Sensors and their applications: proximity switches, photoelectric sensors, resistive, capacitive, and inductive sensors
Programmable logic controller hardware and software, applying programmable logic controllers to the control of manufacturing equipment.
Pneumatics - pneumatic control, pneumatic circuit design.

PO4004 - GLOBAL POLITICAL ECONOMY
ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *This module aims to familiarise the student with the basic principles and issues in Global Political Economy (GPE). These include the theories associated with GPE and the institutions that manage it. The module, through the assignments and the tutorials, will also develop writing and oral presentation skills.*

Syllabus: This module is divided into two sections. The first will deal with the theories used to explain the GPE (mercantilism, liberalism and critical theory) and how they interact and contribute towards the changing nature of global politics. The second will look at the institutional and governmental workings of the global economic, and discuss the context and impacts such governance has had. By the end of the course students should be able to grasp the linkages between politics and economics at the global level and be able to critically evaluate key concepts such as globalisation, the relationship between states and markets, the emergence of multinational economic actors and the role and purpose of institutions such as the World Bank, International Monetary Fund and World Trade Organisation

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PO4008 - AFRICAN POLITICS: DEVELOPMENT AND DEMOCRACY
ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *This module will supply an introduction to major political trends in contemporary Africa. Against a brief historical review of African state institutions since the advent of colonialism the course will explore successive efforts to modernise predominantly peasant economies, using Tanzanian experience as a case study. The factors that many critics believe have helped to contribute to the persistence and accentuation of African poverty will be assessed: these include poor macroeconomic management, weak institutions, and disadvantageous patterns of historically entrenched primary commodity production*

Syllabus: Modern African State Formation: regional contrasts
'Development' from the 1930s (with a Tanzanian case study)
African poverty: 'the bottom billion'
Urbanisation and urban politics: Lagos
Structural adjustment and market reform (Zambian case study0
Democratisation in the 1990s (Ghanaian case study0
Democratisation in the 1990s (South Africa)
The developmental consequences of democratisation
War and peace in Africa: Sierra Leone
'The politics of the belly': the patrimonial politics in Central Africa
New social movements

PO4013 - GOVERNMENT AND POLITICS IN IRELAND
ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *To introduce the principal institutions of Irish government and politics and to examine their relationship to Irish society.*

Syllabus: Historical introduction to the economic, cultural, and social background of Irish politics; economic, social and political change; Irish political culture; constitutional development; development of political parties and evolution of the party system; electoral behaviour; social bases of party support;

overview of the principal political institutions, including the presidency, the Oireachtas, the Government, the Taoiseach and the civil service.

PO4015 - GOVERNMENT AND POLITICS OF THE EU
ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *The module aims to develop students' understanding of the way the European Union works and how its policy output and powers affect their lives as citizens. As a result, the module has two objectives. First, to give students a solid understanding of the history, institutions, decision-making processes and major policies of the European Union. Second, to equip students with an appreciation of the principal issues and controversies which currently face the European Union.*

Syllabus: The course is divided into two main parts: The first part looks at the EU Institutions and introduces the basic theories of European integration. The second part concentrates on policies and current EU issues.

Prerequisites: PO4011

PO4048 - ISSUES IN WORLD POLITICS
ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *This main focus of this module is to study current themes in contemporary global politics and to understand their historical development. Students will be able to locate current global issues and place them in a wider theoretical context.*

Syllabus: The module is divided into a number of subsections that engage with an area of study in World Politics and more prominently upon an issue of structural and functional importance in International Relations. The first part of the course looks at the historical development of the International system and introduces questions such as sovereignty and the concept of globalisation, whilst the second part will be made up of a collection of developments and issues that have arisen out of the current structures within world politics.

PO4052 - INTRODUCTION TO POLITICS AND INTERNATIONAL RELATIONS II

ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *This module will continue the broad introduction to the study of Politics and International Relations. It will turn intention to critically explore concepts such as Sovereignty, Civil Society, Conflict, Inequality, Poverty and Terrorism and look at how these are understood at both the national and the global level. The module will be offered in the new BA Arts programme.*

Syllabus: The Changing Role of the State Globalisation Civil Society Conflict War Human Rights Terrorism Inequality and Poverty International Organisations European Union

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PO4062 - CONTEMPORARY MORAL ISSUES

ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *This module is created for inclusion on the BA Arts programme. It aims to give students an opportunity to engage critically with some of the ethical dilemmas and issues confronting contemporary society and to give them the skills to understand and analyse normative arguments and debates.*

Syllabus: The module will examine a range of issues that currently feature in the public debate, such as abortion, euthanasia, sexual and racial discrimination, affirmative action, animal rights etc. The topics may change every year depending of what is most topical at the time.These will be approached from a philosophical perspective and each week the class discussion will be based on two core readings that present opposing or different views on each topic.

PO4067 - STUDIES IN POLITICAL THOUGHT

ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *To build on the knowledge gained during earlier modules, especially PO4022 Modern European Political Thought, by exploring the writings of a number of key political thinkers in more depth. This module will be an option in the fourth year, and is intended for those interested in exploring political theory themes in more depth. The class will follow a seminar format.*

Syllabus: The relationship between political action and political philosophy, with particular reference to questions of freedom and virtue, explored through the thought of Plato, Machiavelli, and Foucault; the political thought of Plato as a foundation for Western philosophy; the politics of Machiavelli and his influence on the development of humanism and republicanism; Michel Foucault and the relationship between truth and power.
Prerequisites: PO4022

PO4118 - IRELAND AND EU MEMBERSHIP: ADAPTING POLITICS, POLICY AND POLITY
ECTS Credits: 6

Politics and Public Admin

Rationale and Purpose of the Module: *This module aims*
To examine the nature and impact of Irelands membership of the EU
To explore the theoretical interpretations of Europeanisation
To systematically investigate the impact Europeanisation has had on selected policy domains in Ireland
To identify the domestic and global factors which mediated the Europeanisation process and to assess the learning and adaptation which led to changes in Irelands political and policy processes.

Syllabus: Conceptualising and theorising Europeanisation.
Historical and contemporary interpretations of the relationship between Ireland and Europe.
The Irish public and Europe: attitudes and discourse. The institutional and administrative impact of EU membership.
Domestic and global factors which mediate the impact of

Europeanisation.
The effects of Europeanisation on specific policy domains namely, the economy, fiscal policy, regional development, agricultural and rural policy, environmental policy, foreign policy, language policy and equality issues.
Europeanisation as a broker of change between Northern and Southern Ireland.
Assessing the impact of Europeanisation and the influence of the mediating factors.
Reflecting on new patterns of governance.
Looking to the future.
Module review.

PS4012 - HUMAN DEVELOPMENT AND THE LIFE SPAN 1
ECTS Credits: 6

Psychology

Rationale and Purpose of the Module: *For students to extend and deepen their knowledge of human development through the lifespan within the field of psychology. To develop skills in identifying and critically examining major tenets of psychological theory in relation to development through childhood, adolescence and adulthood.*

Syllabus: This module provides students with foundation information about how psychologists have studied human development from prenatal life through childhood, adolescence and the stages of adult life including older adulthood. The course will require students to reflect critically on recent empirical studies examining human development through these life stages. The course will focus on the topics of cognitive, biological, social and moral development, from the field of psychology. These topics are studied from a lifespan perspective.

Prerequisites: PS4032, PS4031

PS4032 - PSYCHOLOGY AND SOCIAL ISSUES
ECTS Credits: 6

Psychology

Rationale and Purpose of the Module:
This module will explore a range of contemporary social issues bringing to bear upon them the methods and theoretical perspectives of psychology in an attempt to better understand their causes and consequences. Using the social issue as a focus, students will gain insight into the discipline of psychology and engage in debating and evaluating the theory and method of psychology.
Through a psychological analysis of the causes and consequences of social issues students will gain insight into how these issues might be resolved. .

Syllabus: Issues covered will include; the media and human behaviour; social conflict; the use and abuse of power; sex and sexuality; society and mental health; social inclusion and exclusion; bullying at work; equality and advocacy; parenting and childcare; the environment

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PS4037 - COGNITION 1

ECTS Credits: 6

Psychology

Rationale and Purpose of the Module: *To provide core area coverage of the field of cognitive psychology - a sub-discipline of psychology concerned with the study of the mental processes that underlie human behaviour.*

Syllabus: Cognitive processes cover a broad range of research domains including; memory, attention, perception, knowledge representation, reasoning and problem solving. In this module, through an empirical (including practical demonstrations) and theoretical examination of cognitive processes, students will develop their knowledge of central aspects of cognition including perception, memory and attention.

Prerequisites: PS4042, PS4021

PS4042 - PSYCHOLOGY: THEORY AND METHOD 2
ECTS Credits: 6

Psychology

Rationale and Purpose of the Module: *To cover the main paradigms, concepts, issues, and debates in the core areas of cognitive psychology and developmental psychology.*
To develop students' research and data analysis skills, specifically through the use of experimental methods and inferential statistics.

Syllabus: This module is the second of two which provide coverage of the main paradigms, concepts, issues, and debates within the core areas of psychology. The section detailing developmental psychology will cover the main theoretical approaches to the study of human development from prenatal and childhood biological development to theories of socio-emotional development across the lifespan. The section on cognitive psychology will cover the basic cognitive models of memory and thinking. The key debate of the utility and limitations of the metaphor of 'the brain as information processor' will be common to both areas. In the laboratory classes, students will be required to employ basic principles of experimental design; data entry and analysis using SPSS; probability testing and inferential statistics.

PS4047 - SOCIAL PSYCHOLOGY 2
ECTS Credits: 6

Psychology

Rationale and Purpose of the Module: *To build upon previous introductory modules in social psychology by providing comprehensive in-depth coverage of the core areas of the subdiscipline as well as alternative critical perspectives*

To introduce students to more advanced epistemological and methodological debates in the subdiscipline as well as to historical and cultural variations in social psychological research

Syllabus: Social psychology is a 'broad church' in terms of the values, theories and methods applied across the subdiscipline. More than other areas of psychology it also reflects the contemporary concerns and values of the societies in which it occurs. The purpose of this module is to provide students with a more in-depth knowledge of the core topics of social psychology, but also to put these topics in their socio-political and historical context and to critically evaluate psychological research from different epistemological and methodological grounds. Topics will include: advanced group processes; intergroup conflict; discursive social psychology; measurement in social psychology; critical perspectives in social psychology.

Prerequisites: PS4011

PS4052 - PRACTICAL PSYCHOLOGY 2
ECTS Credits: 6

Psychology

Rationale and Purpose of the Module: *to develop students understanding of the range of laboratory based activities in psychology and to provide opportunities for students to undertake practical studies in psychology and in so doing develop student's ability to collect, code and analyse empirical data.*

Syllabus: This practical class introduces the range of methods employed in psychology to students. The value of experiments, observational, survey and interviews and case studies work are considered using illustrative examples. Practical skills in the experimental and survey methods are developed through the use of selected examples. Students are encouraged to become increasingly familiar with SPSS for coding of data and simple inferential statistics are introduced.

PS4087 - POLITICAL PSYCHOLOGY
ECTS Credits: 6

Psychology

Rationale and Purpose of the Module: *To extend students' knowledge of psychology into the area of political psychology and to improve students understanding of the role that social and political structures can have on human behaviour*

Syllabus: The specific focus of this module is political psychology. Political psychology is an interdisciplinary area of psychology. The course provides an introduction to the psychological foundations of political life. Psychological theories are applied to particular political problems including the formation of belief systems, moral reasoning and ideology, colonialism, political socialization, political culture, mass hysteria, psychohistory. In doing so, it is demonstrated how psychology informs political behaviours and actions, the behaviour of politicians and the effects of social and political structures on behaviour.

PS4097 - DEVELOPMENTAL PSYCHOPATHOLOGY
ECTS Credits: 6

Psychology

Rationale and Purpose of the Module: *to introduce students to the rapidly developing field of developmental psychopathology, to improve students understanding of the role that social, psychological and biological factors play in determining mental health and to highlight the importance of the developmental approach to understanding adjustment and maladjustment.*

Syllabus: The specific focus of this module is developmental psychopathology. Developmental psychopathology is a domain of psychology which concentrates on how psychosocial and biological factors contribute to psychological adjustment and maladjustment. The module will introduce students' evidence relating both environmental and genetic determinants of mental health and consider the role that developmental factors may have in the expression of mental health problems.

Prerequisites: PS4012

PS4108 - APPROACHES TO SOCIAL IDENTITY
ECTS Credits: 6

Psychology

Rationale and Purpose of the Module: *For students to develop an understanding of the different theoretical approaches to the study of social identities in psychology as compared to those in other disciplines*
To introduce students to the range of epistemologies and methodologies employed in social psychological research and to outline the implications of these for the discipline of psychology more generally.

Syllabus: The Social Identity approach in social psychology originated in an interdisciplinary effort to explain large-scale intergroup conflict. Drawing upon sociology, social anthropology and social cognition it aimed to provide a comprehensive account of intergroup relations from the individual perspective to the group level. However, in the four decades since its inception the Social Identity approach has become overwhelmingly cognitive and experimental in focus and lost links with other disciplines and methodologies. This module places the Social Identity perspective in its historical context and introduces students to cognate theories and methods elsewhere in social psychology and in other disciplines with a view to enriching their understanding of social psychology. Topics include: evolution of the Social Identity approach; advances in Self Categorisation Theory; discursive approaches to social identities; ethnography and displays of identity; approaches to national identity.

Prerequisites: PS4011

PS6062 - ADVANCED PERSPECTIVES IN SOCIAL IDENTITY RESEARCH
ECTS Credits: 6

Psychology

Rationale and Purpose of the Module: *The aim of this module is develop students understanding group levels of analysis in social psychology and how this has been informed by social identity and self-categorisation theories. This module will make particular attempts to apply these theoretical approaches to contemporary social issues.*

Syllabus: The module will give an overview to traditional social identity theory and later developments in the self-categorisation approach. Particular emphasis will be placed on theoretical advances in the field over the last two decades emphasising the emotional components of identity, the strategic use of identity and the multidimensionality and multiplicity of identities. We will cover applications in the areas of health psychology, organisational psychology, and clinical psychology. The overall emphasis in discussing these topics will be on social change and improving personal well-being.

PT4004 - INTRODUCTION TO QUALITY MANAGEMENT
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *The aim of the module is to give an effective and functional overview of Quality Management. It will: 1. Introduce the student to the basic concepts of Quality Management; 2. Inform the*

student about the role that quality plays in the workplace and impact that quality has on the organisation as a whole; 3. Make the student aware of the how to implement a range of quality strategies and tools.

Syllabus:
1. What is Quality and why is it important;
2. Quality Control / Assurance;
3. Quality Management Systems,
4. Development of Total Quality Management;
5. Continuous Improvement;
6. Documentation, Audits, Standards (ISO9000:2000);
7. Human Resource issues,
8. Quality Tools and techniques: Quality Function Deployment, Failure Mode and Effects Analysis, Statistical Process Control, Six Sigma; Benchmarking

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PT4008 - DELIVER AND RETURN WITHIN SUPPLY CHAINS
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *This module is the third in a stream.*

There is a need to appreciate the external operational landscape and the complexities that arise in the multiplicity of processes encountered in international logistics operations. This takes in the processes of getting materials between suppliers' facilities, intermediate production facilities and onwards to customers. These processes are subject to incessant disturbances, and also demands from myriad bodies governmental and commercial, with considerable uncertainty and risk components, yet customers expect a smooth supply of their regular products on time, to agreed high quality and sustainability standards, and economically, as if nothing else matters. Framing these activities and applying them to configure and operate supply networks and to optimise their contribution to performance trade-offs is the subject of this module. In the context of the Supply-Chain Operations Reference (SCOR) model these concepts lie in the domain of Deliver and Return activities.

Syllabus: Concepts of Logistics and Distribution, Introduction to history and development, Channels of distribution, planning framework for logistics, Logistics network planning and management.
Physical Logistics Planning Warehousing, stocking, order-picking, Transportation, modes of transport, intermodal freight.
International Contracting in Logistics International Contracts, Customs, Regulations, Incoterms, Managing transaction risk, payments, exchange rate exposure.
Regulation and Green Logistics Reverse logistics and product lifecycle management, return of goods at end of life, Logistics and the environment.

PT4012 - DECISION SUPPORT TOOLS
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To prepare students to take an active part in developing IT systems that reflect the needs and priorities from their working perspective.*
To apply some elementary programming and information handling concepts in the context of technology management.

Syllabus: Spreadsheet basics: MS Excel, cell attributes (number, character formats), relative/absolute, formulas functions incl. arithmetic, trig, conditional), row/column calculations, configuring charts (category data line/bar, scatter plots, primary/secondary axes, formatting), row/column calculations, functions (sum, sumproduct, statistical, financial), linking between worksheets, add-ins, pivot tables, macros.

Spreadsheet automation: macros, visual basic for applications MS VBA, conditional looping and branching, vector (list) and matrix (array) lookup.

Applications to observation and data analysis for building an evidence base: experimental observations (1) continuous variables (time), work hard versus work smart experiment, t-test to compare outcomes (manual and excel function). (2) binary attribute variable (present/absent), occurrence sampling, confidence intervals, chart on number line. (3) associative relationship: linear regression curve-fitting, trendline fit to observed data, extension to non-linear regression-based models.

Process visualisation: MS Visio, 5S lean process improvement, flow charts, critical questioning matrix, performance improvement (time). Standard Time, rating observations: correction to standard time using linear regression trendline fit for correction and comparison of observers and methods (trendline function).

Optimisation: MS Solver add-in, most profitable mix of products subject to constraints of capacity, market, and material availability.

Decision philosophy: continuous improvement PDSA, evidence-informed decisions, scale of scientific evidence used in healthcare delivery.

PT4014 - PLANT AUTOMATION
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To introduce the student to industrial sensors and their applications in automation.*
To introduce the student to fundamental control systems within automation.
To outline the various types of hardware elements within a production environment.
To provide the student with the ability to control and monitor data flowing to and from a production line - LABView software.
To introduce the student to programmable logic controller hardware and software.
To introduce the student to material transportation systems used within industrial environments.

Syllabus: Introduction to Automation Basic elements of an automated system, networks, interfacing and levels of automation within the manufacturing plant. Open Vs Closed loop systems Hardware: Sensors types and applications, correct selection, Analogue to Digital Converters, Digital to Analogue Converters, encoders, logic gates, Boolean algebra, signal conditioning. Programmable Logic Control Siemens PC based, Mitsubishi code, ladder logic, timers, counters, industrial applications and uses. LabVIEW Continuous monitoring of data, graphical user interface, control of systems, programming language, industrial applications and uses. Material Transportation Systems Material handling, transport equipment, AGVs, conveyors, design of systems, rating of systems, SMEMA control. Material storage systems, retrieval systems, carousels. Automated Identification: Bar-coding, 1D barcode, 2D barcodes, Radio Frequency ID, smart sensors Â linked to production control and warehousing.

PT4022 - INTRODUCTION TO QUALITY MANAGEMENT
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *The aim of the module is to give an effective and functional overview of Quality Management.*
It will:
1. Introduce you to the role that Quality Management plays in the workplace
2. Make you aware of the how to implement a range of quality strategies and tools
3. Inform you about the impact that quality has on the organisation as a whole

Syllabus: 1. Quality Control / Assurance, Quality Management Systems, documentation, audits, standards (ISO9000:2000)
2. Total Quality Management, human resource issues, sourcing policy
3. Quality Costs
4. Problem solving tools
5. Benchmarking and Quality Function Deployment.

PT4038 - PRODUCTION AND SERVICE SYSTEMS
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *Prior module material may be seen as disparate unconnected knowledge. The aim of this module is to draw together learning from prior modules into a whole-systems perspective, through the application of operations theory to case questions in specific domain areas. This is a capstone module.*

Syllabus: Differentiation between production, manufacturing and service activities. Analysis of case examples linked back to theory of supply chain operations in specific domains, as follows. Systems dynamics phenomena: Forrester-Bullwhip effect and explanation (Beer game or similar e.g. mortgage game), in e.g. a service environment. Supply chain operations reference model SCOR, and SCE implementation framework, in e.g. a global high technology supply chain case context. New service development, including service encounter and service quality, in e.g. a franchise case context. Capacity and demand management, including forecasting and yield/revenue management, in e.g. a health service case context. Waiting time management and capacity planning in variable time and demand environments, e.g. airport or health service design case context.

PT4112 - MANUFACTURING TECHNOLOGY 2
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To introduce the student to a further range of manufacturing and fabrication processes and the relationship between materials and processes.*
To emphasise the importance of accuracy and precision.

Syllabus: Engineering measurement.
Length standards.
Standard measuring temperature.
Process Capability.
Quality and Accuracy.
Machining - further consideration of sawing, turning, milling, drilling.
Fundamental treatment of the shear plane - relation between the rake angle and the shear plane and implications for power requirements.
Workholding - methods of clamping, magnetic workholding, chucks and collets.
Welding techniques including: manual metal arc, oxy-acetylene, MAGS and TAGS welding.
Brazing, soldering and adhesive bonding.
Mechanical joining.
Joint design.
Introduction to engineering materials and their properties.

Prerequisites: PT4111

PY4055 - SOCIOLOGICAL CONCEPTS OF TEACHING AND LEARNING IN PHYSICAL EDUCATION
ECTS Credits: 3

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *This module introduces socialisation into and through physical education and the role of the physical educator. Students are encouraged to reflect on their own socialisation into the role of physical education student and how this impacts on their understanding of physical education. This module also focuses on issues of social development (e.g. gender, social class, disability and racism). These topics are examined in light of how they have affected and are currently affecting the teaching of school physical education.*

Syllabus: Topic include: socialisation, roles, interaction, identity and sociology of the body. Issues of social development are included such as: gender, race & ethnicity, religion, sexuality, family support, socio-economic status, social power. Also included is an introduction to the sociology of sport, with an emphasis on violence in sport and the implications on teaching school physical education.

PY4068 - PHILOSOPHY, ADVOCACY AND PHYSICAL EDUCATION
ECTS Credits: 6

Physical Education & Sport Sciences

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

PY4078 - YOUTH SPORT AND POLICY
ECTS Credits: 3

Physical Education & Sport Sciences

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

PY4086 - PSYCHOLOGY OF MOVEMENT DEVELOPMENT FROM INFANCY TO ADOLESCENCE
ECTS Credits: 3

Physical Education & Sport Sciences

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

PY4096 - PEDAGOGY OF STRIKING, FIELDING, NET GAMES
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *The aim of this course is to help students develop a practical knowledge, inclusive of theoretical aspects of striking, fielding and net games through a pedagogical context. It will introduce the students to the basics of each strand through participation in and later on through the application of pedagogical principles. The will identify and discuss cultural the cultural diversity of each A variety of teaching methods and equipment will be used. Students will learn how to plan lessons in order for them to be safe, challenging and appropriate for all abilities.*

Syllabus: Theory:

Overview of striking, fielding and net games from a variety of perspectives (bio-mechanical, physiological, educational, pedagogical)

Striking, Fielding and Net Games in schools - limitations and possibilities

Striking, Fielding and Net Games lessons - planning for mixed ability

Cultural aspects of Striking, Fielding and Net Games

Applying Striking, Fielding and Net Games to Junior and Senior Cycle Syllabus

Practical:

Fundamentals skills of Striking, Fielding and Net Games

Involvement in and creation of 'Striking, Fielding and Net Games related activities' (indoors & out)

Teaching second level students the fundamentals of Striking, Fielding and Net Games

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PY4102 - INTRODUCTION TO FUNDAMENTAL MOTOR SKILLS
ECTS Credits: 3

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *Fundamental motors skills are foundational to participation in physical activity for a lifetime and engagement with more complex sport forms. The purpose of this module is to equip students with the skills, knowledge, and attitude regarding fundamental motor skills to enhance their participation and that of others.*

Syllabus: Fundamental motor skills are generic motor activities with specific observable patterns. They encompass one stage in motor skills development, occupying a place between rudimentary movement skills and the development of sport specific skills. This module will examine the development of selected fundamental motors skills. The fundamental motors skills to be included are those considered to be critical to the majority of future participation.

Specific content will include:

1. Development of competence
a. Locomotor skills (walk, run skip, gallop, leap, hop, slide)
b. Throwing
c. Catching
d. Striking with the hand
e. Kicking
f. Jumping (horizontal and vertical)
g. Landing
h. Balance (static and dynamic)
i. Rolling

2. Identification of critical elements of selected fundamental motor skills
a. Feedback
b. Analysis

3. Importance of fundamental motor skills
a. Participation
b. Social competence
c. Attitude
d. Self-confidence

4. Overview of issues with teaching
a. Time
b. Feedback
c. Environment

PY4112 - PHYSIOLOGY AND ANATOMY AND PEDAGOGY OF HRA
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *This course is a unique opportunity to become familiar with key concepts in kinesiology, the study of human movement, and physiology, the study of how the body functions. It will also examine the role of physical activity (PA) and related themes (link with sport, health, etc.), while particular emphasis will be placed on the role of Health-Related and Skill-Related Fitness (HRF / SRF) in Physical Education (PE). To enable students to understand the basic anatomy of the musculo-skeletal system and how the system functions in normal motion such as walking gait. To enable students to understand the basic physiology of the systems which support movement in the body.*
Apply the concepts to a physical education/ activity environment.

Syllabus: Anatomical terms and definitions. Identification and functions of the musculo-skeletal system. Structure and type of bones and muscles. Kinesiological analysis of simple joint movements and analysis of posture. Forms of motion. The nervous system and the brain; nerve structure and function, nerve transmission; the action potential, the neuromuscular junction, neurotransmitters; The central nervous system, the peripheral nervous system, autonomic and somatic nervous systems. Structure and function of muscle fibres; organisation into motor units; Motor unit recruitment in muscle contraction. Functional properties of muscle. The circulatory system; structure and function of the heart; blood vessel structure and function; blood pressure and its measurement. The respiratory system; structure and function of the upper respiratory tract, the lungs, pulmonary ventilation, and pulmonary gas exchange. Practical application will include an introduction to the concept and application of fundamental movement skills, in addition to the various components of HRF & SRF; an introduction to, and personal experience of, field tests for both; warm up and cool down procedures; health appraisals and screening; components of physical fitness (PF); principles of training specific to HRF and PF; and field tests for physical fitness. Principles of effective measurement (validity, reliability, safety, objectivity, etc.) will play a key role throughout this course and this will become particularly

evident during physical assessments and testing. Students will also be introduced to the concept of a personal profile and all related issues that combine to create such a synopsis of an individual's physical status (assessment results, change over time, training log, etc.).

RE4006 - SPATIAL ROBOTICS
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module covers a broad range of the necessary enabling and advanced technologies required for the design, integration and operation of Modern Robots including industrial robotic arms and mobile robots.*

Syllabus: Design of Modern Robotic Systems.
Component specification; Robot Arms, sensors and actuators.
Position Control; Rigid Transformations, Kinematics, Inverse Kinematics.
Robot Programming, Sensor System Integration, Robot Grippers.

Positioning and Navigation, Position Estimation, Trajectory Following.

Advanced topics:
Robot arms: Payload analysis, Jacobians, Quaternions, Dynamics.
Robot navigation: Explicit incorporation of uncertainty in Robotic Systems design, parametric approaches stochastic models of uncertainty, Kalman Filter design, specification and implementation.

Prerequisites: ET4224

RE4017 - MACHINE VISION
ECTS Credits: 6

Electronic & Computer Engineering

Rationale and Purpose of the Module: *This module introduces students to one of the key enabling technologies that is necessary for modern robotics design, machine vision. At the end of this module students will be able to use common techniques for the design, specification and practical implementation of modern vision systems*

Syllabus: Image Formation: Pin-hole camera model, Projective geometry, colour space RGB & HSL
Image Distortion and camera calibration
Image Acquisition: Lenses, Camera Systems, Sampling.
Low-Level Image Processing for Machine Vision: Filtering, Edge-Detection, Thinning, Photometric Stereo, Shape-From-Shading, Interest point detection.
Motion: Motion Field and Optical Flow
High-Level Image Processing: Region Segmentation And Labelling, Classification, Object Detection.
Neural Approaches to Image Processing. Structure From Motion. Example Application (Picking Parts From A Bin).
Stereovision. Visual Servoing; Position Based and Image Based Visual Servoing.

RM4002 - RESEARCH METHODS IN LANGUAGES, LITERATURE AND CULTURAL STUDIES 2
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *This module introduces students to the academic study of languages, literature and cultural studies, with a specific focus on the theoretical approaches used in languages, literature and cultural studies. The module provides training in essential research skills, equipping participants to pursue self-directed study, to individually research a topic, to apply the appropriate tools and methods of research, to source and use primary archival materials, and to present findings appropriately. The aims of the module are: to introduce students to the theoretical approaches used in languages, literature and cultural studies;*
To equip students with the necessary skills to carry out a research project and to present findings appropriately;
To equip students with the research skills for sourcing, storing and presenting research data;
To enhance students awareness of the information technology skills necessary to develop the above research skills.

Syllabus: Students undertaking research in languages, literature and cultural studies will be introduced to the theoretical approaches used by researchers in each of these disciplines and will engage in the evaluation of the critical readings of scholars in their discipline in light of such theoretical frameworks. Incorporating a practice-based element, students will be equipped with the necessary skills to design and carry out a research project in their selected discipline. Through small group discussion- and writing-focused workshops, students will be engaged in activities to develop the appropriate skills to collect, interpret and present research data appropriately, and to share their research findings with peers in verbal, visual and written forms.

Prerequisites: RM4001

SE4016 - ADVANCED SCIENCE PEDAGOGY
ECTS Credits: 6

School of Education

Rationale and Purpose of the Module: *To make the students proficient in planning, teaching post-primary Senior Cycle Science syllabi (Biology, Agricultural Science, Chemistry, Physics), with an emphasis on learning sciences-informed approaches to effective pedagogy in various classroom, field and laboratory settings, attentive to safe working practices and risk assessment in the science classroom. New developments in the senior cycle curriculum will be incorporated and emphasis will be placed on emerging trends in pedagogy.*

Syllabus: Nature of Science (NOS); Review of the post-primary syllabi with a focus on Senior Cycle Science (Biology, Agricultural Science, Chemistry, Physics, as appropriate); structure and rationale for the syllabus. Structures of subject knowledge; investigative and inquiry-based approaches in the classroom/laboratory and workshop; Theory and practice of curriculum and syllabus design and development including 'teachers as designers'; Rationale for inclusion of science subjects on the curriculum; Mixed ability teaching; varied approaches to assessment to include formative, summative and diagnostic strategies; fostering a community of learning (FCL) and self-directed learning in science programmes; classroom/workshop/laboratory organisation;

international achievement testing and scientific literacy (i.e. TIMMS-R and PISA); Literacy and numeracy in science teaching; Cross-curricular integration.

Prerequisites: EN4015, EN4025

SE4034 - INTRODUCTION TO SCIENCE PEDAGOGY
ECTS Credits: 6

School of Education

Rationale and Purpose of the Module: *To make the students proficient in planning, teaching post-primary Science, with an emphasis on learning sciences-informed approaches to effective pedagogy in various classroom, field and laboratory settings, attentive to safe working practices and risk assessment in the science classroom. New developments in the Junior Science curriculum will be incorporated and emphasis will be placed on emerging trends in pedagogy.*

Syllabus: Application of learning theories (particularly cognitive and socio-cultural perspectives) to the teaching of science with a focus on inquiry-based learning, addressing misconceptions, argumentation, simulation, technology-enhanced learning in the sciences; Nature of teacher knowledge including content knowledge (CK), pedagogical content knowledge (PCK) and general pedagogical knowledge (GPK) and Technological Pedagogical Content Knowledge (TPCK); Junior and Senior cycle Science syllabi including rationale, structure, content and assessment and cross-curricular aspects. Science in Transition Year; Transition from Primary to post-primary level; Organisation of pair, group work and co-operative learning; Project work; Data loggers, their use and integration into the teaching of science. Preparation and evaluation of schemes of work and lesson plans. Literacy and numeracy in science teaching; Teaching resources to including the range of teaching aids, textbooks and online science learning resources.

The management of active learning situations in the laboratory and the field; design and execution a wide range of laboratory and field-based investigations and experimental work reflective of the objectives of the post-primary syllabi; evaluation of their effectiveness as an aid to teaching and learning. Preparation of laboratory chemicals and reagents; using the natural environment as a teaching resource. Laboratory safety considerations; safety, efficiency and expertise in a range of common junior cycle laboratory procedures; legal responsibilities, accident response and reporting.

Prerequisites: EN4041, EN4022, EN4033, BY4001, BY4002, PH4131, CH4252

SN4202 - SOCIAL SCIENCES 2: SOCIOLOGY OF HEALTH AND ILLNESS
ECTS Credits: 6

Nursing & Midwifery

Rationale and Purpose of the Module: *This module introduces students to basic sociological concepts and models of understanding in relation to health and illness. Students will be expected to develop an understanding of the social factors that influence health status, as well as an understanding of how sociology may be relevant to understanding of the social contexts of healthcare policy and health work.*

Syllabus: Sociological models/theories of health and illness; social factors (especially gender, ethnicity and class) effecting health chances; socio-cultural health beliefs and research on chronic illness; illness-related stigma; theories of professionalization; gender and power relations; 'sick role' theory. Social context of health care provision: healthcare policy (historical and contemporary context); equity and healthcare structures; professionalization of nursing and midwifery; social power of medicine; healthcare division of labour; changing relationship between nurses and doctors. Social context of health care for clients: access to services professional-patient relationships. Contemporary politics of health care: crisis in welfare; crisis in health care; social implications of health care policy; changing context of health work.

SO4002 - GENDER: SOCIOLOGICAL PERSPECTIVES
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *The aim of this module is to introduce the students to sociological approaches to gender including the main theoretical frameworks in the study of gender and society.*

Syllabus: This module equips students with a critical understanding of key concepts in gender studies and feminist thought and how these are informed by, and inform, sociological enquiry. It offers in introduction to the main sociological perspectives on gender; key debates in feminist theory; debates in the study of masculinity; and perspectives on substantive topics such as work and care in the context of these frameworks. The module also examines the operation of gender divisions across national and transnational social contexts and their articulation with other major social divisions such as class, sexuality, ethnicity and race.

SO4006 - THE SOCIOLOGY OF CRIME DEVIANCE AND SOCIAL CONTROL
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *The purpose of this module is to explore the manner in which society seeks to control particular ways of behaving, being and thinking. The broad framework of both informal and formal sanctions will be adopted, but the module will focus in particular on the latter. A critical approach to the ideas which underpin the criminal justice system, its remit and functioning, will be encouraged. Questioning will be facilitated through introducing students to sociological theories of crime and deviance, through their application to contemporary case studies and through comparison to other cultural and historical contexts. Particular attention will be given to inequitable experiences of criminal justice including on the basis of social class, gender, ethnicity and racialized identities, sexuality and legal status.*

Syllabus: The social construction of deviance and crime; Theories of deviance; Informal social control; Formal social control; The law and social change; Social hierarchies of victims and offenders; Hate crime; Social stratification and the Criminal Justice System - Policing, Sentencing, Incarceration, White collar crime; Sociological perspectives on restorative justice; Victimisation as social control.

SO4008 - SOCIOLOGY OF MEDIA AUDIENCES
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *The purpose of this module is to introduce students to the emerging area of media audiences. It is built around a number of key issues and concerns that exist around studying media audiences and will address the significant theories and debates on media audiences. Emphasis will also be placed on the development of practical audience research skills which students will be asked to demonstrate and apply to the tasks outlined in their course assignments.*

Syllabus: Working from a sociological perspective, this module will document the changing theoretical and methodological paradigms that the study of media audiences has gone through and the impact that these frameworks have had on the nature of research produced and knowledge acquired about the composition and abilities of media audiences in an increasingly media saturated society. The impact of such processes as globalisation, politics and the public sphere, the rise of popular entertainment, the internet and the recent explosion of new media products(e.g. online/offline gaming, Facebook, MySpace, Twitter, and YouTube), and the study of media fans will be discussed. Overall it is hoped that students will become more reflexive about their media usage and develop a new level of understanding about the role that media consumption has on their daily lives.

SO4032 - INTRODUCTION TO SOCIOLOGY 2
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *This module aims to better acquaint students with the discipline and field of sociology, including the work of contemporary sociologists, and to provide them with strong foundation of knowledge in preparation for further sociology modules.*
In addition to enhancing students' awareness and understanding of key sociological theories, concepts and issues, this module is oriented to developing students' ability to use sociology as an analytical tool. Finally, this module also seeks to promote valuable skills in critical thinking, writing, referencing, and research.

Syllabus: An introduction to deviance, crime and control.
Crime Statistics
Sociological approaches to explaining crime
Sanctions
Prison
Concepts of race and ethnicity
Manifestations of diversity
Representations of race and ethnicity in the media.
Racism and public attitudes towards cultural diversity, minorities and immigrants
An introduction to the sociology of religion
Secularisation
Civil Religion and Invisible religion
Social class
The continuing relevance of class
Class, consumption and identity
Class, cultural capital and consumption

SO4036 - CONTEMPORARY SOCIOLOGICAL THEORY
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *a) Introduce students to a selection of modern and contemporary theories following on the classical tradition.*
b) Develop students understanding of the discipline of sociology in the contemporary context, taking account of changing intellectual and social contexts.
c) Demonstrate how these theories have been influenced by classical social theories in terms of how they
- challenge key classical presuppositions about the nature and scope of sociology in understanding the social world;
- their level of indebtedness to or departure from classical theoretical antecedents.
d) Enable students to differentiate between different theoretical approaches in relation to key sociological concepts such as structure and agency, rationality and reflexivity, objectivism and subjectivism, micro-analysis and macro-analysis, realism and constructivism, modernity and postmodernity.

Syllabus: This module aims to broaden and deepen students' engagement with and understanding of the development of sociology as a discipline following on from their introduction to the sociological classics. It introduces students to a selection of modern and contemporary theories as a way of understanding how sociological theory has developed to reflect changing social and intellectual contexts. The course will identify the extent to which the selected theories build on key classical presuppositions or offer more radical departures in terms of the key analytical debates within sociology. As a way of elucidating these issues, substantive topics will be discussed in relation to the different theoretical perspectives. The range of theoretical perspectives will encompass the following: social constructionism (Berger and Luckmann); the sociology of the everyday (e.g. Goffman, Blumer); critical theory (e.g. Foucault, Habermas, Feminist Theory and theories of late/post-modernity; theories of rationality (Rational Choice/Rational Action theory); and the theory of social practice (Bourdieu).

SO4042 - VIOLENCE IN SOCIETY
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *The purpose of this module is to provide students with the conceptual tools to develop a critical approach to understanding violence in society. The module surveys theoretical approaches to understanding the social, cultural and political dynamics of institutional and individual violence. It introduces students to the variety of ways in which violence may be conceptualised, including as physical force, as coercive control and as symbolic, and asks students to consider the relative merits and limitations of such definitions. The module invites students to consider the place of state coercion in modern governance. Equally, students are invited to consider modes of political protest in the contemporary period and the relationship between violence and popular legitimacy. The module gives attention to the relationship between institutional and interpersonal violence and societal inequality. Finally, students are invited to critically consider arguments regarding the association of modernity with a decline in violence in society.*
This is to be added to the new BA LM002.

Syllabus: Defining violence; exploring concepts relating to physical force, coercive control and symbolic violence; coercive state power and governance in the 21st century; protest and resistance - methods and responses; violent crime and social control; normalisation and oppression; interpersonal violence and social inequality; state responses to interpersonal violence; retributive justice; theorising the link between violence, pacification and modernity.

SO4046 - QUANTITATIVE METHODS FOR SOCIOLOGICAL RESEARCH
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *This module considers quantitative research in relation to sociology. This module aims to develop students' knowledge gained in SO4053 to increase and deepen their understanding of and facility with quantitative research methods; particularly to develop their facility in the analysis of quantitative data. The primary objective of the course is to ensure that students are able to understand and use basic quantitative methods. The course begins by reviewing the role of quantitative methods in sociology, with consideration of the theoretical implications of the method and of the sorts of research it permits. It then moves on to a practical core, introducing basic techniques for data collection, processing, presentation and statistical analysis. The lectures run in parallel with lab sessions, in which students use SPSS and other relevant software.*

Syllabus: This course introduces students to the basic statistical analysis of social data, including simple descriptive statistics and presentations, samples, surveys and elementary probability theory, inferential statistics, bivariate measures of association and multivariate techniques including an introduction to linear regression and correlation. The class will provide the practical skills to analyse and draw conclusions from quantitative social science data. Emphasis will be placed on understanding, computing and interpreting basic statistics; interpreting and evaluating survey research findings; and analysing quantitative data with statistical software programmes such as SPSS.

SO4078 - INEQUALITY AND SOCIAL EXCLUSION
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *The aim of the module was to introduce the students to the dynamics and processes implicit to inequality and social exclusion. Further, to make them aware of the complexity of the conceptualisation and operationalisation of equality and social exclusion. At the end of the module students will be able to apply their understanding of both concepts to key substantive areas in Irish society.*

Syllabus: The key focus and aim of the module is to provide students with a conceptual and operational understanding of the dynamics of inequality and social exclusion. Students will be familiarised with debates, definitions and theoretical frameworks pertaining to both inequality and social exclusion. Specifically the module will focus on the Irish context as it seeks to examine the structural, cultural and ideological dynamics underpinning inequality and social exclusion and their implications for individuals and groups. It will introduce students to the central approaches to measuring inequality and social exclusion. Key will be a focus on the relationship between poverty, inequality and social exclusion. A central theme across the substantive areas covered will be the exploration of the continued significance of class, gender, sexuality, ethnicity, disability, and racial divisions as bases for both social exclusion and inequality. Additionally the module will examine the impact of media texts with particular reference to media discourses about those who are excluded. Finally, the module will refer to institutions and agencies engaging with the above themes.

SO4088 - SOCIOLOGY OF GLOBALISATION
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *a. to provide an opportunity for the student to examine of key theoretical perspectives and central debates relevant to the study of globalisation*
b. To offer ways of evaluating the work of major sociological schools/theorists in the study of economic, cultural and political globalisation.
c. To develop the ability to analyse and evaluate various outcomes of globalisation through a critical framework.

Syllabus: The aim of this course is to provide a comprehensive introduction to the various discourses of globalisation. It will explore some of the key meanings, history and differing theoretical perspectives and interpretations of globalisation in contemporary research, and will identify main policy issues related to economic, cultural and political globalisation. The focus will be the development of transnational communities and cultures including emergent new forms of worldwide political protest; the challenge for trade unions; culture and the `global and `local divide; the possibilities for a future global society or culture; the inter-meshing of local-global interests and identities; the inequalities and social exclusion generated by economic globalisation; and the extent to which sociology like other disciplines needs to re-think many of its central concepts, debates and theoretical approaches in the light of globalisation processes. The analysis and discussion will be illustrated with international and Irish case studies.

SO4108 - SOCIOLOGICAL APPROACHES TO GENDER AND MULTICULTURALISM
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *To provide students with a theoretical framework for understanding the social, political and intellectual meanings of gender and multiculturalism in the Global North; to present feminist critiques of different approaches to multiculturalism; to familiarise students with the development of multiculturalism and its gendered effects within particular national and transnational contexts.*

Syllabus: The syllabus will include theories that account for multiculturalism as a top-down response to cultural difference which produces a reification of `culture and gender. It will also examine theories that identify multiculturalism as a new way forward to a `politics of recognition and progressive gender politics. Examples of gendered cultural practices that raise critical questions for the effectiveness of multiculturalism, such as polygamy, forced marriage, female genital mutilation, unequal access to health care, education and rights of ownership will be examined. The course will consider how multiculturalism is reshaping the public spheres and civil societies of the West with particular implications for women and for gender relations. The module will be driven by questions relating to the relationships between gender, cultural diversity and global capitalism; how multicultural approaches to social cohesiveness reconceive belonging in gendered ways; and how gender relations affect and are affected by multicultural strategies for negotiating difference

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SO4118 - SOCIOLOGY OF GENDER AND POPULAR CULTURE
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *a. to provide an opportunity for the student to examine of key theoretical perspectives relevant to the study of gender and popular culture*
b. To offer ways of evaluating the work of major sociological schools/theorists in the study of popular culture and gender studies.
c. To develop the ability to analyse and interpret popular cultural texts through the lens of gender analysis.

Syllabus: This module explores the twin themes of bodies and sexualities in the spaces of contemporary Western culture. Utilising a range of popular cultural forms, sites and events which are most accessible television, cinema, magazines; households, shops and workplaces; and popular understandings of medicine, science and technology. The module involves students in a series of critical engagements. The module addresses a number of issues; why the subjects of sexualities and the body become the focus of so much interest across a broad range of disciplines; How we de-naturalise and problematise normative gender categories by setting gendered identities in cultural contexts; What important contributions have been made to the field by recent work on masculinities; How the practices of everyday life can be interrogated to yield insights about the relationships between the body, gendered identities and prevailing cultural norms.

SO4158 - SOCIOLOGY OF HIGHER EDUCATION
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *To understand and to explore key theoretical perspectives on higher education*
To critically engage with examples of empirical research on higher education nationally and internationally
To encourage and to enable critical and analytical thinking about the nature and purpose of higher education and its relationship with the state, with industry and with civic society
To understand the processes operating within higher educational institutions

Syllabus: This module aims to provide students with an understanding of the sociology of Higher Education internationally and the processes impacting on it, including globalisation, massification; managerialism and masculinisation. It will locate these changes in the context of changing paradigms of Higher Education in Ireland and its nature and purpose. Policies related to Higher Education will be explored in the context of its relationship with the state, the economy and the paradox of gender. The relationship between students' social class position; states encouragement of access policies and its perceived elite/non-elite character. Issues related to managerialism versus collegiality; career paths; organisational culture; leadership styles; the gendering of academic and senior management in Irish Universities and internationally; the factors explaining such variation will be explored. Similarities and differences between academic and senior management in Universities and other types of higher education institutions. The future of Higher Education.

SO4178 - THE SOCIOLOGY OF THE BODY
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *Aims:*
This module introduces students to the sociology of the body/embodiment. Key theoretical work is reviewed, incorporating reference to various perspectives from a range of disciplines and approaches (e.g. biology, anthropology, sociology and feminism). Empirical studies in the social sciences, exploring a range of bodily issues and practices, are also considered.

Objectives:
1) Locate sociological interest in the body/embodiment within its larger social context.
2) Describe and critically assess the main theoretical approaches for studying human embodiment and bodily practices.
3) Ground theoretical discussion on human bodies in empirical work from sociology and the social sciences.

Syllabus: The module begins by introducing students to social theory on the body and highlights the case for embodying social theory. Sociology is the main disciplinary approach taken for exploring bodies as the source, location and medium of society, but we will first underscore the socially constructed character of the body with reference to broader socio-cultural changes and anthropological research. Attention then focuses on some key themes and debates in late modernity, such as medicalisation, risk, identity, the significance of biology, consumption and gender. More specific substantive lectures will explore themes such as: the obesity debate; disordered eating; cosmetic surgery; sport, physical activity and fitness; bodybuilding and drug-taking; tattooing; piercing; working bodies; sexualities; virtual bodies and cultures of technological embodiment (cyborgs); ageing; disability, chronic illness and healthcare; and, the body as a research instrument.

SO4208 - SOCIOLOGY OF LOVE AND ITS DARK SIDE
ECTS Credits: 6

Sociology

Rationale and Purpose of the Module: *This module examines the different aspects of relationships: love, mate selection and dating, non-marital lifestyles, marriage, reproduction and forms of parenting. A key component of the course is the influence of changing work patterns and changing sexual values and behaviour on increasing diversity in family forms.*

The objectives of this module are:
** To introduce students to the sociological perspective as it applies to the understanding of relationships and familial phenomena.*
** To present various sociological theories regarding love, sexual relationships, marriage and family systems.*
** To familiarise students with the results of empirical research of social scientists who study partnership formation and family behaviour.*

Syllabus: The module explores a number of key themes: Trends in family formation and their competing theories; classifications and functions of the family especially in relation to Ireland, past and present; love, sex and courtship, exploring issues of partner choice; marriage and cohabitation, addressing the effects of cohabitation on both nuptiality and fertility; lone-parenting, various paths into and problems faced; separation and divorce, exploring trends across social groups and their correlates; re-marriage and stepfamilies with a particular focus on growing up in a step-family; work and families, analysing power relations within the family in terms of gender roles and housework by discussing a range of contemporary studies of the

domestic division of labour especially the impact of increasing male unemployment, the crisis of masculinity, the new man, dual burden/triple shift and the relationship between home and work; the family, state and social policy: the role of social policy and the declining family.

Prerequisites: SO4073, SO4001

SP4002 - INTRODUCTION TO LATIN AMERICAN CULTURE/S
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *First year students majoring in Spanish need to have a general but solid knowledge of the main socio-political processes in Latin American history and their effects on and interaction with literary and film production, as well as other forms of culture, as background for further modules and as part of their overall achievement within this programme.*

Syllabus: The development of Latin American culture has been marked by its multicultural and multi-ethnic history. The arrival of the Spanish Conquistadors had a massive effect in Latin American cultures and civilizations. From 1492 onwards, the construction of Latin American identities are characterised by the encounter and interaction of indigenous and African cultures and the influence of the Hispanic tradition.
In order to explore the development of Latin American culture, the module will pay special attention to a number of themes, from the Amerindian civilizations to the literary boom of the 1960s, Magical Realism, and the importance of women's artistic production.

SP4132 - SPANISH FOR BEGINNERS 2
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *The beginner's course aims to provide the student with a strong basic knowledge of Spanish and of contemporary Spain and Latin America.*

The course is designed to:
Enable the student to understand and use basic structures of Spanish grammar.
Expose the student to a range of vocabulary and expressions which will allow her/him to present her/himself to, and communicate with native speakers of Spanish.
To foster autonomous language learning skills.
To introduce the student to Spanish and Latin American cultures.
To develop listening and speaking skills in Spanish.
To equip the student with basic writing skills.

Syllabus: Lecture: introduction to contemporary Spanish and Latin American cultures and societies.
These include: transculturation and indigenous cultures in Latin America; contemporary Spanish and Latin American literature, basic concepts of Spanish linguistics.
Tutorials and lab: working with set text-book, back-up audio-visual and online materials, students are introduced to past tenses, pronominal verbs and more complex structures in the Spanish language.

Prerequisites: SP4131

SP4134 - SPANISH FOR LEGAL STUDIES (BEGINNERS)
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *Students within the BA in Law and European Studies who take Spanish as their foreign language benefit from a module that gives them an overview of the Spanish legal system and basic legal terminology. Students will compare the Irish legal system to the Spanish legal system and will acquire basic knowledge of Spanish legal terminology.*

Syllabus: Extracts from newspapers and magazines, dealing with topical issues specifically related to the field of law in the Hispanic world- will be selected for reading comprehension and other related language work, developing a critical view through discussion.
A selection of audio and video material will be used for oral and aural skills facilitating integration of all language skills.
Practice of new grammatical aspects of Spanish will also be included.
A class will be devoted to introducing, practising and improving the use of specific grammatical areas such as the past tenses and the introduction of the subjunctive in Spanish.

Prerequisites: SP4133

SP4142 - SPANISH LANGUAGE AND SOCIETY 2
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module:
The course is designed to:
** Revise and broaden the student's knowledge of the structures of Spanish grammar.*
** Expand the student's range of Spanish vocabulary.*
** Improve pronunciation and patterns of intonation in Spanish.*
** Further develop the student's language skills by exposing them to different situation and registers, both formal and informal.*
** Facilitate the student's understanding of various cultural aspects within the Spanish-speaking world.*
** Foster autonomous language learning.*

Syllabus: The course is designed to:
Revise and broaden the students' knowledge of the structures of Spanish grammar.
Expand the students' range of Spanish vocabulary.
Improve pronunciation and patterns of intonation in Spanish.
Further develop the students' language skills by exposing them to different situation and registers, both formal and informal.
Facilitate the students understanding of various cultural aspects within the Spanish-speaking world.
Foster autonomous language learning.

Prerequisites: SP4141

SP4146 - MODERN AND CONTEMPORARY SPAIN
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *Consolidation of the structures, functions and vocabulary taught in the*

first and second years and expands grammatical competence to include complex use of the subjunctive. Further development of knowledge of contemporary Spain and Latin American cultures and societies, with a particular focus on the interaction between Spain, Europe and the wider world.

Syllabus: Tutorials: Working with set textbook, complementary audio-visual material, as well as advanced literary texts.

Prerequisites: SP4133, SP4143, SP4134, SP4934

SP4148 - MEDIA AND CURRENT ISSUES IN THE SPANISH SPEAKING WORLD
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *By the end of this module students should:*

** have developed further their understanding and command of Spanish grammar, vocabulary and usage.*

** have improved their ability to use Spanish fluently and accurately and to make brief presentations in the language.*

** have the ability to identify some of the characteristics of a variety of styles and genres, particularly in the area of media language.*

** have a greater awareness of issues in translation and an enhanced ability to translate a variety of text types from Spanish to English and vice versa, particularly in the area of media language.*

** understand more about a variety of issues of central importance to Spain and/or Latin America, with particular reference to the media and to other key aspects of language and society.*

** have developed a critical understanding of an extended example of modern Hispanic fiction.*

Syllabus: The programme is centred on a variety of topics of relevance to students of Spain and Latin America. The intention is to provide variety but a theme running through a substantial part of the module is that of the media and communication. Additionally, there will be attention given to questions of democracy, violence and the rule of law, as well as issues of gender in contemporary society, particularly with reference to the media.

Prerequisites: SP4147

SP4232 - SPANISH LANGUAGE, CULTURE AND SOCIETY 2 (BEGINNERS)
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *The beginner's course aims to provide the student with a strong basic knowledge of Spanish and of contemporary Spain and Latin America.*
The course is designed to:
Enable the student to understand and use basic structures of Spanish grammar.
Expose the student to a range of vocabulary and expressions which will allow her/him to present her/himself to, and communicate with native speakers of Spanish.
To foster autonomous language learning skills.
To introduce the student to Spanish and Latin American cultures.
To develop listening and speaking skills in Spanish.
To equip the student with basic writing skills.

Syllabus: Lecture: introduction to contemporary Spanish and Latin American cultures and societies.
These include: transculturation and indigenous cultures in Latin America; contemporary Spanish and Latin American literature, basic concepts of Spanish linguistics.
Tutorials and lab: working with set text-book, back-up audio-visual an online materials, students are introduced to past tenses, pronominal verbs and more complex structures in the Spanish language.

Prerequisites: SP4231

SP4242 - SPANISH LANGUAGE, CULTURE AND SOCIETY 2A
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *The course is designed to:*
** Revise and broaden the student's knowledge of the structures of Spanish grammar.*
** Expand the student's range of Spanish vocabulary.*
** Improve pronunciation and patterns of intonation in Spanish.*
** Further develop the student's language skills by exposing them to different situation and registers, both formal and informal.*
** Facilitate the student's understanding of various cultural aspects within the Spanish-speaking world.*
** Foster autonomous language learning.*

Syllabus: The advanced course consists of four hours of Spanish per week:
* Two language tutorials (grammar, vocabulary, communication skills, writing and reading skills).
* One laboratory/oral class (oral communication skills).
* One General Lecture

Prerequisites: SP4241

SP4246 - SPANISH LANGUAGE, CULTURE AND SOCIETY 4
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *Consolidation of the structures, functions and vocabulary taught in the first and second years and expands grammatical competence to include complex use of the subjunctive. Further development of knowledge of contemporary Spain and Latin American cultures and societies, with a particular focus on the interaction between Spain, Europe and the wider world.*

Syllabus: Tutorials: Working with set textbook, complementary audio-visual material, as well as advanced literary texts.

Prerequisites: SP4243, SP4233

SP4248 - SPANISH LANGUAGE, CULTURE AND SOCIETY 6
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *By the end of this module students should:*

** have developed further their understanding and command of Spanish grammar, vocabulary and usage.*

** have improved their ability to use Spanish fluently and accurately and to make brief presentations in the language.*

** have the ability to identify some of the characteristics of a variety of styles and genres, particularly in the area of media language.*

** have a greater awareness of issues in translation and an enhanced ability to translate a variety of text types from Spanish to English and vice versa, particularly in the area of media language.*

** have a developing awareness of issues in liaison interpreting and an ability to interpret a variety of text types from Spanish to English and vice versa, particularly in the area of media language.*

** understand more about a variety of issues of central importance to Spain and/or Latin America, with particular reference to the media and to other k*

Syllabus: The programme is centred on a variety of topics of relevance to students of Spain and Latin America. The intention is to provide variety but a theme running through a substantial part of the module is that of the media and communication. Additionally, there will be attention given to questions of democracy, violence and the rule of law, as well as issues of gender in contemporary society, particularly with reference to the media.

Prerequisites: SP4247

SP4622 - INDIGENISMO AND NEGRISMO IN LATIN AMERICA LITERATURE
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *Aims & Objectives:*

To analyse Latin American literature from the marginalised perspective of two distinct ethnic groups as a way of examining the authenticity and specificity of Latin American peoples and their literature. To broaden and enrich students' critical thinking by exposing them to issues closely related to the quest for human rights and freedom of marginal groups in Latin America.

Syllabus: Students will analyse poetry, novels and testimonies by/about black and indigenous populations to include some of the following: Alcides Arguedas (Bolivia), Jorge Icaza and Adalberto Ortiz (Ecuador), Miguel Angel Asturias (Guatemala),JosÚ MarÝa Arguedas, Enrique Lopez Albujar and Nicom Údes Santa Cruz (Per·), Lydia Cabrera and Manuel Cofi±o (Cuba) among others.

Prerequisites: SP4003

SP4628 - WOMEN'S NARRATIVES OF RESISTANCE IN THE HISPANIC WORLD
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *Aims & Objectives:*

To develop the students' knowledge of different literary modes in 20th-century Hispanic culture.
To introduce students to political and testimonial women's writing in the Hispanic World.
To develop the students' understanding of different literary and political discourses.
To further develop students' analytical skills, with a special focus on political women's writing.

Syllabus: The module will concentrate on the exploration of women's narratives of resistance to power in different textual modes, from testimony to literature, in order to study the different ways in which women have experienced and represented the oppression/repression of dissidence in colonial, neo-colonial and authoritarian regimes in Latin America and Spain

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SP4914 - SPANISH FOR BUSINESS 4
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *The module aims to prepare students to communicate effectively and confidently when using Spanish in a Spanish or Latin American working environment and to give them an overview of the organisation of public administration, national firms and some relevant economic issues in Spain and other Spanish speaking countries.*

Syllabus: A series of articles from newspapers, magazines, journals, textbooks and the internet dealing with topical issues specifically related to the business in the Hispanic world will be selected for text analysis and as source material for essay writing. A selection of audio and material recording on DVD will be used for oral and aural skills. Course work included preparation of CVs and letters of presentation when looking for a job. Simulation of job interviews with special attention to the use of formal language and negotiation of working conditions.

SP4934 - SPANISH FOR LAW STUDENTS (ADVANCED)
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *Students within the BA in Law and European Studies who take Spanish as their foreign language benefit from a module that gives them an overview of the Spanish legal system and basic legal terminology. This module will help students:*
- To consolidate and further develop productive and receptive language skills at an advanced level.
- To facilitate students' understanding of legal terminology used within the Spanish legal world.
- To develop basic translation skills of legal documentation from Spanish into English: contracts,

wills, powers of attorney, etc.

Students will compare the Irish legal system to the Spanish legal system and will acquire certain knowledge of Spanish legal terminology.

Syllabus:
- A series of articles from newspapers, magazines, journals, textbooks and the Internet dealing with topical issues -specifically related to the field of law in the Hispanic world- will be selected for text analysis and as source material for essay writing.
- A selection of audio and material recorded on DVD will be used for oral and aural skills. A debate class in groups will facilitate integration of all related language skills. A variety of topics relating to issues in legal ethics, i.e. human rights, euthanasia, death penalty and terrorism will be discussed.
- A class will be devoted to practise and improve the students' command of Spanish concentrating on difficult grammatical areas and the pragmatics of the language.
- Basic translation of legal documentation from Spanish into English.

Prerequisites: SP4143

SS4012 - EXERCISE AND HEALTH FITNESS FOR PHYSIOTHERAPISTS
ECTS Credits: 6

Physical Education & Sport Sciences

ACADEMIC CONTENT IS NOT CURRENTLY AVAILABLE FOR THIS MODULE - UPDATES ARE IN PROGRESS

SS4103 - PSYCHOLOGY OF MOVEMENT DEVELOPMENT FROM INFANCY TO ADOLESCENCE
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *To advance the students' knowledge and understanding of psychological development from infancy to adolescence from both motor development and psychosocial perspectives*

Syllabus: MOTOR SKILL DEVELOPMENT
Motor development as a part of human development; motor development as (a) a process and (b) as a field of study. Descriptions of the phases of motor development from infancy through adolescence to adulthood (reflexive, rudimentary, fundamental skills, sport specific skills) noting the changing characteristics. Factors influencing motor development (growth, maturation, genetics (nature), environment (nurture); historical overview of theories to explain motor development with focus on the maturation perspective of 1930s and more recent dynamic systems theory; influences of the individual, the environment and task demands Methods of investigation. Concepts of direction of development, readiness, critical/sensitive periods. Motor development in infancy, childhood and adolescence; early and late developers, implications for teaching and coaching. Importance of a developmental philosophy. Perception and perceptual development with focus on vision. Balance and its development. Evaluation of stimulation and perceptual motor training programmes at various phase of development.

PSYCHO-SOCIAL DEVELOPMENT
This module aims to develop a fundamental knowledge and understanding of how developmental issues from childhood to adolescence can influence participation and performance in sport and physical activity. This module will include content relating to youth sport participation and development including models of development in sport, the influence of significant others, stages of development, motivation and participation in sport, and burnout and dropout in sport. This module will compare and contrast readiness for youth sport competition from the biological, social, cognitive and psychological perspectives. The module content will consider psychological considerations of participation in sport and physical education from childhood to adolescence and will critically examine current practices in this area. This module will also critically consider best practices in this area based on research from youth sport and motor development, specifically addressing issues such as long term participation patterns, competition, and program characteristics.

SS4142 - SCIENTIFIC PERSPECTIVES OF SPORT AND EXERCISE PSYCHOLOGY
ECTS Credits: 3

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *The module aims to introduce key theoretical and applied concepts in sport and exercise psychology. In addition the module will provide a foundation in the methods, issues and application in sport and exercise psychology.*

Syllabus: Psychology as a scientific discipline and mode of enquiry to investigate the mind and behaviour. Major concepts studied in psychology (e.g. personality, motivation, stress, attention, perception, memory, learning, nervous system). Methodologies employed in psychology and the changing scientific paradigms. Evolution of sport and exercise psychology. Psychological skills training, Psychology of physical activity and health. Relevance of psychology to sport coaching and participation in physical activity. Psychology and skill acquisition. Professionalisation of the discipline and applications.

SS4198 - EXERCISE PSYCHOLOGY
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *The aim of this module is to provide students with a critical understanding of theories, concepts and practice in exercise psychology.*

Syllabus: This module will study the brain, cognition, emotion and behaviour in physical activity in both physical activity and exercise setting. The core topics of study will include the key concepts and theories, exercise and mental health, and the psychology of physical activity behaviour. It will also include hot topics under contemporary issues which will comprise half of the module.

SS4204 - SUPPORT SYSTEMS TO MUSCLE CONTRACTION
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *The energy requirements of exercising muscle are carefully regulated and supported by fuel and oxygen delivery and the removal of waste products including heat. The purpose of this course is to provide an understanding of the regulation and adaptation of cardiovascular and pulmonary function in response to exercise. An experimental laboratory component provides an opportunity to challenge theoretical concepts by empirical analysis and to competence in measurement techniques.*

Syllabus: The challenge to cardiovascular and pulmonary function induced by physical activity. Cardiac and vasomotor regulation at rest and during exercise.
Adaptation of the cardiovascular system to acute and chronic exercise.
Pulmonary and ventilatory control at rest and during exercise.
Adaptation of the cardiopulmonary system to chronic exercise (training).
Respiratory buffering. Altitude-induced hypoxia and cardiopulmonary function. Altitude training as an ergogenic aid.
Validity and sensitivity of cardiopulmonary measures of exercise performance.

Prerequisites: SS4202

SS4318 - NOVEL METHODS IN BIOMECHANICS
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *Aims*
** To give students an understanding of new and developing methodologies in the biomechanics of sport and exercise.*

** To give students an understanding of the applications of existing methods using novel and developing techniques of data analysis.*
** To provide students an understanding of the merits of mathematics for biomechanics research.*

Syllabus:
* Methods to examine variability in human movement: single subject analysis, considerations of movement variability.
* Methods to examine coordination and stability in human movement: Applied Dynamics systems theory for analysis of movement, measures of coordination and variability in gait patterns.
* New and developing methods for Data analysis of human movement: applications Power spectrum analysis, Wavelet analysis in biomechanics of Kinematic, Kinetic and EMG Data.

SS4332 - INTRODUCTION TO BIOMECHANICS FOR SPORT AND EXERCISE
ECTS Credits: 3

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *Module created due to restructure of Year 1 of the BSc Sport and Exercise Sciences programme. Originally this module (SS4304) was a week 1-15 6 ECTS module and is now being changed to a week 7-12 3 ECTS module to suit the restructure.*

Syllabus: Introduction to segmental modelling techniques including cadaver dissection data. Centre of mass centre of pressure, centre of gravity and radii of gyration. Fluid mechanics and air flow effects with applications to cycling, skiing, and aquatics. Friction. Angular momentum. Stability & balance. Analysis of specific movements; including Walking and running, diving, throwing and striking skills, jumping and throwing and sprint start.

SS4404 - COACHING AND SCIENCE PERFORMANCE 3
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *To give students a theoretical and practical learning experience in the areas of sport administration and organisation and sport coaching.*

Syllabus: Administration and organisation: Structure and function of Irish NGB's. National coaching development programmes. The module includes an introduction to the management issues related to sports administration and allows students gain practical experiences in the organization of a sports event. Students explore how to operate within an organization, e.g. minutes, meetings and time management, planning, budgeting, promoting, sponsorship, safety and legal aspects, running the event, media, legal and ethical aspects and evaluation.

Coaching: Planning, delivery and evaluation of phases of a single session, and of a number of sessions. Coaching, experience gained by placement of students with mentor coaches or exercise leaders in an ongoing practical setting. Maintenance of a coaching and reflective log.

Exercise Prescription: Specific case studies of asymptomatic participants for health related activity and sports specific training. Health appraisal, knowledge of participants goals, selection of appropriate field tests, assessment and evaluation of field tests, programme design for six weeks, delivery of programme, ongoing monitoring of participant and programme, post programme evaluation, guidelines for future work.

Prerequisites: SS4403

SS4405 - SPORTS INJURIES
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *To develop an understanding of the causes and immediate treatment of sporting injuries, and to take adequate steps to prevent and minimize the incidences and extent of sport injuries.*

Syllabus: Syllabus
* The incidence and causes of sports injuries; risk factors and mechanisms of injury.
* Classification of soft tissue injuries, body response to trauma, phases of tissue healing.
* A review of the most common sports injuries.
* Application of first aid principles to injuries, use of RICES in first handling of injuries, E.A.P., procedures for referral to medical/other agencies,
* Goals of sports rehabilitation, components of rehabilitation programme.
* Prevention and rehabilitation of injuries through the application of stretching and strengthening exercises, sports massage and the aquatic environment.

* Overview of the modalities used in the treatment of sports injuries.
* Rehabilitation programmes for specific injuries, functional progressions, guidelines for return to sport.
* The role of medications in the treatment of injuries.
* The role of the sport scientist in the sports medicine team.
* Research in sports injuries.

SS4418 - CLINICAL APPLICATIONS OF EXERCISE
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *This module is designed to provide students with an appreciation of the techniques and approaches used in designing and applying exercise interventions in specific clinical conditions. The aim is to allow students to apply aspects of physiology and applied exercise science to understanding the treatment / prevention of disease.*

Syllabus: The course begins with a structures review of the evidence for benefits of exercise and health. Practical aspects of exercise prescription, including pre-participant screening, components of exercise prescription, outcome measures and progression.
The course covers the application of exercise in the following conditions: people with: neuromuscular disorders, with a focus on multiple sclerosis. Cardiorespiratory disorders, including COPD and myocardial infarction. Vascular disease, with a focus on peripheral arterial disease. Osteoporosis. Learning disorders, focusing on autistic spectrum disorder. Pregnancy.

Prerequisites: SS4202, SS4203

SS4422 - EXERCISE AND FITNESS
ECTS Credits: 3

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *To provide students with a foundation and understanding of effective prescription of exercise/physical activity for health and sport performance.*

Syllabus: Structure, phases and components of cardio-vascular endurance and resistance (body, machine and weights) training sessions. Safe selection, structuring and teaching of appropriate exercises. Adaptations and progressions. Application of training principles. Safety guidelines. Pedagogical aspects of class management. Basic weight training schedules. Monitoring intensity. Exercise to music.

SS4552 - SPORT AND EXERCISE SCIENCES - IMMERSION
ECTS Credits: 9

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *This module introduces students to the application of a multidisciplinary approach to understanding activity in sport and exercise contexts through the provision of examples of human performance and endeavour. It provides an introduction to sports biomechanics, exercise and health fitness and the application of psychology. It explores a multi-disciplinary approach to thematic issues within the scope of exercise, biomechanics and psychology.*

Syllabus:
Key concepts in sport and exercise psychology and basic concepts in skill acquisition.
Revision of basic mechanical concepts but with special reference to sports examples: forms of motion, linear and angular kinematics and kinetics.
Differentiation of video data by finite differences.
Projectiles: importance of angle, speed and height of release/projection and distance travelled and applications in sport.
Construction of generalised link segment models for digitising video.
Process raw data and perform basic kinematic calculations,
Effective use of movement analysis software
Terms and key concepts in exercise science and physical activity

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SS6032 - ENDURANCE SPORTS
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *Endurance is required in a wide range of sports activities and can be expressed in various forms depending on the duration and intensity demands of the activity. A wide range of factors influence performance in endurance activities including: Physiological, nutritional, biomechanics and psychological factors. This module will provide core knowledge of endurance development and an understanding of how the physiological, nutritional, biomechanical and psychological factors influence this development. The module will be delivered using a combination of lectures, lab sessions as well as case based and problem based learning activities. The emphasis of this module will be on gaining an understanding of the methodologies to develop an endurance based athlete and applying these techniques and methodologies in a practical setting.*

Syllabus: Biomechanical Aspects of Endurance Development. Biomechanical responses to fatiguing exercise: Changes in movement pattern, muscle activation patterns, impact forces in response to fatigue. Measurement of the biomechanical responses to fatigue using force platforms, EMG and Motion Analysis. Nutritional Aspects of Endurance Development principles of nutrient intake for sports performance; macro and micronutrients; body water and fluid composition; nutrient intake and body composition; nutrient interaction with exercise and competition; adaptation and recovery. Physiological Aspects of Endurance Development, muscle adaptation to endurance training; Cardiovascular and respiratory adaptation to endurance training; environmental effects of endurance training and competition. Central and peripheral fatigue in endurance exercise.

SS6042 - STRENGTH SPORTS
ECTS Credits: 6

Physical Education & Sport Sciences

Rationale and Purpose of the Module: *This module aims to provide opportunities to develop knowledge and understanding of the principles and theories of strength and conditioning practice, and their application to a variety of sports and performance-based settings. The module content will be drawn from a broad base of research theory and applied methodologies that currently form the basis of contemporary strength and conditioning practice. Additional content will focus on developing proficiency in the fundamental performance aspects of strength training such as Olympic Weightlifting*

and aspects of complex training. This module will also provide video and notational analysis workshops, as well as coaching feedback methodologies, which will be delivered through lectures, lab sessions and student centred learning. Aspects of nutrition for elite performance in this field will also permeate throughout the module content. Ethical issues as they relate to the field of strength and conditioning training will also be addressed.

Syllabus: Principles and theories of strength/conditioning practice; application of this to a variety of sports and performance-based settings; muscle anatomy, group names and physiology; bone and connective tissue; research theory and applied methodologies in strength and conditioning practice; developing proficiency in the fundamental performance aspects of strength training; fundamental strength/conditioning training; stability and balance methods; complex strength conditioning training; Olympic Weightlifting; programme design and implementation; safety issues in strength/conditioning; testing protocols and administration; provision of video and notational analysis workshops; critical analysis of performance technique through video analysis; coaching feedback methodologies; nutrition for elite performance; current concepts in performance nutrition; nutritional requirements for strength sports.

TE4012 - ENGLISH AS A FOREIGN LANGUAGE 2 (INTERMEDIATE)
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To provide language support to students on the Erasmus exchange programmes to enable them to benefit more fully from their Erasmus experience at a social, cultural and academic level.*
To provide integrated tuition and practice in the four language skills of listening, speaking, reading and writing.

Syllabus: Students work from a set text book, back-up audio visual and on-line material.
Practice is given in the four language skills, language awareness-raising and with special emphasis on pronunciation at this level.
The following grammatical areas are covered: second and third conditionals, passive voice, gerunds and infinitives, reported statements, reported questions and commands, quantifiers, articles
lexis e.g. phrasal verbs, strong adjectives, ed/ing adjectives, some uses of get, noun formation, compound nouns, frequent collocations, common expressions, conversational responses and idioms, discourse markers (oral and written) e.g. connectives, sequencing, signposting.

TE4022 - ENGLISH AS A FOREIGN LANGUAGE 2 (UPPER INTERMEDIATE)
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To provide language support to students on the Erasmus exchange programmes to enable them to benefit more fully from their Erasmus experience at a social, cultural and academic level*
To provide integrated tuition and practice in the four language skills of listening, speaking, reading and writing.

Syllabus: Students work from a set text book, back-up audio visual and on-line material.
Integrated tuition and practice is given in the four language skills.
The following grammatical areas are covered: adjective order, hypothetical time, countability and plural nouns, quantifiers, gerund or infinitive after verbs, clauses of contrast, clauses of purpose and reason, reporting verbs, use of the passive, as/like
Lexis: wordbuilding, homonyms, frequent collocations, common expressions, conversational responses and idioms, discourse markers (oral and written) e.g. connectives, sequencing, signposting.

TE4032 - ENGLISH AS A FOREIGN LANGUAGE 2 (ADVANCED)
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To provide language support to students on the Erasmus exchange programmes to enable them to benefit more fully from their Erasmus experience at a social, cultural and academic level.*
To provide tuition and practice in the four language skills of listening, speaking, reading and writing.

Syllabus: Students work from a set text book, back-up audio visual and on-line material.
Integrated tuition and practice is given in the four language skills.
The following areas are covered: grammar; future forms, wishes and regrets, defining and non-defining relative clauses, noun clauses, adverb clauses, perfective v progressive aspect, gerunds, infinitives.
Lexis: discourse markers, phrasal verbs, collocations, British v American English

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TE4106 - TEACHING ENGLISH TO SPEAKERS OF OTHER LANGUAGES (TESOL) 1
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *To provide students with an introduction to the Teaching of English to Speakers of Other Languages (TESOL). This is the first of a three-module suite, and starts with an overview of the main approaches and methods in language teaching and learning, the different theories of language and language learning and the concept of learning styles.*
To enable students to comprehend theoretical aspects of the grammatical and phonological aspects of the English language relevant for teaching purposes.
To enable students to develop an understanding of the different levels of language competency of English language learners.

This is the first of a three-module suite, students also complete TEXXXX (TESOL 2) and TEXXXX (TESOL 3). This suite of modules is intended to give students a foundation in Teaching English to Speakers of Other Languages which is validated by TESOL certification from the University of Limerick. TEXXXX (TESOL 1) and TEXXXX (TESOL 3) are offered in the Spring semester; TEXXXX (TESOL 2) is offered in the Autumn semester.

Note: This suite of modules replaces TE4025 (TEFL 1), TE4026 (TEFL 2) and TE4028 (TEFL 3). The roll out of this new stream of TESOL modules will not affect students currently completing the TEFL suite of modules, and they will exit with a TEFL certificate. New entrants in

the academic year 2014/15 will start the new TESOL suite of modules

Syllabus: The module integrates three independent but related components:
1. Methods and approaches: Grammar Translation Method, the Direct method, Situational Language Teaching, Audiolingualism, Total Physical Response, the Silent Way, Suggestopedia, Community Language Learning, The Natural Method, Communicative Language Teaching, Task Based Learning, the Lexical Approach, Eclecticism. The Theory of Multiple Intelligences.
2. Grammatical concepts: Word classes: Lexical words (nouns, verbs, adjectives, adverbs); Function words (determiners, pronouns, prepositions, coordinators); Phrase, clause and sentence structure: The Verb Phrase (time, tense, aspect, mood); The English Tense System.
3. English Phonetics and Phonology: individual vowel and consonant sounds, basic transcription. Suprasegmental aspects of speech: intonation, stress, rhythm. Pronunciation differences between Received Pronunciation and Irish English.

TE4108 - TEACHING ENGLISH TO SPEAKERS OF OTHER LANGUAGES (TESOL) 3
ECTS Credits: 6

School of Modern Languages and Applied Linguistics

Rationale and Purpose of the Module: *This module covers aspects of the theory and practice of language teaching and language systems. This is the last of a three-module suite, preceded by TEXXXX (TESOL 1) and TEXXXX (TESOL 2). This suite of modules is intended to give students a foundation in Teaching English to Speakers of Other Languages which is validated by TESOL certification from the University of Limerick. TEXXXX (TESOL 1) and TEXXXX (TESOL 3) are offered in the Spring semester; TEXXXX (TESOL 2) is offered in the Autumn semester.*

Note: This suite of modules replaces TE4025 (TEFL 1), TE4026 (TEFL 2) and TE4028 (TEFL 3). The roll out of this new stream of TESOL modules will not affect students currently completing the TEFL suite of modules, and they will exit with a TEFL certificate. New entrants in the academic year 2014/15 will start the new TESOL suite of modules.

Syllabus: The module covers two main areas: (a) the theory and practice of language teaching and (b) language systems.

The areas covered in theory and practice include: Questioning and elicitation techniques, instruction techniques, interaction patterns, teaching young learners, teaching grammar (continued from previous modules), error analysis and contrastive analysis, using ICT (Information and Communications Technologies), types of Assessment, English language examinations (e.g. Cambridge examinations, TOEFL), course book evaluation.

The areas covered in language systems include: Conditionality, modality, multi-word verbs, morphology, collocation and the lexical approach, language awareness-raising practice.

Prerequisites: TE4025, TE4026

TW4118 - Content Development and Information Management
ECTS Credits: 6

School of Culture and Communication

Rationale and Purpose of the Module: *To provide students with information on the project management and quality issues in a content development environment, along with practical issues concerning indexing and editing.*
To give students an introduction to theory and practice of instructional design and e-learning.
To give students an opportunity to put their learning into practice through a project which incorporates e-learning and project management.
To introduce students to multimedia tools used in content development.

Syllabus: This module has two strands: documentation management and instructional design.
The documentation management strand covers: managing complex documentation projects, tools for project management, quality, developing a style guide, editing and indexing, the review process.
The instructional design strand covers: learning theories, needs assessment, audience analysis, objective analysis, media specifications, course design, performance assessment, and delivery systems.

TX4407 - CORPORATE TAXATION
ECTS Credits: 6

Accounting & Finance

Rationale and Purpose of the Module: *This module aims to provide a detailed understanding of the principles underpinning the computation of the liabilities of companies to Corporation Tax, VAT and Capital Gains Tax. To compute corporate tax liabilities, including the utilisation of available reliefs such as Research and Development and relief for losses. To understand Close Company legislation and related liabilities. To understand the residency rules for corporates, including relevant international tax planning. To understand the tax implications of business incorporation and related planning.*

Syllabus: This module covers:
The advantages and disadvantages of incorporation of a business; the principles underpinning the taxation of Irish companies, computing tax liabilities on trading income, non-trading income and capital profits. Payment of tax and filing of returns. Tax relief for investment in Research and Development (R&D).
Relief for losses, including terminal loss and Group relief. Close company legislation and the consequences of Close Company status.
An introduction to Capital Gains Tax, both for individuals and companies. Computation of gains and use of losses. An introduction to Value Added Taxation (VAT). Overseas aspects of Company taxation. A review of selected case law and topical issues of relevance to company taxation in Ireland.

Prerequisites: TX4305

WT4014 - INTRODUCTION TO GEOLOGY AND SOIL MECHANICS
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *This module introduces the most common material encountered in the construction industry by exploring soil mechanics beginning with the fundamentals in civil engineering geology. The course is designed to challenge the student to seek the key concepts in geology and soil mechanics*

and apply these concepts in projects and self-directed learning to achieve the following key objectives:

To provide a clear understanding of the role of geology and soil mechanics in achieving a successful construction project.
To form the basis for subsequent modules on Soil Mechanics and Geotechnical Engineering Design.
To generate enthusiasm for the subject through field trips, practical experimentation and case histories.

Syllabus:
PART I: The Earth and its formation; plate tectonics; physical and chemical processes; erosion and deposition; Quaternary geology; Rock types; igneous, sedimentary, metamorphic; geological maps and terminology; role of geology in civil engineering.
PART II: Setting the context using the soil mechanics triangle; soil composition and chemistry clay bonding and double layer; classification and identification; phase relationships; soil compaction and improvement techniques; effective stress concept and flow of water in soils; permeability and flow nets; drained and undrained shear strength; site investigation.

WT4018 - ADVANCED TIMBER CONSTRUCTION
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *The aims of this module are*
** that the student gains an insight into the use of wood in modern building design*
** that the student develops a confidence and ability to defend, develop and promote the use of wood in competition with other building materials and systems*

The objectives of this module are
** to introduce the context of current building practice in the use of wood and wood based components*
** to integrate new ideas and innovations in the use of wood in construction in a global context*
** to equip the student with the terminology and concepts involved in analysis and design of wood based constructions*
** to introduce the concept of end use of construction, particularly for humans using timber based constructions*

Syllabus: Elements of timber frame construction: beam, truss, shear wall, stressed skin panel, ground floor wall, party wall, cladding, insulation, connectors.
Methods of construction: system construction, proprietary products, site assembly
Methods of design: truss, floor, wall, lateral resistance, multi-storey
Methods of analysis: EC5, limit state design, self-weight, wind, snow
Physics of wooden buildings: flow of heat, flow of moisture, flow of sound, flow of fire, flow of light

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WT4028 - WOOD TECHNOLOGY AND DESIGN 3 (ED)
ECTS Credits: 6

School of Education

Rationale and Purpose of the Module: *This module will develop advanced manufacturing processing techniques for wood and wood composite based materials. Student's knowledge and skills will be developed through an introduction to contemporary trends and concepts utilised to add value to wood as a manufacturing material. Through design for context activity the properties, advantages and limitations of wood as a manufacturing material will be explored. Students will explore how modern wood processing and jointing techniques can be utilised to promote the use of wood in competition with other materials. The module will examine how the properties of solid wood and wood-composites influence product/component design. Students will experience the complexities of designing with wood through a series of tests and experiments that will examine the suitability of the material for the end use environment.*

Syllabus: Mechanical Properties of Wood: Natural characteristics, knots, rate of growth, slope of grain, specific gravity, elasticity. Grading: Strength classification, visual grading, general structural and special structural grading parameters. Effects of machining and service environments: Moisture Content, Temperature, Deflection, Fatigue, Fire. Wood technology: Bending and Lamination, Form work, Jig and template design. Radio-frequency bonding, advanced wood turning (face plate turning), CNC manufacture, traditional and contemporary jointing techniques. Framing and assembly exercises. Strategic planning for manufacture and assembly of wooden artefacts/components. Programming and operation of CNC equipment. Data transfer from CAD systems. Design, realisation and testing. Physical and virtual (CAD) modelling of design solutions. Ecological impact of materials and processes. Analysis of the application of these technologies in the second level school setting.

WT4048 - HEALTH AND SAFETY IN TECHNOLOGY EDUCATION
ECTS Credits: 3

School of Education

Rationale and Purpose of the Module: *The purpose of this module is to prepare the student to manage health and safety in the technology classroom in accordance with relevant legislation, standards and guidelines. The teacher has numerous responsibilities under the Safety, Health and Welfare Act 2005. It is essential that the student can recognise these and apply them in the technology classroom at second level. Students should be confident in their ability to devise and implement a safety management system for their classroom in accordance with current guidelines and standards. Students should be able to identify the hazards and evaluate the associated risks that arise in the technology classroom and develop a comprehensive safety statement for this context. The student should have a strong appreciation for the importance of their role in relation to protection of pupils in their care.*

Syllabus: Regulatory framework: safety legislation, regulations and standards that apply to technology education at second level. Human factors and safety behaviour. Safety promotion strategies in the classroom. Safety culture and safety climate. Safety statements for technology learning environments. Risk assessment for teachers and students. Classroom safety auditing. Accident/ near miss/ dangerous incident reporting and investigation. Safe handling and storage of materials and chemicals. Specific hazards: wood dust extraction, noise, electricity etc. Working alone in safety. Teaching strategies to facilitate safe learning. Teaching hazard recognition skills.

WT4102 - WOOD SCIENCE 1
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To introduce students to the microstructure and macrostructure of wood and wood growth.*
To understand the basic failure modes of wood and wood products.

Syllabus: Tree growth, production of woody tissue].
[Silviculture] practice establishment, management, harvesting.
[Macroscopic] nature of wood.
[Microscopic nature of wood], cell wall, hardwood, softwood.
[Chemistry of wood], celluloses, lignin, extractions.
[Factors affecting wood quality]:
[Chemical: degradation
[Biological]: growth, wood variants, reaction, juvenile, bark, foreign organisms, fungi, insects, marine.
[Mechanical]: processing defects

WT4107 - PULP, FIBRE AND BOARD MANUFACTURE 1
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To integrate the combination of wood and its reconstruction into wood products, in terms of process, properties and end uses.*

Syllabus: Concepts in modifying wood: deconstruction, combination, chemical and physical changes.
Commination: fibres, pulping, mechanical, chemical, physical, chips, particles, veneer, sections.

Fibre Products:
Papers manufacture, types, specification, modification, print requirements.
Cardboard, specification, corrugation, packaging.
Hardboard, insulation board.
Medium and high density fibreboard, manufacture, types, properties, end uses.

WT4202 - DESIGN STUDIO
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module:
This active learning module introduces the students to teamwork and personal development skills. The module is non-repeatable and 100% continually assessed, the students are introduced to design concepts and are required to prepare reports, make presentations, undertake surveys, model building and testing exercises. The key objectives of this module are:
** To develop the student's critical thinking skills.*
** To empower the student with the skills necessary to undertake research.*
** To promote the importance of teamwork*
** To develop good 'soft skills.'*

Syllabus: Learning styles & Bloom's taxonomy; basic engineering terminology and SI units; model building and testing; introduction to research methodologies via minor research projects broadly related to engineering and construction; projects involving individual presentations and team debates; Report writing on given engineering scenarios. Industry participation through invited speakers or industrial visits will be accommodated whenever practical.

WT4208 - BUILDING SERVICES 2
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *The aim of this module is to provide a comprehensive introduction to the more complex building services and equipment being adopted in modern non domestic buildings. It is also an aim to introduce the student to key elements of services design for buildings. This module builds on the learning of WT4504*
** Introduction to building services in non-domestic construction including both active and passive services.*
** Understand design, build and operation implications of these services.*
** Have good knowledge of water installations to multi storey buildings*
** Understand the essentials of electrical and gas distribution and supply*
** Identify the principle firefighting equipment needs for modern buildings*
** Understand the principles of providing appropriate lighting within buildings*

Syllabus:
* Heating and air-conditioning services: energy performance measurements using, SBEM and NEAP; heating and air conditioning, temperature drop through structures; gas supply and distribution, gas controls, ventilation ducts and fans, solar heating, heat pumps and bio-mass.
* Hot and cold water services: Pipe sizing for hot and cold water multi-storey buildings, force and pressure, hydraulics.
*Drainage services: sustainable urban drainage, retention tanks, oil separation, green roof, grey water recycling
*Electrical services: electrical terms and installations, supply and distribution of electricity, supply controls, protection, conductor and cable rating, methods of wiring and distribution systems, single phase power circuits; electrical installations in large buildings; site electricity, electric space heating
* Access services: lifts, escalators and service ducts, automatic control.
* Lighting services: integration with electric light, natural lighting, artificial lighting, design of lighting, lighting controls
* Safety services: classification of fire risks, safety devices, heating and flues; sprinklers, risers and hose reel installations, dry and wet risers; portable and fixed extinguishers, automatic fire detectors, alarms and dampers, pressurisation of escape routes, automatic fire ventilation fire detection, security systems.
* Electrical services: supply to non-domestic buildings micro generation (solar and wind)
* Data services; audio visual, broadband and telephony.

Prerequisites: WT4504

WT4502 - CONSTRUCTION TECHNOLOGY
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module:
This module builds on the material covered in WT4401 through applied practical coursework based on residential construction practice. The course emphasises best industry practice and is framed around the relevant legislative instruments governing residential construction in Ireland.

Syllabus:
* Site selection and analysis for residential construction - addressing engineering, planning and Irish architectural heritage and conservation.
* Soil identification, properties and behaviour - factors affecting drainage & foundation choice.
* Concrete technology and mix design.
* Environmental considerations in residential construction - sustainable technologies for waste disposal and energy.
* Introduction to housing estate development and planning applications.
* Interpretation of construction drawings.
* Trouble shooting residential building problems via case histories.

Prerequisites: WT4401

WT4504 - BUILDING SERVICES 1
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module:
The aim of this module is to provide a comprehensive introduction to building services and associated technology:
Key objectives
** Introduction to active and passive building services in domestic construction.*
** Understand design, build and operation implications of these services.*

Syllabus:
* Heating ventilation and air conditioning services; district heating, heat loss calculations, thermal insulation, ventilation, air filters, heat recovery systems; principles of air conditioning, dual duct and convector air conditioning systems, DEAP.
* Hot and cold water supply services; low, medium and high pressure hot water heating.
* Drainage services; below ground drainage systems, pipe materials and pipe laying, soakaways, drain testing and inspection.
* Waste services; soil and waste systems, modified single stack and ventilated stack systems; resealing and anti-siphon traps, air pressure in discharge stacks; irrigation systems, sewage pumping, refuse disposal systems; sewage disposal, settlement tanks, bio-filters.

Prerequisites: PH4032

WT4604 - LAND SURVEYING
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module:
The aim of this module is to provide an understanding of principles of land surveying and the use of specialist surveying equipment. The principles and techniques of surveying are applied to a wide variety of realistic construction project applications
The specific objectives are to provide:
* *An understanding of surveying fundamental principles and use of surveying instruments*
* *Knowledge of the application of these to conduct land and site surveys*
* *Practical experience in using these modern instruments in the solving of a variety of site problem situations.*

Syllabus: Surveying fundamentals, tape & offset surveying; levelling, the theodolite and its use, tension determination, steel taping differential levelling, traversing, angle measurement electromagnetic distance measurement, satellite positioning systems, survey methods, analysis & adjustment of measurements, areas & volumes, setting out, curve ranging, topographic surveying, construction control surveys, geographic information systems, global positioning systems, construction applications, field coding, automatic target recognition, typical field operations. Practical case studies and fieldwork.

WT4608 - PROJECT 2 WOOD SCIENCE
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *To provide the student with an opportunity to express a professional expertise in executing an independent body of work.*

Syllabus: Evaluation of initial solution, development and modification of same. Preparation of final brief which includes analysis, developments, solutions and conclusions.

Prerequisites: WT4607

WT4704 - BUILDING MEASUREMENT
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *The overall aim of this module is to illustrate measurement techniques and procedures for buildings and associated works.*

Syllabus: Setting down dimensions, alternative systems, applied mensuration, general rules for taking-off; measuring substructures, excavations, formwork areas, various foundation types and measurement; walls, floors, concrete, blockwork, masonry, partitions and suspended ceilings; internal surface finishes, dry linings roofs, structural elements, roof finishes and coverings, waterproofing; internal finishes, windows, doors, staircases, fixtures and fittings; reinforced concrete structures, columns, beams, slabs, formwork, concrete finishes, reinforcement, precast elements; structural steelwork; structural timber, standard joinery components; plumbing, fittings, mechanical and electrical installations; drainage, underground and above ground, external works, roads, pavings, earthworks and groundworks, landscaping; demolitions, alterations and renovations.

WT4804 - ESTIMATING AND COSTING
ECTS Credits: 6

School of Engineering

Rationale and Purpose of the Module: *The overall aim of this module is to introduce some standard estimating and costing techniques that apply to building construction works.*
The key objectives are to
** Describe the role of the estimator in the tendering process*
** Illustrate standard estimating techniques and the process for preparing a cost estimate for building works*
** Introduce value for money concepts and techniques to identify alternative solutions to deliver value for money.*

Syllabus: Organisation of the estimating function, estimating methods, project appreciation, enquiries to suppliers and tender planning; resource costs, unit rate pricing, sub-contractors, fluctuations; provisional sums, preliminaries, cashflow forecasts, completing the estimate, tender submission and follow up; impacts of new developments on estimating, new procurement methods, target cost estimating, gain share, negotiations and development of incentives; value engineering and developing value for money solutions.

WT4902 - MODEL MAKING
ECTS Credits: 6

School of Design

Rationale and Purpose of the Module: *To introduce the student to skill and techniques that will enable them to make realistic models that will enhance their design presentation. To explore the use of a variety of materials and methods with particular emphasis on the safe use of wood and metal working machinery and both power operated and manual hand tools.*

Syllabus: An introduction to Health and Safety in the workshop. An introduction to machines, equipment and tools for cutting, shaping, joining and finishing.
Model making techniques using wood, plastics, metals and plaster of Paris, involving mould making for vacuum forming and plaster casting.
Analysis of shapes and graphic presentation relative to material and process selection for designing the model.

Prerequisites: PN4111
