

Environmental Sustainability

Distance Learning

**Masters in Science
Graduate Diploma & Certificate**

UCD ONLINE



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***Prospectus Cover Photograph:**

The prospectus cover photo, which shows a wind turbine and domestic turf cutting in a peatland area, captures one of the many debates relating to sustainable use or otherwise of natural resources.

1.0 Foreword

Welcome to the Environmental Sustainability Distance Learning Programme. This course has been developed with you, the student, in mind. At University College Dublin, we understand and indeed embrace students with a variety of training needs, educational, cultural and employment backgrounds, recognising this diversity as an asset to the development of good cross-disciplinary communications which can facilitate wholesome, well-rounded discussions and discovery. The Environmental Sustainability Distance Learning Course has been designed specifically to provide you with the widest variety of interdisciplinary modules together with a number of qualification points (Graduate Certificate, Diploma or a Masters in Science) so that you can choose the route that best suits your specific training needs and career goals.

This course not only offers you the flexibility to negotiate your own learning but also gives you the opportunity to study at your own pace and in your own time, online. This is a customised educational experience, tailored to your individual requirements.

We encourage you to browse our prospectus, and hope that you will find this a suitably challenging, stimulating and rewarding educational offering.

If you would like more information please contact:

Dr. Mary Kelly-Quinn: sustainabilityonline@ucd.ie

Course Co-ordinator

Telephone: Dr. Mary Kelly-Quinn / Patricia Cunningham +353 (0) 1 716 2020

2.0 Course Overview

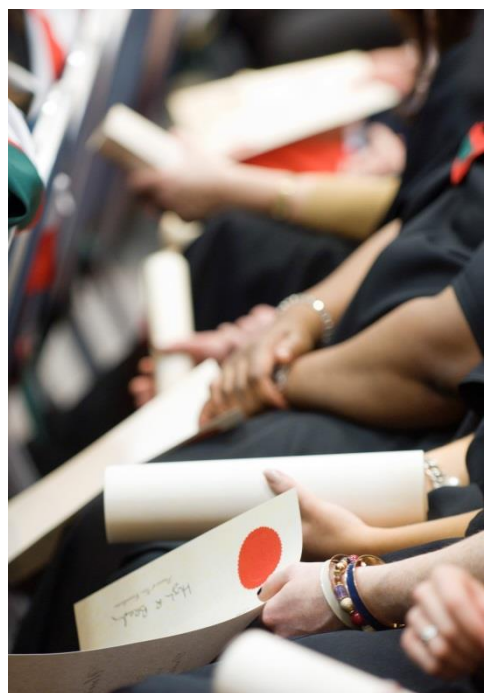
The modules on offer can be taken so as to build towards a Masters in Science, Graduate Diploma or Graduate Certificate in Environmental Sustainability (Negotiated, Distance Learning). Alternatively you can also choose to take some of our [modules](#) as part of the [UCD Module to Masters](#) initiative.

This is a highly flexible offering. For example, if you choose to register as a Graduate Certificate student, or as part of *Module to Masters*, you can later decide to continue building towards a Graduate Diploma or MSc, by transferring [credits](#) previously earned in the course. Similarly, this offering, allows for those registered to an MSc, to choose an alternative exit qualification point, subject to discussion with the academic team.

The acquisition of credits for any of the awards offered here is subject to time restraints. All credits successfully achieved, must have been gained within a maximum of four years, in order to count towards your award. The duration of the course is typically, but not exclusively, one year for a Graduate Certificate or Diploma qualification, two years for an MSc Degree and a maximum four years for all. Your timeline begins on the commencement of your first semester with the Environmental Sustainability course.

*Education is the most powerful
weapon which you can use to change
the world*

Nelson Mandela



2.1 Awards & Qualification Points

The following qualification points and awards are available:

Awards	NFQ Level	ECTS Credits	Equivalent to:
Graduate Certificate	9	30 Credits	6 x 5-credit modules
Graduate Diploma	9	60 Credits	12 x 5-credit modules
Masters in Science Degree	9	90 Credits	a. 13 X 5-credit modules & a 25-credit Research Component (Practicum; field/lab) b. 15 X 5-credit modules & a 15-credit Research Component (Practicum; desk-based)

Note: There are some 10 credit modules and of course you can choose to take a smaller selection of our modules as part of the *Module to Masters* initiative. All MSc students must take a research component. Graduate Certificate and Diploma students are not permitted to take the research component.

2.1.1 What is Module to Masters?

Successful completion of credits enables the award of a Graduate Certificate (30 credits), Graduate Diploma (60 credits) or a Masters degree (90 credits). However, in keeping with the flexibility of this course, you also have an alternative option. Perhaps you don't need a Certificate, Diploma or Masters - but you would like to take a couple of modules to gain a better understanding of a subject or particular skill? Through the *Module to Masters* initiative, you can take up to 25 credits from within the Environmental Sustainability course, and on successful completion you can decide whether you wish to take further modules and work towards completing the Graduate Certificate, Diploma or Masters. Should you decide to conclude your studies with fewer than 30 credits, we will issue an academic transcript listing the modules and credits you have completed and the results you achieved.

For more information see the [Module to Masters](#) Webpage, or contact the course coordinator (see section 4.3 Contact Information for details).

2.1.2 What are NFQ levels?

The [National Framework of Qualifications \(NFQ\)](#) has been established to create a coherent structure for the development and recognition of all awards within the Irish education system.

“The National Framework of Qualifications (NFQ) has been in place since 2003. The NFQ is designed for the development, recognition and award of qualifications based on standards of knowledge, skill and competence acquired by learners. The Framework consists of 10 levels, from basic learning to Doctoral awards. The NFQ can help you as the learner to plan your education, training and career progression and help you make informed choices about the qualifications you choose and to recognise the progression routes that may be open to you upon successful completion”.

Please visit the [NFQ website](#) or UCD’s [Academic Secretariat](#) for more information.

2.1.3 What is the ECTS Credit system?

Credit is essentially a way of measuring the amount of learning undertaken by a student. This normally includes all the time you devote to your studies: teaching time through lectures and tutorials, work for assignments and private study time. UCD uses the European Credit Transfer System (ECTS), in which one ECTS credit corresponds to 20 to 25 hours of student learning time. Most modules will have a credit value of five credits, thereby giving 100 to 125 hours of student time per module.

2.2 Start Date & Semesters

The Masters in Science, Graduate Diploma and Certificate in Environmental Sustainability (Negotiated, Distance Learning) commences in September, coinciding with the beginning of Semester One and indeed the academic year.

Semester 1	Typically September to December
Semester 2	January to mid-May
Semester 3	Mid-May to August

2.3 UCD Academic Expertise

This Masters degree, Graduate Diploma and Certificate course are offered, delivered and supported by a highly inter-disciplinary team of world-class academics from nine UCD Schools: [Biology and Environmental Science](#), [Mechanical and Materials Engineering](#), [Biosystems and Food Engineering](#), [Archaeology](#), [Civil Engineering](#), [Information and Communication Studies](#), [Earth Sciences](#), [Agriculture and Food Science](#) and [School of Public Health, Physiotherapy and Sports Science](#).

2.4 Fees

The course fee is calculated on a per credit basis. Each credit on the Environmental Sustainability Distance Learning course costs €63.80. A typical module size is 5 credits, though some modules have a greater number of credits. It will cost you €5742 for 90 credits (i.e. €2871 per year for the Master's course if taken over 2 years). Those opting to study for a Certificate or Diploma will pay €1914 and €3828 respectively. Students may pay for individual modules e.g. €319 for a 5-credit module, under the *Module to Masters* initiative. For more information on how to pay and when fees are due, please visit [UCD's Fees & Grants page](#).

UCD Online fees are inclusive of registration costs meaning that UCD Online students have full access to campus facilities. For more information on the facilities available to UCD Online and UCD Campus Students, [click here](#).

This course draws on the significant teaching and research experience of world-class educators from eight schools in UCD to provide the widest coverage of environmental topics



2.5 Why is this course for me?

This **online** Masters in Science is a flexible, innovative, negotiated learning course that takes on board the training needs of a broad spectrum of end-users by giving you the opportunity to **select modules that best align with your training needs** and career objectives. For some this will involve upskilling but equally the course will facilitate career change. It not only offers flexibility for you to negotiate your own learning but also gives you the opportunity to study at **your own pace** and in **your own time**, online. Successful completion enables the award of a **Graduate Certificate** (30 credits), **Graduate Diploma** (60 credits) and a **Masters degree** (90 credits). The Masters degree requires students to complete a research project and of course you can choose to take a smaller selection of our modules as part of the [Module to Masters](#) initiative.

This course draws on the significant teaching and research experience of world-class educators from eight schools in UCD to provide the widest coverage of environmental topics. The course will focus on delivery of the knowledge and skills required to address sustainability challenges across a broad spectrum of activities.

Sustainability is generally defined as efforts to meet our present needs without compromising those of future generations. It therefore encompasses not only use of environmental resources but also social and economic goals and captures the interactions between all three elements. With a growing body of environmental legislation and regulation businesses are challenged to work within a sustainability framework while at the same time maximising employment provision and profitability. Equally those within the regulation or policy environment must have the knowledge base to address the complexities of the 'sustainability' challenge. This degree programme has been designed taking on board the training and information needs of all sectors and will be subject to regular review to respond to their constantly evolving needs.

2.6 What will I study?

The MSc, Graduate Diploma and Certificate will provide you with the theoretical background, practical training and ancillary workplace skills needed for a successful career in your chosen field. You will negotiate your learning needs with the assistance of our academic staff. Nine schools contribute to the course capturing the significant strengths of UCD Science and Engineering in renewable energy resources, sustainable energy systems, environmental engineering and resource management, water quality assessment, protection/management and conservation science. The opportunity exists to harness these strengths within a negotiated and distance learning framework, offering you, the student, flexibility to gain a broad understanding of sustainability issues or to specialise more deeply in one of these particular fields of study.

The course aims to develop your understanding of the environmental issues and sustainability goals facing society. You will be challenged to apply your scientific and technical knowledge to develop solutions to local and global problems and needs. Through discussion and research work you will learn to handle complex issues, analyse and interpret scientific data and information, use your judgment and ultimately communicate your findings and ideas. The course will develop your capacity for self-directed learning, within a supportive framework facilitated by online fora, discussion boards and virtual tutorial/classroom sessions.

2.7 How will I study?

Lectures will be delivered through the UCD's online environment using a variety of media, including for example virtual classroom seminars, discussion boards and podcasts. Formative assessments will be used to help you develop and critically assess your own



understanding of the material presented. Many modules will have a high continuous assessment component. For some modules you will be expected to attend an end of semester written examination.

2.8 Learning Outcomes

On completion of the course graduates will be able to:

1. Demonstrate a comprehensive knowledge and understanding of the theoretical background that underpins environmental/energy/sustainability issues.
2. Demonstrate familiarity with the range of data collection and analyses methods necessary to inform decision making in the working environment.
3. Demonstrate familiarity with legislative and regulatory controls within your chosen field of study.
4. Demonstrate the analytical and technical skills required for experimental research and/or the application of scientific information depending on your chosen desk-based or research project.

2.9 Career Opportunities

Successful completion of this course will provide you with the professional competitive advantage to choose from careers in the application of green energy technology, environmental engineering, environmental monitoring and protection, resource and waste management, consultancy, research, heritage, conservation and education either within regulatory bodies or in a wide range of industries, both multinational organisations as well as small and medium size enterprises. The course also opens up opportunities to pursue further studies, including up to PhD level.

2.10 Entry Requirements

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Applicants with pass degrees and with substantial relevant work experience will also be considered.

If English is not your native language, proof of your proficiency in English will be required, unless you have taken your primary degree through English, in an English speaking country. The minimum acceptable score on the TOEFL Internet Based Test is 100, on the IELTS system it is 6.5. Additional information on the UCD's English Language requirements can be found [here](#).

2.11 Training Needs Assessment

At University College Dublin, we understand and indeed embrace students with a variety of training needs, educational, cultural and employment backgrounds, recognising this diversity as an asset to the development of good cross-disciplinary communications which can facilitate wholesome, well-rounded discussions and discovery. The Environmental Sustainability Distance Learning Course has been designed specifically to provide you with the widest variety of interdisciplinary modules together with a number of qualification points (Graduate Certificate, Diploma or a Masters in Science) so that you can choose the route that best suits your individual training needs and career goals.

With so many options, it is essential that we provide you with the best advice and guidance possible, so that you can choose the most relevant modules, specific to your particular requirements and training needs. Your module choices should also stimulate and challenge you, meanwhile addressing any knowledge gaps that you may have.

In order to provide the most suitable, customised advice for each applicant, we need to get to know you a little better. Therefore all students will have a *Training Needs Assessment* before the commencement of their studies. This is an informal assessment carried out by a member of the academic and/or coordinating team for the Environmental Sustainability course, and can be held on campus or remotely e.g. Skype/ telephone call. This evaluation will take account of your education and employment

history, together with your specific career goals and interests. It will aim to identify any knowledge gaps so that we can assist you in choosing the most appropriate suite of modules.

2.12 Modules Available

Students may choose any combination of modules that meet their training needs, however students that wish to build towards a Master's degree must include either a research or desk study practicum. Meanwhile, the research modules (ENVB40330 and ENVB40340, see Table below) are not open to Graduate Certificate or Diploma students. There are 30 modules available across a range of disciplines.

Modules should stimulate and challenge you



Module Code	Title	Credits	Level	Semester	Module Co-ordinator
<i>Energy Systems & Green Technology</i>					
BSEN40480	Sustainable Energy & Environment	10	4	1	Dr Kevin McDonnell
BSEN40210	Green Technology Project	5	4	2	Prof Nicholas Holden
MEEN40900	Energy Systems & Climate Change	5	4	1	Dr William Smith
<i>Communication</i>					
MEEN40820	Technical Communications	5	4	1 or 2	Barry Brophy
IS40030	People Information & Communication	5	4	2	Dr Crystal Fulton
ENVB40380	Managing the Interface between Science & Policy	5	4	2	Dr Tamara Hochstrasser
<i>Resource Characterisation, Assessment & Management</i>					
ENVB40440	Water Quality Assessment, Protection & Management	10	4	2	Dr Mary Kelly-Quinn
CVEN40620	Water Resources Engineering 1	10	4	1	Prof Michael Bruen
CVEN40630	Water Resources Engineering 2	10	4	2	Dr Yaqian Zhao
BSEN30030	Air Pollution	5	3	2	Dr Tom Curran
GEOL40450	Environmental Geoscience	5	4	1 or 2	Dr Laia Comas Bru
AESC40250	Soil Resources	5	4	2	Dr Thomas Cummins
ENVB40360	Peatlands & Global Change	5	4	1	Dr Florence Renou-Wilson
ENVB30130	Ecology & its Application	5	3	1	Dr Tasman Crowe
ENVB30120	Genetics for Environmental Scientists	5	3	2	Dr Joanna Kacprzyk
ENVB40350	Applied Ecotoxicology	5	4	2	Dr Moira McCarthy
ENVB40450	Impact Assessment Procedures	10	4	1 and 2	Dr Florence Renou-Wilson
OSH40160	Environmental Legislation and Regulation	5	4	1	Dr Conor Buggy
ENVB40410	Management of Sustainable Fisheries	5	4	1	Dr Jens Carlsson
ENVB40320	Wildlife Management/Conservation	5	4	2	Dr Favel Naulty

Module Code	Title	Credits	Level	Semester	Module Co-ordinator
Resource Characterisation, Assessment & Management (Continued...)					
ENVB40430	Bioinvasions: Impact to Management	5	4	2	Dr Jan-Robert Baars
ARCH40940	Management Plan	15	4	1	Dr Claire Cave
Heritage					
ARCH40920	Natural Heritage Conservation	10	4	1 or 2	Dr Claire Cave
ARCH40900	Cultural Heritage Conservation	10	4	1 or 2	Dr Claire Cave
ARCH40910	World Heritage Convention	10	4	1	Dr Claire Cave
Data Analysis and Computing					
ENVB40370	Data Analysis & Interpretation	5	4	1	Dr Jon Yearsley
GEOG40850	GIS for Environmental Investigations	5	4	2	Dr Ainhoa González
Research Project					
ENVB40340	Practicum (Research; lab/field)*	25	4	1,2 & 3*	Dr Mary Kelly-Quinn
ENVB40330	Practicum (Desk Study)*	15	4	1,2 & 3*	Dr Mary Kelly-Quinn
ENVB40520	Practicum (Research) Jan*	25	4	1,2 & 3*	Dr Mary Kelly-Quinn
ENVB40470	Practicum (Desk Study) Jan*	15	4	1,2 & 3*	Dr Mary Kelly-Quinn

*Please Note: The Practicum (Research; lab/field) & Practicum (Desk Study) modules are carried out over 1 year. Students have the option to register to these modules in September or January.

3.0 Module Descriptors

3.1 Energy Systems & Green Technology

BSEN40480 **Sustainable Energy & Environment**

What will I study?

This module introduces students to the issues of sustainable energy use and assessment of energy systems in terms of their impacts and sustainability.

The module deals initially with historical and current energy use. The concept and application of energy systems is introduced as well as fossil fuel energy systems. The estimation and evaluation of energy resources will be examined. Sustainable energy will be discussed in the context of energy systems and sustainability metrics; this will include an introduction to systems analysis approaches and measures of sustainability. The module then gives an overview of the principal types of renewable energy, including solar, thermal photovoltaics, bioenergy, hydro, tidal, wind, and wave. In addition the underlying physical and technological principles of renewable energy systems and the future prospects of different energy sources will be examined. Finally the module focuses on an overview of energy efficiency analysis including energy balances, cost-benefit analysis and cost-efficiency analysis of various energy scenarios and renewable energy choices.

How will I study?

The Sustainable Energy and Environment module will include:

- Videos and demonstrations by the lecturers including interactive online learning material
- Interactive learning reinforcement quizzes
- Online assignments

Expected Commitment

Students are expected to spend a total 220 hours on the workload for this module during the semester consisting of:

- Lectures, videos and other online learning materials: 24 hours
- Assessments, project and quizzes: 52 hours
- Student Autonomous Learning: 144 hours

How will I be assessed?

- 3 x Assignments (60%)
- In class, on line quizzes (30%)
- Technical critiques on a discussion forum (10%)

On successful completion of this module I will be able to:

- 1.** Demonstrate knowledge of historical and current energy use as well as fossil fuel energy systems.
- 2.** Discuss the issue of sustainable energy and assess energy systems in terms of their sustainability.
- 3.** Demonstrate knowledge of the fundamentals of renewable energy systems.
- 4.** Discuss the current and future prospects of renewable energy systems including their potential to contribute to a sustainable energy future.

Am I eligible?

Students should have a minimum of 2.2 honours in a science or technology degree qualification. Otherwise, there are no pre-requisites for this module.

BSEN40210 Green Technology Project

What will I study?

This module will introduce and critically assess the concept of “green technology”. During the module you will consider what makes a technology “green”, the importance of the bio-economy and issues of sustainability and social justice. In addition to technical knowledge, the module will address critical assessment of literature, the definition of design criteria and the formation of opinions. During the module you will use the knowledge you acquire, combined with critical thinking to prepare a review of a “green technology” that will address why it is “green”, the evidence to support such claims, its contribution to sustainability and the opinion you will form of the technology over the 12 weeks of the module.

How will I study?

- Introduction of concepts through an online learning environment: interactive learning materials, video, linked documents and public domain information.
- Formative assessments will be used to help you develop and critically assess your own understanding of the concept of green technology.
- A moderated discussion board to allow module participants to propose, discuss and challenge the key concepts important to the module including “greenness”, sustainability, bio-economy, social justice, design, critical thinking and the formation of opinions.
- An individual project detailing the case for a given green technology. Each participant will select a technology to work with during the module.

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected to spend a total 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 24 hours

- Formative assessments: 12 hours
- Moderated discussion: 12 hours
- Assessments for grade, including a written project: 24 hours
- Student Autonomous Learning: 48 hours

How will I be assessed?

- Weekly reflectively diary (20%)
- Quick online tests (X2) addressing major concepts (in-semester) (10%)
- Discussion contributions (in-semester) (10%)
- Project report (in-semester) (60%)

On successful completion of this module I will be able to:

1. Define and analyse a green technology in terms of its design, contribution to sustainability and role in the bio-economy.
2. Synthesize evidence from academic and non-academic sources to evaluate a green technology.
3. Formulate, explain and defend an opinion on the bio-economy, sustainability and a green technology.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Some level of technical knowledge related to environmental science, environmental management, environmental technology or environmental engineering is desirable.

MEEN40900 Energy Systems & Climate Change

What will I study?

This module introduces students to a practical and ethical dilemma:

How can current and future energy demands be met, in a manner that is both equitable and sustainable?

The question arises because unprecedented growth in global population and economic development, continue to drive exponential growth in energy demand. However, the fossil-fuel resource is finite, and its use impacts negatively on the local and global environment. Addressing this issue requires a broad overview of the many challenges and opportunities ahead.

Topics include:

- Introduction to energy systems
- Energy and economic growth
- Energy demand trends and projections
- The greenhouse effect
- Combustion and greenhouse gases
- Alternatives to fossil fuels – biological, solar, wind, and marine energy sources
- Economics of energy systems
- Energy and climate policies – Irish, EU, and global

How will I study?

The Energy Systems & Climate Change module will include:

- Videos and demonstrations by the lecturers

- Interactive learning reinforcement quizzes
- Online assessed multiple choice quizzes

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however students are expected to attend the final semester exam and spend a total 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 24 hours
- Assignments, project and quizzes: 24 hours
- Student Autonomous Learning: 72 hours

How will I be assessed?

- In-semester assessment: 30%
- 2 hour end of semester written exam: 70%

On successful completion of this module I will be able to:

1. Explain the historical and anticipated evolution of energy demand, by region and fuel type.
2. Explain, analyse, and discuss the potential impacts of fossil-fuel combustion on local and global scales.
3. Discuss the political, ethical, and technological tensions associated with growing energy demand.



4. Judge the physical, societal, economic and technical constraints on fossil-fuel based power generation, currently and into the future.



5. Assess the potential of alternative and renewable energy sources to supplement, and/or replace, conventional fuels in this role.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Students should have completed at least a Level One module in Thermodynamics, or equivalent. Although mathematical content is minimized, it is assumed that students are comfortable with basic integration and differentiation (approximately to Honours Leaving Certificate Mathematics level), and have a similar level of understanding of Physics and Chemistry.

3.2 Communication

MEEN40820 Technical Communications

What will I study?

This module focuses on making presentations. To do this an understanding of the entire communication chain is required (e.g. handouts, questions, follow-up meetings etc.) It works off the assumption that you already have the skills necessary to make a presentation – your conversational skills. The challenge is to set out your material in an audience-friendly way so that you can deliver it with the same style, and as easily, as if you were talking to a friend. Click [here](#) to view a short introductory video for this module.

How will I study?

The module will include:

- Extensive set of videos demonstrating best practice and conversational techniques.
- Themed podcasts edited from interviews with people who present as part of their job.
- Small-group work in preparation for each presentation task.
- Discussion boards and several scheduled live group/class discussions.
- Two sessions, on UCD campus, during the term to deliver group presentations.
- Online feedback sessions on presentations.

To learn more about this module click [here](#)

Expected Commitment

Students are not required to attend lectures on the UCD campus. However, to deliver each of the presentation tasks, you are required to attend two separate sessions during

the term to make group presentations and to receive feedback. These dates are not fixed and there may be more than one date for each deliverable (different groups present on different days) to facilitate participants' varied commitments.

There are 100 hours of learning activity associated with the module. Of that, the group-work and final presentations between them will make up nearly 50% of the workload. If you are interested in taking this module, and need more information on the synchronous time commitment required, please contact the course co-ordinator (see section 4.3 Contact Information for details).

How will I be assessed?

Two presentations will be made and one presentation plan to be submitted digitally. Each will be accompanied by a short report summarizing the decision-process that brought about the presentation. The marks are allocated as follows:

- Assignment 1 – Presentation on topic of choice. Visual material and/or description of other aids. (20%)
- Assignment 2 – Presentation to critique a printed and audio-visual sample, chosen by the group. (40%)
- Assignment 3 – Presentation on technical topic. (40%)

On successful completion of this module I will be able to:

- Adapt your personal conversational style to the task of presenting.
- Analyse your presentation task and set realistic goals.
- Learn the design principles of effective visual aids.
- Use of communication tools – examples, analogies, stories, demo's.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Students from all disciplines can take this module.

IS40030 People Information & Communication

What will I study?

In this module, students explore theoretical foundations and research regarding how people interact with information, including how they identify, access, create, share and use information. In addition, they consider how theories and research results apply to the design of effective information services and systems in a variety of contexts, including workplace, educational, health care, personal, and leisure settings.

How will I study?

This module includes:

- Online synchronous* seminar discussion
***Synchronous sessions take place weekly on Wednesdays from 16:00 - 18:00 (GMT)**
- Virtual guest speakers from business/industry
- Online discussion (asynchronous), e.g., this year via closed Facebook group
- Two field trips, one to conduct observation research in support of assessment in the field, and another trip to visit a local institution to learn more about communication and information flows¹

¹ Students located overseas can perform field-trips in their local area

Expected Commitment

Students are not required to attend any lectures at the UCD campus as part of this module, however you are expected to participate actively in weekly synchronous sessions and asynchronous discussion. Students are expected to spend a total of 125 hours workload during the semester consisting of:

- 24 hours - Online Seminars & 2 field activities
- 36 hours - Specified Learning Activities
- 65 hours - Autonomous Student Learning (A textbook is required for this module)

How will I be assessed?

This module has been designed to build a strong foundation in human interaction research and application. To facilitate continuous learning, weekly readings and active seminar participation are essential. Students will also lead class discussion for a given week. Assessment for the course is based on:

- Seminar Participation & Leadership (40%)
- Information Behaviour Unobtrusive Observation Research Project - students explore the information behaviour of a particular group in a small research venture (60%)

On successful completion of this module I will be able to:

1. Apply models of information and communication behaviour to a variety of contexts.
2. Identify critical information issues for particular groups and in particular contexts.
3. Identify and implement best practices for information services in different environments.
4. Analyse methodological approaches to information behaviour research in various contexts.

5. Actualize a research exploration into the information and communication behaviour of a particular group.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. This module is open to all levels of postgraduates. As this module is offered online, students must ensure they have access to a computer/alternative computerized device with audio set up for effective synchronous online participation. Students may also require access to a webcam.

What will I study?

The words 'science' and 'scientific' are often used to indicate authoritative knowledge gained independently of belief and world view by a group of initiated individuals – the scientists. This authoritative knowledge is now informing evidence-based policy making. However, when it comes to global environmental change, it has been found that science cannot answer questions that need urgent solutions and that scientific knowledge was misapplied because the context dependence of the evidence was ignored. This module is a reflection on the role, methods and communication of science to address global environmental change. We will explore how scientists ask questions and generate knowledge and how this knowledge differs from other types of knowledge and beliefs. In the context of addressing global environmental change in complex socio-ecological systems, the role, methods and communication of scientific knowledge need to be adapted to a situation where scientists participate in an ongoing dialogue on potential mitigation and adaptation. This takes place in groups of stakeholders. You will learn agent-based modelling as a means to capture knowledge on complex environmental issues for discussion in stakeholder groups. This will allow us to develop a new picture of what science is and how it can best support policy making in this area of global environmental change.

This module introduces students to a set of seven topics which include, e.g.:

- 1.** What is science?
- 2.** What are complex systems?
- 3.** How can we study complex systems?
- 4.** How do we decide on action in the context of complex systems?
- 5.** Integration: a new task for scientists at the science-policy interface.

How will I study?

The module will include:

- Specified readings
- Interactive tools to facilitate the establishment of connections between new and prior learning
- Use of modelling, software tool, (Netlogo)
- Interactive discussion boards

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected to attend the final semester exam and spend a total 120 hours workload during the semester consisting of:

- Online learning materials: 24 hours
- Reflection and continuous assessment: 24 hours
- Student Autonomous Learning (assigned reading): 72 hours

How will I be assessed?

- In-semester assessment: 75%
- End of semester oral exam: 25%

On successful completion of this module I will be able to:

1. Give an outline of how scientific knowledge is acquired.
2. Understand important properties of complex systems.
3. Use an integrative approach to address questions in the context of global change mitigation and adaptation.

4. Use agent-based modelling to develop alternative scenarios for mitigation and adaptation that can be discussed in stakeholder groups.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Otherwise, there are no pre-requisites for this module.



3.3 Resource Characterisation, Assessment & Management

ENVB40440 Water Quality Assessment, Protection & Management

What will I study?

The overall aim of this module is to equip students with the skills (theoretical backgrounds and practical methods) to participate in freshwater studies relating to reporting and management of water quality with particular emphasis on the detection of impacts from land-use activities and application of mitigation measures. This module commences with an overview of the range of freshwater habitats and their physico-chemical and biological characteristics. This includes instruction to the basic biology of key aquatic biota such as macroinvertebrates and fish. Pollution types, sources, impacts and methods of detection are outlined. The main part of the module deals with assessment of water quality and the focus is on the requirements of the EU Water Framework Directive.

Concepts and issues explored include ecosystem health/integrity, stress factors, reference or ecological target conditions, physical habitat description, lake and river typologies, design of monitoring programs, monitoring using fish, invertebrates and plants, rapid bioassessment assessment protocols, multimetric vs. multivariate approaches, biological indicators, sub-lethal stress indicators, analyses and interpretation of macroinvertebrate data, biotic metrics and indices.

How will I study?

- Lectures will be delivered over a 12-week period through the online learning environment.
- A moderated discussion board to allow module participants to discuss the lecture content; this will be complimented by online tutorials.

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected to spend a total 220 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 30 hours
- Online tests and other exercises (throughout the semester): 24 hours
- Moderated discussion: 12 hours
- Reports (X3): 72 hours
- Student Autonomous Learning: including formative assessments which will enable you to gauge your own progress and level of understanding of the material presented: 82 hours

How will I be assessed?

- Online tests and other exercises (10%)
- Discussion contributions (10%)
- Project reports (3) based on data (physico-chemical and biological) provided (50%)
- Two-hour, end of semester written examination (30%)

On successful completion of this module I will:

- 1.** Have acquired knowledge of basic concepts in freshwater ecology.
- 2.** Be able to confidently design or review a monitoring program to detect potential impacts of land-use activities on water quality.
- 3.** Have knowledge of methodologies for collection and processing of water and biological samples.
- 4.** Have ability to interpret biological and chemical water-quality data.

5. Have sufficient knowledge to read and communicate water quality information in report format.
6. Appreciate the requirement of the Water Framework Directive (WFD) and other relevant legislation.
7. Recognise the ecological basis of the WFD requirements.
8. Be able to source and review freshwater research literature.
9. Work as a team to compile reports and make oral presentations.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Otherwise, there are no pre-requisites for this module.



CVEN40620 Water Resources Engineering 1

What will I study?

This module introduces the student to the key concepts in hydrology and water resources studies. These include:

1. Introduction to the Hydrological Cycle, the main water stores involved and the fluxes between them.
2. Hydrometry, how hydrological fluxes are measured.
3. Quantification of water resources at Global, Continental and National scales.
4. Flood frequency / return period concepts and introduction to annual maximum data analysis for estimating flood risk.
5. Storage-yield relationship for reservoirs for water supply, irrigation and hydropower generation.
6. Hydraulics and habitats – how river flows influence aquatic habitats.
7. Types of aquifer and factors affecting the recharge and sustainability of aquifers.
8. Introduction to groundwater protection schemes to prevent contamination of aquifers.

How will I study?

This module will include:

- Videos and demonstrations by the lecturers
- Written course notes & Interactive discussion boards
- Spreadsheet calculation examples
- Online assessed assignments

Expected Commitment

Students are not required to attend any lectures at the UCD campus. Assessment is by online submission of a series of assignments.

- Lectures, videos and other online learning materials: 24 hours
- Assignments: 96 hours
- Student Autonomous Learning: 95 hours

How will I be assessed?

- A series of in-semester assignments (40%) & a two-hour end of semester exam (60%)

On successful completion of this module I will be able to:

1. Understand the linkages between the various types of water body, the fluxes between them and how they are measured.
2. Have a basic understanding of the spatial distribution of water resources at a number of scales.
3. Be able to analyse annual maximum data and estimate flood risk.
4. Understand how river flows influence aquatic habitat.
5. Appreciate how the various different types of aquifer material and conditions affect the quantity and purity of groundwater resources.
6. Specify the main elements of a groundwater protection plan.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Otherwise, there are no pre-requisites for this module, though numerical ability would be desirable.

CVEN40630 Water Resources Engineering 2

What will I study?

This module introduces the student to the key concepts in the study of the pollution of natural waters and of its control and removal. These include:

- 1.** Water treatment and wastewater treatment technologies.
- 2.** Non-point source pollution, origin, assessment of risk and remediation measures.
- 3.** Wetlands (natural and constructed) as wastewater treatment options.
- 4.** Computer modelling of water pollution.

How will I study?

This module will include:

- Videos and demonstrations by the lecturers
- Written course notes
- Spreadsheet calculation examples
- Online assessed assignments

Expected Commitment

Students are not required to attend any lectures at the UCD campus. Assessment is by online submission of a series of assignments.

- Lectures, videos and other online learning materials: 24 hours
- Assignments (throughout the semester): 96 hours
- Student Autonomous Learning: 95 hours

How will I be assessed?

- A series of in-semester assignments: 40%
- Two-hour end of semester exam: 60%

On successful completion of this module I will be able to:

Understand and quantify the major influences on water quality/pollution and information on how they may be modelled and managed. This module will describe current and emerging technologies and their use.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Otherwise, there are no pre-requisites for this module, though numerical ability would be desirable but not essential.

BSEN30030 Air Pollution

What will I study?

This module covers the measurement, abatement and dispersion modelling of atmospheric emissions from a variety of sources.

Topics include:

- Air pollution and human health
- Legislation
- Sources of air pollution
- Measurement techniques
- Air pollution control systems
- Meteorology
- Climate change
- Atmospheric dispersion modelling

How will I study?

- Videos and demonstrations by the lecturers
- Interactive learning reinforcement quizzes
- Interactive discussion boards relating to case studies

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected to attend the final semester exam and spend a total 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 12 hours
- Case study projects, discussion and quizzes (throughout the semester): 24 hours
- Student Autonomous Learning: 84 hours

How will I be assessed?

- Group project, In-semester assessment including discussion board: 55%
- 2 hour end of semester written exam: 40%
- Weekly MCQ: 5%

On successful completion of this module I will be able to:

1. Describe the impact of air pollution on human health.
2. Outline the regulatory standards and legal aspects of air pollutant emissions.
3. Describe the major sources of air pollution.
4. Explain the principles of meteorology and climate change.
5. Outline the main methods for measuring concentrations of gases and odours.
6. Describe the operation of air pollution control systems.
7. Explain the principles of atmospheric dispersion modelling.
8. Apply mathematical equations to solve air pollution problems.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Otherwise, there are no pre-requisites for taking this module.

GEOL40450 Environmental Geoscience

What will I study?

This module introduces students to the field of Environmental Geoscience. Topics include:

1. Concepts in Earth systems science.
2. Earth's internal and external cycles and their connectedness.
3. Records of Earth's natural environmental change.
4. Human influences on Earth cycles with emphasis on environmental consequences of Earth resource extraction and utilisation.
5. Evidence for global change in Earth's archives.
6. Aspects of environmental geochemistry.
7. Large scale atmospheric effects on Earth's wind energy resources

How will I study?

The Environmental Geoscience module will include:

- Demonstrations by the lecturers
- Interactive learning reinforcement quizzes
- Online assessed multiple choice quizzes
- Interactive discussion boards

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however, you are expected to attend the final semester exam and spend a total 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 24 hours
- Assessments, project and quizzes (throughout the semester): 24 hours
- Student Autonomous Learning: 72 hours

How will I be assessed?

- In-semester assessment: 40%
- 2 hour end of semester written exam: 60%

On successful completion of this module I will be able to:

At the end of the module students will be able to make informed judgments about a range of environmental issues affecting planet Earth. You will study Earth Systems Science and gain an appreciation of how Earth's internal and external processes influence each other. Students will learn about Earth's evolution and its cycles, how the latter are now affected by human activity and about the nature of the archives that preserve evidence for such changes. The impact of changes in large scale atmospheric circulation patterns on the temporal and spatial characteristics of wind energy resources will be discussed. Basic concepts in Environmental Geochemistry relating to pollutant behaviour will also be introduced.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Otherwise, there are no pre-requisites for taking this module.

AESC40250 Soil Resources

What will I study?

This module introduces you to soils and will discuss the formation of soils, soil descriptions, the nature and causes of their variation, the intimate relationships between the physical and biological features of soils and their responses to management practices.

Topics include:

The central role of soils in natural and managed systems paying particular attention to agricultural, forests and built environments; the formation of soils; the physical nature of soils; soil biology; soil descriptions; the intimate interactions between the physical and biological aspects of soil which help in the delivery of sustainable production and water management; soil erosion and the impact of sediments in aquatic systems.

How will I study?

- Videos and demonstrations by the lecturers
- Interactive learning reinforcement quizzes
- Online assessed multiple choice quizzes
- Interactive discussion boards

Expected Commitment

Students will not be required to attend any lectures at the UCD campus, however you are expected to attend the final semester exam and spend a total 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 24 hours
- Assessments, project and quizzes (throughout the semester): 24 hours
- Student Autonomous Learning: 72 hours

How will I be assessed?

- In-semester assessment: 20%
- 2 hour end of semester written exam: 80%

On successful completion of this module I will be able to:

1. Understand pedogenesis.
2. Understand the methods used in describing soils.
3. Appreciate the factors which determine the type of soil occurring under particular environmental conditions.
4. Understand the processes involved in the transformation of nutrients in soils.
5. Appreciate the factors which determine the movement of water and nutrients through soil profiles.
6. Appreciate the effects of physical manipulation on soil.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Otherwise, it is recommended that students taking this module should have a background in a discipline such as science, agriculture, engineering, geography or archaeology.

ENVB40360 Peatlands & Global Change

What will I study?

This module should provide students with a comprehensive summary of peatland science. Human activity climatic variability as well as other natural processes, shape peatlands which are dynamic ecosystems in constant evolution. From microbial diversity to cultural landscape, students will develop an understanding of peatlands especially Irish ones but also around the world.

Topics include:

Natural history; biology and ecology of peatlands; distribution and classification of peat soils; peatlands and climate; utilization and management of peatlands; peatlands and people and current research in peatland science.

How will I study?

- Videos and demonstrations by the lecturer
- Interactive learning reinforcement quizzes
- Online assessed multiple choice quizzes
- Interactive discussion boards

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected to attend the final semester exam and spend a total 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 14 hours
- Assessments, project and quizzes (throughout the semester): 12 hours
- Student Autonomous Learning: 80 hours

How will I be assessed?

- In-semester assessment: 30%
- 2 hour end of semester written exam: 70%

On successful completion of this module I will be able to:

1. Recognise peatland types and understand their natural history (their origin and development and how they got to their current status).
2. Understand processes within these ecosystems (ecology, hydrology and peat accumulation).
3. Understand peatland-environment feedback, especially with regards to global climate.
4. Recognise the different ecosystem services they provide and appraise the consequence of these values.
5. Evaluate resource management options.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline.



ENVB30130 Ecology & its Application

What will I study?

This module introduces students to the fundamental principles of ecology and its application.

Topics include:

Population, community and ecosystem ecology, scales of variation in space and time, methodological approaches to characterising ecological patterns and processes, important links with other disciplines, humans as a source of impact on ecological patterns and processes, areas of human activity that require input from ecologists, such as agriculture, fisheries, disease control, conservation and environmental management.

How will I study?

- Online lectures, videos, demonstrations and live discussions
- Assessed case study project
- Online multiple choice quizzes
- Interactive discussion boards



Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected to attend the final semester exam and spend a total of 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 24 hours
- Assessments, project and quizzes (throughout the semester): 24 hours
- Student Autonomous Learning: 72 hours

How will I be assessed?

- In-semester assessment: 40%
- 2 hour end of semester written exam: 60%

On successful completion of this module I will be able to:

1. Describe the fundamental principles of ecology.
2. Differentiate between ecological patterns and processes at different scales and levels of biological organisation (population, community and ecosystem).
3. Understand and debate how ecological knowledge can be applied to a range of challenges faced by society.
4. Further develop more specialised ecological knowledge and skills through subsequent modules.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. This module is designed so that it is accessible for students with little or no background in biology or ecology.



ENVB30120 Genetics for Environmental Scientists

What will I study?

The discovery of DNA has changed the world. Understanding how DNA functions is essential to understanding the modern biology. DNA technology has revolutionized medicine and pharmaceutical production, changed agriculture and advanced our knowledge about environment and the history of life. Genetics has also become an increasingly important element of conservation studies, helping to save species from extinction and to manage available resources efficiently.

This module will give you a fundamental know-how on reading, analysis and interpretation of genetic data. This module introduces students to basic aspects of genetics and their relevance to environmental studies. Topics include:

1. DNA as inherited and functional information.
2. DNA technology (e.g. PCR and RT-PCR, DNA manipulation methods, DNA sequencing) and its practical applications.
3. DNA as a repository of variation among individuals and species.
4. Interactions between environmental agents and DNA.
5. Conservation genetics and biodiversity.

How will I study?

- Online lectures and videos
- Self-directed study using recommended textbooks and scientific papers
- Interviews with UCD staff members explaining the relevance of their genetic research to environmental studies.

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected to take an online mid-semester MCQ exam and participate in online Discussion Boards. The expected workload during the semester is a total of 120 hours, consisting of:

- Lectures, videos and other online learning materials: 20 -30 hours
- Assessments and quizzes (throughout the semester): 15 hours
- Student Autonomous Learning: 80 hours
- Participation in Discussion Boards: 5 hours

How will I be assessed?

- Mid-semester MCQ exam – 20 %
- Participation in Discussion Boards – 10 %
- Case study: review of relevant scientific article – 10 %
- Final essay (2 500 words) – 60 %

On successful completion of this module I will:

1. Understand how genetic information is decoded in living cells and how it is transmitted from one generation to the next.
2. Understand how variation in genetic information is reflected by intra-and inter-species diversity and be familiar with concepts of natural selection, genetic drift, gene flow and adaptive evolution.
3. Get an overview of available DNA technology and molecular genetics tools and have a general understanding of how they are applied in areas relevant to environmental research.

4. Get familiar with themes of ongoing genetic research at UCD, which are relevant to environmental studies.

Am I eligible?

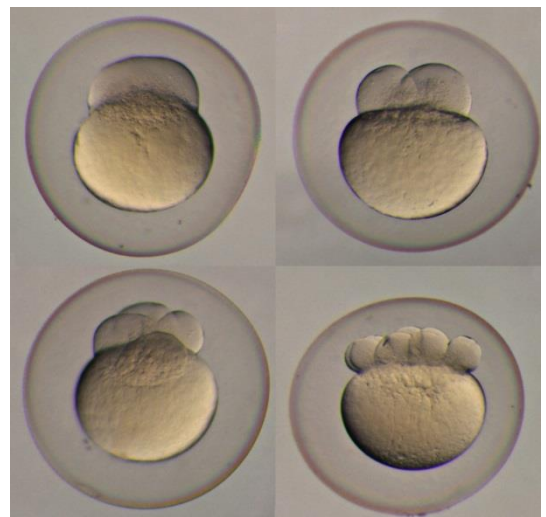
Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Otherwise, there are no pre-requisites for taking this module

ENVB40350 Applied Ecotoxicology

What will I study?

Ecotoxicology examines the effects of toxic chemicals on organisms at different organizational levels from individual to ecosystem. As an interdisciplinary science, Ecotoxicology combines elements of biology, ecology, toxicology, biochemistry, analytical chemistry and statistics. This module will introduce the student to Ecotoxicology and its role in the monitoring of ecosystem health. The course will include:

1. An introduction to the principles of Ecotoxicology
2. The origin of pollutants and factors affecting their fate in the environment and within organisms
3. The effects of pollutants and the methods used to assess these effects at different organizational levels: Ecosystem, Community, Population, Whole organism, Tissue, Cellular and Subcellular
4. Virtual laboratory sessions outlining the methodologies of two commonly utilized tests in Ecotoxicology laboratories.



How will I study?

- Online lectures, videos and quizzes
- Virtual laboratory sessions and report writing
- Self-directed study using recommended publications and online materials

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected attend the end of semester exam and to spend a total 120 hours workload during the semester consisting of:

- Lectures, videos, virtual laboratories and other online learning materials: 20-30 hours
- Report writing and assessment (in-semester): 30 hours
- Student Autonomous Learning: 60 hours

How will I be assessed?

- Continuous assessment in the form of laboratory reports (in-semester): 40%
- Participation in Discussion board: 10%
- End of semester examination: 50%

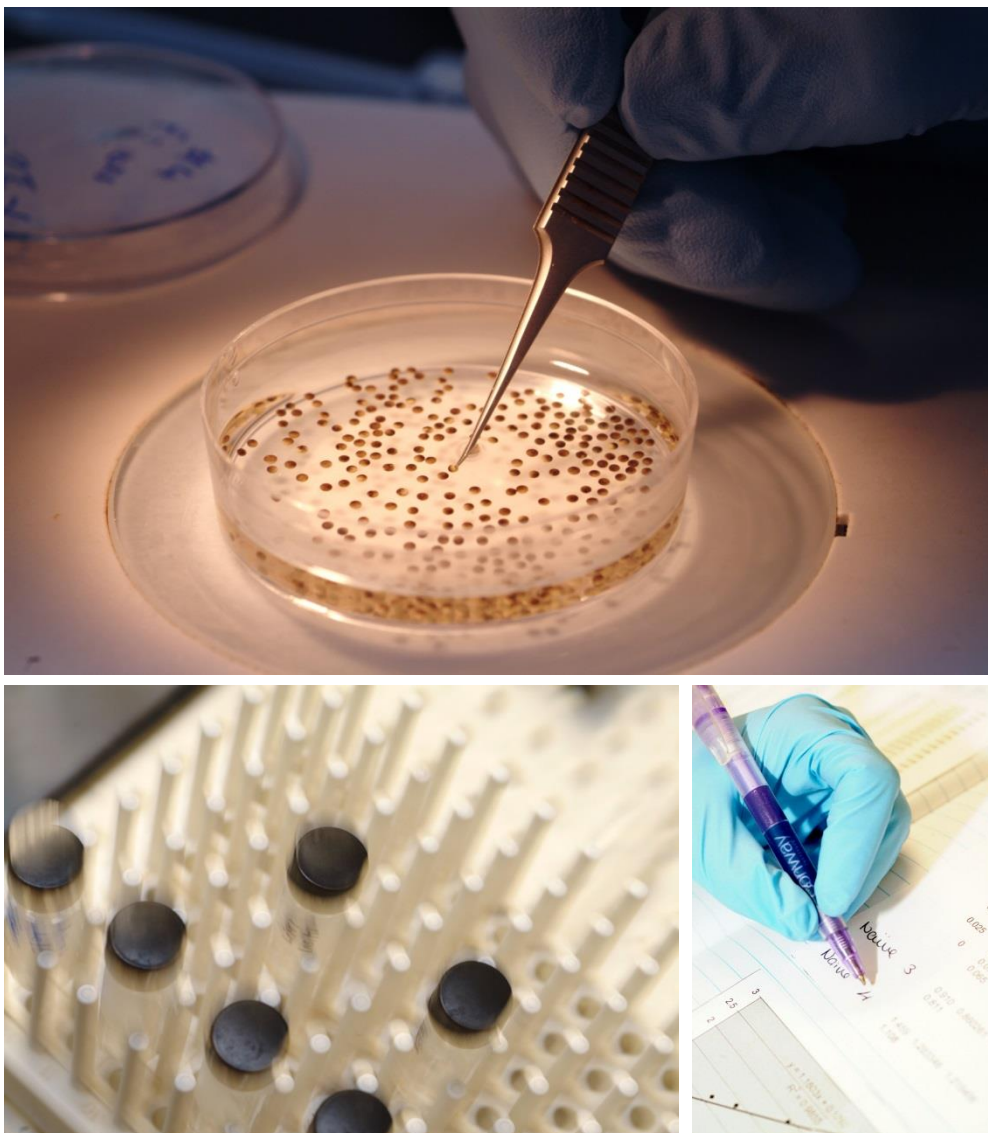
On successful completion of this module I will be able to:

- Describe the origin, and understand the factors both biotic and abiotic, that influence the fate of many common pollutants
- Understand the role of current legislation in chemical safety assessment
- Give examples of biological indicators, toxicity tests and biomarkers used to monitor pollutant effects at each level of biological organization

- Run a *Lemna minor* (duckweed) growth inhibition (EC₅₀) test
- Run a 48h *Daphnia magna* immobilisation test
- Write a laboratory report in the style of a scientific paper including references to outside materials

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Otherwise, there are no pre-requisites for taking this module.



ERM40450 Impact Assessment Procedures

What will I study?

This module is worth 10 CP and will cover:

- Policy assessment; Strategic Environmental Assessment (SEA) of plans and programmes; Environmental Impact Assessment (EIA) at project level; Environmental Management Systems (EMS); Life Cycle Analysis (LCA); Cumulative Effects Assessment (CEA).
- Other legislation impacting on EIA/SEA: Appropriate Assessments: Birds, Habitats, and Water Framework Directives; Seveso & COMAH legislation; IPPC, Waste and Discharge Licensing.
- Environmental Management Systems; Environmental Audit and Life Cycle Analysis.

Overview

1. This distance-learning module provides an overview of Impact Assessment Procedures in line with best international practice, but with particular emphasis on their operation within Ireland and the EU.
2. Background context is provided on attitudes to environmental management, dominance and control; planning vs. control, and sustainable development, together with insights from the historical development of Impact Assessment practice.
3. The relationship between EU and Irish national environmental control is addressed during coverage of EU policy and legislative structures; environmental policies, plans and programmes; regulations, Directives etc.;

environmental liability; freedom of environmental information and access to justice.

4. The general stages of assessment are identified and explored with reference to appropriate tools and methodologies; screening, scoping, impact identification; mitigation, monitoring, follow-up and process audit.
5. The procedures appropriate to each level in the conceptual planning hierarchy are compared and contrasted; policy assessment; Strategic Environmental Assessment (SEA) of plans and programmes; Environmental Impact Assessment (EIA) at project level; Environmental Management Systems (EMS); Life Cycle Analysis (LCA); Cumulative Effects Assessment (CEA).
6. Other legislation impacting on EIA/SEA: Appropriate Assessments: Birds, Habitats, and Water Framework Directives; Seveso & COMAH legislation; IPPC, Waste and Discharge Licensing. Environmental Management Systems; Environmental Audit and Life Cycle Analysis

How will I study?

- Lectures, videos and demonstrations by the lecturer(s)
- Interactive learning reinforcement tasks
- An assessable simulation exercise
- Interactive discussion boards

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected to attend the final semester exam and spend a total 155 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 30 hours

- Assessments, project and quizzes (throughout the semester): 25 hours

- Student Autonomous Learning: 100 hours

How will I be assessed?

- In-semester assessment (3 part simulating exercise): 40%
- In-semester assessment (participation at discussion board): 5%
- 2 hour end of semester, ('seen') written exam, whereby the question is given in advance: 55%

On successful completion of this module I will be able to:

1. Describe and comment on the implications of environmental assessment procedures.
2. Explain the legislative basis for, and structure of an Environmental Impact Statement (EIS) and/or Environmental Report (ER).
3. Critique the format of an EIS/ER.
4. Critically assess the scope and limitations of national legislation for EIA and SEA.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Impact Assessments are procedures affecting ordinary citizens and are designed to involve those with both lay and professional interests in the subject. The module should be relevant to students from a wide variety of backgrounds.



OSH40160 Environmental Legislation and Regulation

What will I study?

This module will cover an introduction to the Irish and EU legislation system and key legislation relating particularly to environmental (including biodiversity) protection and climate change at Irish and European level with reference to regulatory guidance this area. Information on international conventions and treaties will be covered. *The aim is to:*

1. To provide the student with a general knowledge of environmental legislation at Irish and European level.
2. To provide the student with the necessary legal knowledge in the environmental area to permit them to give advice in relation to specific aspects of environmental management.
3. To make the student aware of the importance of understanding, development and implementation of environmental legislation, particularly regarding climate change and human health and environmental protection.
4. To familiarise the student with Irish environmental legislation, with emphasis on the transposed directives from European legislation.

How will I study?

E-Lectures will be delivered over an 8-week period (approximately 2 to 3 hours per week) through the online learning environment and will also include two optional half-day workshops at UCD. A moderated discussion board will be used to allow module participants to discuss the e-lecture content.

Expected Commitment

Students are not required to attend the workshops at the UCD campus – they are entirely optional, however you are expected to spend a total 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: approximately 20 hours
- Specified reading (throughout the semester): approximately 20 hours
- Moderated discussion: approximately 8 hours
- Wiki development: 20 hours
- Student Autonomous Learning: 50+ hours
- Formative assessments will enable students to gauge their progress and level of understanding of the material presented.

How will I be assessed?

- Essay Assignment 1 – 35%
- Wiki Assignment 2 – 35%
- EOS MCQ – 25%
- Attendance at 2 Workshops 5%

On successful completion of this module I will:

1. Have acquired knowledge of basic requirements of legislation and policy discussed.
2. Have sufficient knowledge to advise on compliance with the requirement of key legislation and policy.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree or higher diploma in a science, engineering or cognisant discipline. Otherwise, there are no pre-requisites for this module

ENVB40410 Management of Sustainable Fisheries

What will I study?

The course aims at introducing the students to fisheries and how they are managed. The conflicts among fisheries stake holders and potential solutions. The multi-level challenges for maintaining sustainable fisheries will be highlighted. Students are introduced to principles of fisheries management, which tools are available and methods than can be implemented for data acquirement and policy making.

How will I study?

- Lectures will be delivered over a 12-week period through the online learning environment
- Online assessed essays & interactive discussion boards together with the use of a core textbook that students will need to purchase.

Expected Commitment

Students are not required to attend any lectures at the UCD campus; however you are expected to spend a total 100 hours workload during the semester consisting of:

- Online learning materials (throughout the semester): 20 hours
- Student Autonomous Learning: 70 hours
- Discussion boards: 10 hours
- In addition two Skype meetings are required throughout the semester (specific dates to be confirmed) to introduce and then discuss each students final research essay.

How will I be assessed?

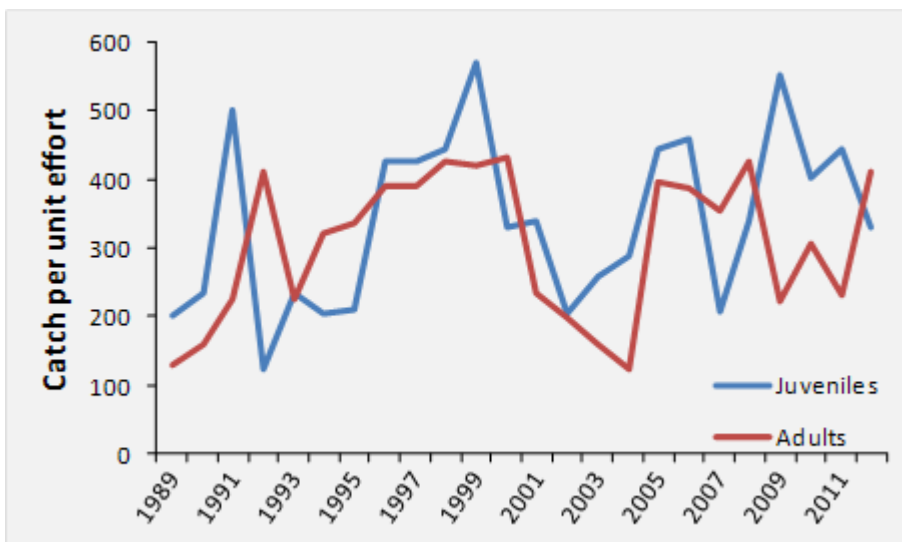
- In-semester assessment (essays): 70%
- Final project essay: 30%

On successful completion of this module I will be able to:

At the end of the course students will be able to: demonstrate an understanding of key concepts in fisheries management, the tools and methods. It is expected that students will know who the fisheries stakeholders are and be aware of common conflicts that might occur between them. In addition, students are required to show evidence of ability to read and extract information from the scientific literature and to compile fully referenced scientific essays highlighting specific problems related to sustainable fisheries.

Am I eligible?

Students must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. There are no pre-requisites for taking this module.



ENVB40320 Wildlife Management/Conservation

What will I study?

This module will provide students with a comprehensive summary of the science of wildlife management and species conservation. During this module, students will develop an understanding of the complex interplay of factors that affect wildlife species and how best to address key activities such as assessment and monitoring of populations.

Topics include:

Population dynamics; carrying capacity and population regulation; sustainable harvesting; population assessment methodology; conservation project evaluation and selection; importance of population viability analysis; conservation techniques including protected areas and the translocation spectrum and in situ and ex situ species conservation.

How will I study?

The Wildlife Management module will include:

- Videos and demonstrations by the lecturers
- Interactive learning reinforcement quizzes
- Online assessed multiple choice quizzes
- Interactive discussion boards
- A case study of a selected species
- Development of a management plan for a selected species

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected to attend the end of semester exam and spend a total 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 24 hours
- Assessments, project and quizzes (throughout the semester): 24 hours
- Student Autonomous Learning: 72 hours

How will I be assessed?

- In-semester assessment: 50%
- 2 hour end of semester written exam: 50%

On successful completion of this module I will:

1. Appreciate the importance of national and international legislation as a background to conservation management initiatives.
2. Understand the need to tailor monitoring processes to the intended use of the data
3. Be familiar with common population assessment methods
4. Have developed a working understanding of basic population dynamics
5. Understand the problems associated with small populations and the importance of population viability analysis
6. Be able to critically evaluate the strategies of management applied to a number of wildlife species

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline.

ENVB40430 Bioinvasions: Impact to Management

What will I study?

This module introduces students to concepts of invasion biology, the range of impacts that result and the management options to address non-native species.

Topics include: A foundation in the ecological theory of colonization and invasion including disturbance and succession; an evaluation of the key attributes of plants and animals that promote invasiveness and its role in risk assessment; the global threat of invasive species and the role of the international community; ecological and economic impacts addressing the issue of scale illustrated by case studies; practical management including mechanical, chemical and biological control and the utilization of invasive species; cost and benefits of control in a global context; case studies from terrestrial, freshwater and marine habitats provided throughout.

How will I study?

- Online interactive learning materials
- Online videos
- Interactive learning reinforcement quizzes
- Online assessed multiple choice quizzes
- Interactive discussion boards

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected to attend the final semester exam and spend a total 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 20 hours
- Assessments, project and quizzes (throughout the semester): 28 hours
- Student Autonomous Learning: 72 hours

How will I be assessed?

- In-semester assessment: 40%
- 2 hour end of semester written exam: 60%

On successful completion of this module I will be able to:

1. At the end of the course you will understand the invasion process and role of the species characteristics and habitat context.
2. Understand the role of different sectors in the invasion of species and level of risk associated with each and how the international community is responding.
3. Understand the range of ecological impacts associated with non-native species and how the assessments of impacts are affected by scale.
4. Evaluate and critically appraise the advantages and disadvantages of control methods and the need for long term management plans to consider economic costs.
5. Understand the key aspects of benefit/cost analysis to evaluate management options. Source and appraise information on species relevant to the student in their country.
6. Recognize the characteristics of invasive species and invaded habitats and the challenges faced to reduce the threats and impacts.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. If students do not have a knowledge of ecology they are recommended to take ENVB30130 (Ecology & its Application) prior to starting this module.

ARCH40940 Management Plan

Who is this module for?

This module is designed to accommodate applicants with a variety of academic qualifications including Archaeology, Architecture, Geography, Biology, Arts, Agriculture, Engineering, Environmental Science and Economics. This module is directed at professionals interested in advancing their career in the field of heritage conservation and management. It builds on the knowledge gained in previous modules (see section on 'Am I eligible?'), introducing students to cultural and natural heritage conservation and the implementation of the UNESCO World Heritage Convention.

What will I study?

Within this module students complete a Management Plan on a selected site of conservation interest. The primary aim of this project is to increase student awareness of the key issues and challenges associated with the development of appropriate, protected area, sustainable management plans.

Topics include:

Stakeholder and community participation, natural and cultural values, integrity and functioning of protected areas, planning, implementation, monitoring and evaluating.

How will I study?

The Management Plan module will include:

- Interactive course notes
- Video clips and input from protected area managers
- Reflective study journal
- Interactive discussion boards

Expected Commitment

Students are not required to attend any lectures at the UCD campus as part of the module. The module is worth 15 credits, whereby one credit corresponds to approximately 25 hours of total student effort. As a guideline the workload for this module (375 hours) is broken down as follows:

- Interactive learning online: 45 hours
- Independent study: 210 hours
- Assessment: 120 hours

How will I be assessed?

- In-semester assessment: 30%
- End of semester project: 70%

On successful completion of this module I will be able to:

1. Identify the different roles and functions of key actors in heritage conservation and management.
2. Analyse necessary conditions for conservation of World Heritage Sites and protected areas.
3. Apply plan methodology.
4. Produce an original, professional, management document, logically structured and supported by appropriate evidence.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. It is advised that the module on the World Heritage Convention (ZOOL40360) is taken in parallel.

3.4 Heritage

ARCH40920 Natural Heritage Conservation

Who is this module for?

This module is designed to accommodate applicants with a variety of academic qualifications including Archaeology, Architecture, Geography, Biology, Arts, Agriculture, Engineering, Environmental Science and Economics. This module is directed at professionals interested in advancing their career in the field of natural heritage conservation and sustainable management with regard to the implementation of the UNESCO World Heritage Convention in particular.

What will I study?

This core module provides a broad introduction to natural heritage in a World Heritage context and explores biodiversity and its origins in the natural world. The module deals with how biodiversity is distributed across the globe and the role of World Heritage Convention in biodiversity conservation. Topics include natural heritage values, benefits of biodiversity, threats to natural World Heritage properties, biodiversity loss, governance and biodiversity conservation.

How will I study?

- A series of written 'Sessions' that are structured to help guide students in their study of specific topics with recommended readings and exercises.
- Reflective study journal
- Interactive discussion boards

Expected Commitment

Students are not required to attend any lectures at the UCD campus as part of the module. The module is worth ten credits, whereby one credit corresponds to

approximately 25 hours of total student effort. As a guideline the workload this module (250 hours) is broken down as follows:

- Interactive learning online: 30 hours
- Independent study: 140 hours
- Assessment: 80 hours

How will I be assessed?

- Study journal (20%): a tool for continuous reflective learning
- Essay (40%): mid-term assignment
- Project work (40%): end of module assignment

On successful completion of this module I will be able to:

1. Demonstrate a critical understanding of the concept of biodiversity and its spatial variation across the globe.
2. Critically appraise the role of the World Heritage Convention and other international instruments in biodiversity and natural heritage conservation.
3. Identify threats to natural heritage and the impacts of biodiversity loss in national and international contexts.
4. Categorize the different intrinsic and extrinsic values of biodiversity and explain their importance.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. It is advised that the module on the World Heritage Convention (ZOOL40360) is taken in conjunction with this module.

ARCH40900 Cultural Heritage Conservation

Who is this module for?

This module is designed to accommodate applicants with a variety of academic qualifications including Archaeology, Architecture, Geography, Biology, Arts, Agriculture, Engineering, Environmental Science and Economics. This module is directed at professionals interested in advancing their career in the field of cultural heritage conservation and management with regard to the implementation of the UNESCO World Heritage Convention in particular.

What will I study?

This core module provides a broad introduction to cultural heritage in a World Heritage context. It covers theoretical aspects of cultural heritage, its protection and management, including international charters and conventions. Topics include heritage tourism, postcolonial heritage, endangered heritage through natural disasters, conflicts and war, and the return of stolen objects. Cultural heritage is explored as a human right and tool for sustainable development with focus on World Heritage properties and international case studies.

How will I study?

- A series of written 'Sessions' that are structured to help guide students in their study of specific topics with recommended readings and exercises.
- Reflective study journal
- Interactive discussion boards

Expected Commitment

Students are not required to attend any lectures at the UCD campus as part of the module. The module is worth ten credits, whereby one credit corresponds to approximately 25 hours of total student effort. As a guideline the workload for this module (250 hours) is broken down as follows:

- Interactive learning online: 30 hours
- Independent study: 140 hours
- Assessment: 80 hours

How will I be assessed?

- Study journal (20%): a tool for continuous reflective learning
- Essay (40%): mid-term assignment
- Project work (40%): end of module assignment

On successful completion of this module I will be able to:

1. Demonstrate a critical understanding of cultural heritage as a multidisciplinary process.
2. Compare and contrast tools for cultural heritage evaluation and protection.
3. Identify the different roles and functions of key actors in cultural heritage conservation in national and international contexts.
4. Analyse necessary conditions for selection, nomination and management of cultural World Heritage properties.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. **It is advised that the module on the World Heritage Convention (ARCH40910) is taken in conjunction with this module.**

ARCH40910 World Heritage Convention

Who is this module for?

This module is designed to accommodate applicants with a variety of academic qualifications including Archaeology, Architecture, Geography, Biology, Arts, Agriculture, Engineering, Environmental Science and Economics. This module is directed at professionals interested in advancing their career in the field of heritage conservation in the context of the implementation of the UNESCO World Heritage Convention.

What will I study?

This module will cover the origin and development of the World Heritage Convention using case studies of selected World Heritage Properties. It will deal with how the World Heritage Convention operates, from the nomination process and the associated Global Strategy for a representative, balanced and credible World Heritage List, to the monitoring and periodic reporting of World Heritage properties, and the role of the List of World Heritage in Danger.

How will I study?

The cultural heritage conservation module will include:

- A series of written ‘Sessions’ that are structured to help guide students in their study of specific topics with recommended readings and exercises.
- Reflective study journal
- Interactive discussion boards

Expected Commitment

Students are not required to attend any lectures at the UCD campus as part of the module. The module is worth ten credits, whereby one credit corresponds to approximately 25 hours of total student effort. As a guideline the workload for this module (250 hours) is broken down as follows:

- Interactive learning online: 30 hours
- Independent study: 140 hours
- Assessment: 80 hours

How will I be assessed?

- Study journal (20%): a tool for continuous reflective learning
- Essay (40%): mid-term assignment
- Project work (40%): end of module assignment

On successful completion of this module I will be able to:

1. Demonstrate a thorough understanding of the World Heritage Convention and its governance.
2. Understand and communicate processes relating to the nomination of World Heritage Properties.
3. Identify the necessary elements of Outstanding Universal Value.
4. Discuss the role of the Advisory Bodies and the World Heritage Centre in assessing and monitoring World Heritage Properties.
5. Critically compare international instruments for heritage protection and conservation.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Otherwise, there are no pre-requisites for taking this module.

3.5 Data Analysis

ENVB40370 Data Analysis & Interpretation

What will I study?

This module aims to equip you with the skills to professionally synthesize and communicate technical information in the field of biology and environmental science. The module blends online lessons, computer practicals and self-test problem sheets. Topics covered include the reporting of data, data management, design and analysis of biological and environmental experiments, hypothesis testing and the use of the R statistical software.

Please note For this module you will require access to a computer that will run the R statistical software (available for Windows, Mac or Linux operating systems at <https://www.r-project.org/>) and RStudio (freely available at the following link; <https://www.rstudio.com/products/rstudio/#Desktop>)

How will I study?

Teaching on this module is a combination of online problem-based learning, online lessons, problem-sheets, and online self-tests.

The module will include:

- Online videos
- Self-study worksheets
- Online problem-based learning

Expected Commitment

You are not required to attend any lectures at the UCD campus, however you are expected to attend the final semester exam and spend a total 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 24 hours
- Assessments, project and quizzes (throughout the semester): 24 hours
- Student Autonomous Learning: 72 hours

How will I be assessed?

Assessment:

You will be assessed on your understanding of the topics discussed in the online lessons, R worksheets, as well as other topics that the lecturer may draw your attention.

- Analysing data with a computer (40% of the overall grade):
- Writing R scripts (10% of the overall grade):
- Final Exam (50% of the overall grade):

On successful completion of this module I will be able to:

1. Design a biological / environmental experiment, taking due account of independence, allocation of replicates and controls
2. Develop a strategy for using data to make decisions you can stand over in an uncertain world
3. Select and undertake univariate analyses using the free R software package
4. Understand the difference between multivariate and univariate data analysis

Skills:

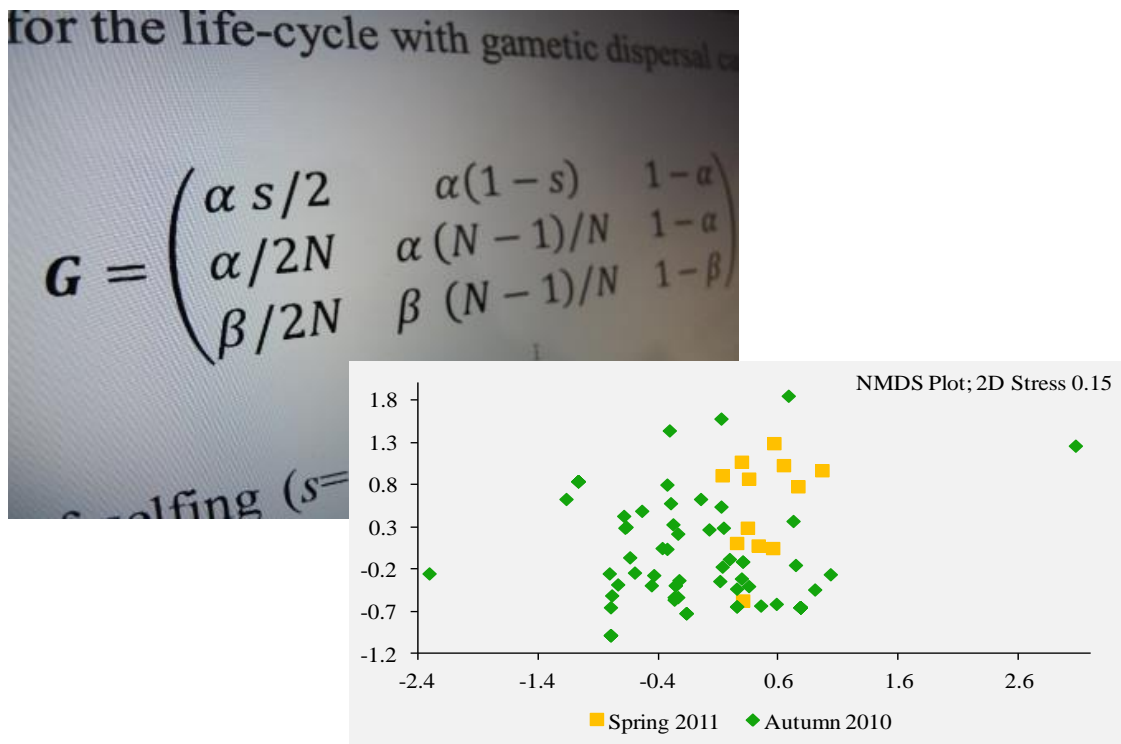
The module will contribute towards the development of the following skills:

- Effective presentation and writing of technical information

- Time management
- Data analysis on a computer

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. For this module you will require access to a computer that will run the R statistical software (available for Windows, Mac or Linux operating systems at <https://www.r-project.org/>) and RStudio (freely available at <https://www.rstudio.com/products/rstudio/#Desktop>)



What will I study?

This module introduces students to Geographic Information Systems (GIS). The module will include a limited number of lectures and will be largely based on practical GIS exercises. GIS tools and methods will be applied within the framework of an environmental impact assessment assignment, to identify and assess environmental resources and to investigate the potential pressures/effects on such resources. This approach will enable students to gain GIS skills as they undertake the assignment, facilitating a hands-on and practice-led application and testing of the relevant software components. *Topics include:*

1. GIS software (commercial and open-source resources).
2. Environmental spatial data (international and national data providers and online data sources).
3. Spatial data management issues (e.g. spatial coverage, quality, scale, metadata).
4. GIS applications (examples of GIS use in environmental assessment and sustainable planning).
5. Introduction to ArcView 10 software (ArcMap, ArcCatalog and ArcToolBox).
6. Practical application of ArcView 10.

How will I study?

- Presentations by the lecturer
- GIS tool demonstration videos by the lecturer
- Learning reinforcement questions
- Online submission and assessment of the GIS assignment

- GIS test (see below)
- Interactive discussion boards and one-to-one response to any module-related queries

Expected Commitment

Students are not required to attend any lectures at the UCD campus, however you are expected to attend the final semester GIS test and spend a total 120 hours workload during the semester consisting of:

- Lectures, videos and other online learning materials: 24 hours
- Assessment and questions (throughout the semester): 24 hours
- Student autonomous learning: 72 hours

How will I be assessed?

- In-semester assessment: 60% (submissions of the practical exercise)
- 2 hour end of semester GIS practical exam: 40% (GIS test)

On successful completion of this module I will be able to:

1. Theoretical knowledge of GIS, applications, environmental spatial data sources and data management issues.
2. Working competence of the GIS software package ArcView 10.
3. Ability to demonstrate the application of GIS tools to environmental assessment and sustainable planning.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Students should have moderate to strong computer skills, including software installation knowledge in order to facilitate ArcGIS installation in personal PCs/laptops, and an understanding of maps. Currently this module is only open to those

students who are completing an MSc in Environmental Sustainability. This module is not available to students registered as Certificate, Diploma or Module to Masters.

3.6 Research Project

ENVB40340 Practicum (Research; lab/field)

Who is this module for?

This module is carried out by students over the course of a year (September to August of the following year) as part of the MSc Environmental Sustainability (Negotiated Learning) course. Those students intending to build towards a Masters Degree (90 credits) must take either the 15 credit Practicum (Desk Study) or the 25 credit Practicum (Research; lab/field). These modules are not available to students registered to the Certificate, Diploma or *Module to Masters*.

What will I study?

The objective is to give students a rigorous training in the planning, execution and write-up of a research project. Students carry out an individual research project under the direction of an academic supervisor. Students may join the supervisor's research team and carry out the practical work in the laboratory or field site or they may undertake a project in the workplace or other location deemed suitable



by the module coordinator. This is followed by a period for data analyses and write-up of a thesis.

How will I study?

You will be required to carry out a literature review prior to commencing the project and submit a plan and timeline for the research, for approval. This will be carried out off-

campus. The research (campus or off-campus) will then be carried out as planned. This will be followed by a period of data analysis and finally the thesis write-up.

Expected Commitment

Students are expected to carry out research (planning, data collection etc.) for a minimum of 10-12 weeks or equivalent hours (460 hours). The data analyses and write-up require at least four weeks (160 hours) of effort.

How will I be assessed?

- Practical work: 30%
- Thesis: 70%

On successful completion of this module I will:

On completion of the research project students should be able to: design a research project, organise and manage the work programme, work as part of a research team, carry out a comprehensive review of scientific literature, confidently apply the required scientific methods, undertake data analyses and write a scientific report.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Students are advised to take a module in data analyses before commencing their research project. Those students intending to build towards a Masters Degree (90 credits) *must* take either ENVB40330 Practicum (Desk Study) or ENVB40340 Practicum (Research).



ENVB40330 Practicum (Desk Study)

Who is this module for?

This module is carried out by students over the course of a year (September to August) as part of the MSc Environmental Sustainability (Negotiated Learning) course. Those students intending to build towards a Masters Degree (90 credits) must take either the 15 credit Desk Study or the 25 credit Practicum (Research; lab/field). This module (ENVB40330 Practicum - Desk Study) is not available to students registered to the Certificate, Diploma or *Module to Masters*.

What will I study?

The objective is to give students a rigorous training in information research, analysis and report writing. The exercise will be totally desk-based and will involve a substantial literature review and generally data or information analysis (depending on the subject area). Students are required to spend approximately 300-350 hours on this module.

How will I study?

The desk study will be agreed with the module coordinator and another academic for some topics. It will be undertaken off-campus with regular communication with coordinator/supervisor.

Expected Commitment

Students are required to spend approximately 300-350 hours on this module.

How will I be assessed?

Written report 100%



On successful completion of this module I will:

On completion of the desk study students will be able to carry out a comprehensive review of scientific literature, source relevant data, undertake data analyses and write a scientific report.

Am I eligible?

Applicants must hold a minimum of a 2.2 honours level degree in a science, engineering or related discipline. Students are advised to take a module in data analyses before commencing their research project. Those students intending to build towards a Masters Degree (90 credits) *must* take either ENVB40330 Practicum (Desk Study) or ENVB40340 Practicum (Research).

4.0 Further Information

4.1 IT Requirements

To complete the course, students must have access to a relatively modern computer which matches the minimum specifications required to run the UCD software.

For more details on basic computer requirements, please follow [this](#) link:

Or, contact UCD IT Services:

Telephone: +353 (0)1 716 2700

Email: ithelpdesk@ucd.ie

Web Address: <http://www.ucd.ie/itservices/>

Your computer should also have at minimum an internal microphone and speakers to allow effective participation in many of our modules. In addition you will need a media player enabling you to view various video formats e.g. Quicktime / Windows Media Player, or a suitable alternative. Most computers will have these capabilities as standard. Please see individual module descriptions for any specific requirements, or contact the course co-ordinator if you have any queries.

4.2 Frequently Asked Questions

More information about modules and credits can be found [here](#).



4.3 Contact Information

If you would like more information on individual modules or the overall course, please contact:

Dr. Mary Kelly-Quinn / Patricia Cunningham

Email: sustainabilityonline@ucd.ie

Tel. +353 (0)1 716 2020

Web Address: www.ucd.ie/online



4.4 Useful Information/Links

4.4.1 General

UCD Online Website - <http://www.ucd.ie/online/>

Environmental Sustainability Course Page:

<http://www.ucd.ie/online/environmentalsustainability/>

UCD Main Webpage – www.ucd.ie

4.4.2 Qualification Information

The National Framework of Qualifications – <http://www.nfq.ie/nfq/en/>

4.4.3 Applying Online

To apply online, please go to: <http://www.ucd.ie/apply>

4.4.4 Fee Information

For information on fees, please visit:

<http://www.ucd.ie/students/fees/gradtaught2018.html>

4.4.5 IT Support

University College Dublin is an innovative digital campus, with dedicated IT support for students.

www.ucd.ie/itservices

