



Trinity College Dublin

Coláiste na Tríonóide, Baile Átha Cliath

The University of Dublin

School of Natural Sciences

Environmental Sciences

Senior Sophister Handbook 2017-2018

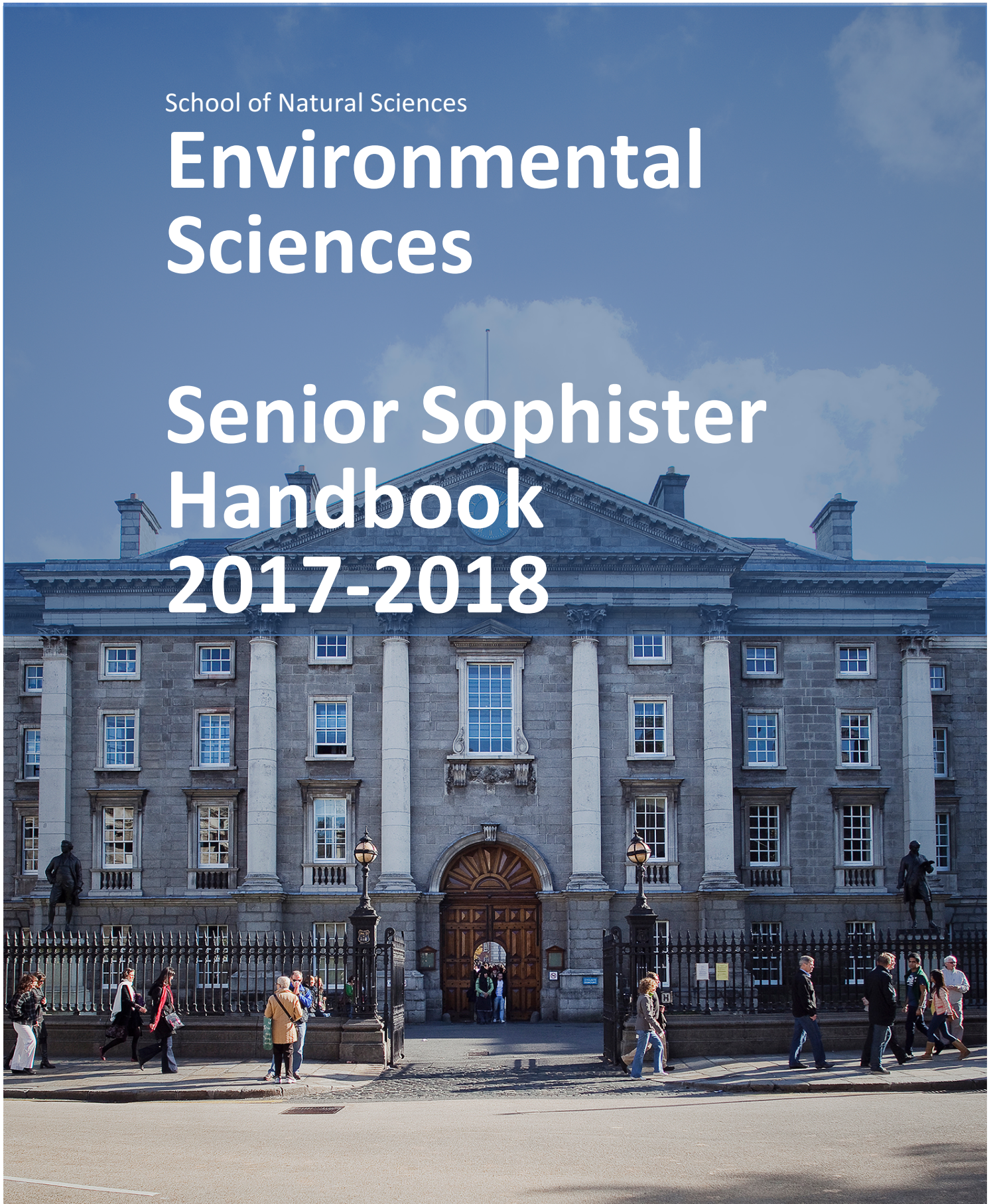


Table of Contents

The Programme

| | |
|--|----|
| Course objectives and learning outcomes..... | 5 |
| The European Credit Transfer System..... | 7 |
| Course structure..... | 8 |
| Module descriptions..... | 9 |
| Some important dates in 2017-18..... | 20 |

Programme Regulations

| | |
|-----------------------------------|----|
| Assessments and examinations..... | 21 |
| Plagiarism and Ethics..... | 22 |
| Grading guidelines..... | 23 |

General Information

| | |
|-----------------------------------|----|
| Academic and personal issues..... | 25 |
| Health and safety..... | 26 |
| Staff contacts..... | 30 |

A note on this Handbook

This handbook applies to all students taking the Environmental Sciences Programme taught by the School of Natural Sciences. It provides a guide to what is expected of you on this programme, and the academic and personal support available to you. Please download and retain a copy for future reference.

The information provided in this handbook is accurate at time of preparation. Any necessary revisions will be notified to students via email, and will be updated on the Environmental Sciences undergraduate programme website.

Your attention is drawn to the University Calendar Part 1 (the relevant parts of which are available at registration, or from your tutor) and, in particular, sections G & P that outline general rules governing all students progression through College and the Faculty of Science; in addition your attention is drawn to Sections H5/H6 regarding attendance. In the event of any conflict or inconsistency between the General Regulations published in the University Calendar and information contained in course/departmental handbooks, the provisions of the General Regulations will prevail.

Welcome

Welcome to the Environmental Science Moderatorship Programme! This booklet aims to provide you with a basic overview of the Programme and the courses you will undertake during your Junior Sophister year with us.

Environmental Sciences is by its nature a multidisciplinary research area, comprising a study of the frequently complex interactions between the biological, chemical and physical components of our environment. Environmental scientists have training that is similar to other physical or life scientists, but is specifically applied to the environment. A broad scientific knowledge is required which may also involve an understanding of economics, law and the social sciences.

The undergraduate degree course offered by the School of Natural Sciences has been designed to provide for the needs of students with an interest in this rapidly developing academic and professional field. The programme comprises specially designed modules plus suitable modules from contributing disciplines. Field study is a core component of the programme.

We look forward to working with you during your sophister years with us and trust that you will find Environmental Sciences as fascinating and rewarding as we do.

Ian Donohue
Course Director

Course objectives and learning outcomes

Our mission is to:

- make you aware of the basic concepts and current research developments in Environmental Science;
- enable you to understand the basis of good experimental design;
- teach you to work efficiently and safely in laboratories;
- enable you to become a competent field researcher;
- teach you to critically analyse quantitative data;
- develop your written and oral communication skills;
- develop your skills to work effectively in a group and independently; and
- make you socially aware, particularly in relation to the contribution that Environmental Science makes to society.

On successful completion of this programme, students should be able to:

- identify and describe plant and animal communities and analyse their distribution;
- demonstrate the principles of geochemical cycling in the global context with specific reference to environmental change;
- discuss the principles of hydrology and its relationship with groundwater quality;
- discuss the causes and effects of terrestrial, atmospheric and marine pollution and present day mitigation strategies;
- show a good working knowledge of skills and tools, such as spatial data analysis and statistical techniques, which can be used selectively to address complex problems, or to conduct closely guided research;
- identify, formulate, analyse and suggest reasoned solutions to current environmental problems;
- design an Environmental Impact Assessment for a range of diverse habitats;
- critically assess scientific literature;
- work effectively as an individual, in teams and in multidisciplinary settings; and
- communicate effectively with both the scientific community and with society at large.

In the Senior Sophister (fourth) year you will research and write a thesis on a project in the field of Environmental Sciences. In the past, students have undertaken a diverse range of projects in many fields, including air pollution,

waste management, restoration ecology, invasive species, water quality, habitat management and greenhouse gas emissions.

Emphasis in the Moderatorship is on the student acquiring laboratory and field skills. In the final year of the Environmental Science degree, students may also attend a residential field course in Kenya, as part of the module in Tropical Ecology and Conservation.

The School makes every effort to keep down expenditure on field courses. However, it is necessary that students should budget appropriately. For information on financial assistance, contact: Senior Tutor's Office, No. 27, College or your tutor.

Note:

Students receiving local authority grants may be eligible for local authority support. Letters confirming attendance on courses can be obtained from the Course Director.

Please note: If cheques from Local Authorities are not received before the start of the Field Course, students will be required to pay the full amount and will be refunded this amount on receipt of cheques from Local Authorities. You are therefore advised to apply to your local Authority for funding well in advance of the field trips.

The European Credit Transfer System

The European Credit Transfer and Accumulation System is an academic credit system based on the estimated student workload required to achieve the objectives of a module or programme of study. It is designed to enable academic recognition for periods of study to facilitate student mobility and credit accumulation and transfer. The Credits are the recommended credit system for higher education in Ireland and across the European Higher Education Area.

The Credits weighting for a module is a measure of the student input or workload required for that module, based on factors such as the number of contact hours, the number and length of written or verbally presented assessment exercises, class preparation and private study time, laboratory classes, examinations, professional training placements, and so on as appropriate. There is no intrinsic relationship between the credit volume of a module and its level of difficulty.

The European norm for full-time study over one academic year is 60 Credits. The Trinity academic year is 40 weeks from the start of Michaelmas Term to the end of the annual examination period. 1 Credit represents 20-25 hours estimated student input, so a 5-Credit module will be designed to require approximately 120 hours of student input including class contact time and assessments.

Credits are awarded to a student only upon successful completion of the course year. Progression from one year to the next is determined by the course regulations. Students who fail a year of their course will not obtain Credit for that year even if they have passed certain component modules. Exceptions to this rule are one-year and part-year visiting students, who are awarded Credits for individual modules successfully completed.

In addition to the specified contact hours indicated under each module, you are expected to engage in work associated with the module to bring your input up to a total of at least 125 hours for a 5 Credit module and 250 hours for a 10 Credit module.

Course structure

The Senior Sophister Environmental Science Moderatorship Programme consists of 60 European Credit Transfer Systems (ECTS Credits) per year. Senior Sophisters take a total of 40 mandatory Credits and optional modules up to 20 Credits. Some modules are examined entirely by in-course assessment; most are assessed by a combination of in-course assessment and examination. These modules are indicated in greater detail below:

Compulsory Modules

| Module Code | Modules | ECTS | Exam% | CA% |
|---------------------------|---------------------------------|-----------|-------|------|
| BO4105 | Global Environmental Change | 5 | 50% | 50% |
| ES4052 | General Environmental Sciences | 5 | 100% | - |
| FB4000 | Research Project | 15 | - | 100% |
| ZO4030 | Data Handling | 5 | - | 100% |
| ZO4060 | Research Comprehension | 5 | 60% | 40% |
| ZO4092 | Environmental Impact Assessment | 5 | 50% | 50% |
| TOTAL ECTS CREDITS | | 40 | | |

Optional Modules (students choose 20 credits from the following modules)

| Module Code | Modules | ECTS | Exam% | CA% |
|-------------------------------|--|-----------|-------|------|
| BO4103 | Plant Conservation and Biodiversity | 5 | 50% | 50% |
| BO4107 | Plant-Animal Interactions | 5 | 50% | 50% |
| BO4109 | Vegetation Description and Analysis | 5 | 50% | 50% |
| BO4110 | Evolution of Plants and Plant-Atmosphere interaction | 5 | 25% | 75% |
| ES4020 | Water Technology | 5 | 50% | 50% |
| ES4054 | Spatial Analysis using GIS | 5 | - | 100% |
| GG4026 | Environmental Governance II | 10 | - | 100% |
| ZO4013 | Conservation & Wildlife Management | 5 | 80% | 20% |
| ZO4017 | Tropical Ecology and Conservation | 5 | 50% | 50% |
| TOTAL CREDITS REQUIRED | | 20 | | |

Module Descriptions

COMPULSORY MODULES

BO4105: GLOBAL ENVIRONMENTAL CHANGE

Course type: Mandatory

Coordinator: Professor Michael Williams

ECTS Credits: 5 Credits

Assessment: 50% Continuous assessment, 50% Examination

Description:

The global environment is changing more rapidly at present than at any time during the human occupancy of the planet. This module reviews the existence of the changing environment and the predictions for the future.

Learning outcomes:

On successful completion of this module students should be able to:

- Understand the various elements of current global environmental change and the contribution of the major drivers of these changes.
- Understand the prevailing hypotheses as to the mechanisms and ultimate causes of global environmental change and the extent to which processes operate at different temporal and spatial scales.
- Appreciate the nature of the interactions between environmental change and ecosystem processes.
- Use analytical procedures in the laboratory and field to investigate the impacts of global change.

ES4052: GENERAL ENVIRONMENTAL SCIENCES

Course type: Mandatory

Coordinator: Professor Ian Donohue

ECTS Credits: 5 Credits

Assessment: 100% Examination

Description:

This module provides an opportunity for students to revise and study, in greater depth, topics from throughout the Sophister Environmental Sciences programme. Students are expected to integrate their approach to this material with the perspectives and skills they develop during their final year.

Appropriate literature relating to the Junior and Senior Sophister core (mandatory) modules will be recommended for detailed study.

The module is assessed through a problem-solving lab-based paper.

Learning outcomes:

On successful completion of this module, students will be able to:

- Understand and describe topical issues related to the environment.
- Develop critical appreciation of the scientific literature.
- Explain important basic concepts and current developments in such key areas of environmental sciences as ecology, freshwater hydrobiology, hydrology, wildlife biology and environmental governance.

- State confidently the theoretical and practical aspects relating to essential laboratory techniques.

FB4000: RESEARCH PROJECT

Course type: Mandatory

Module Personnel: Prof. Yvonne Buckley, All Zoology, Botany and Centre for the Environment Staff

ECTS Credits: 15 Credits

Assessment: 100% Continuous assessment: Thesis (14 ECTS credits), poster presentation (1 ECTS credit)

Description:

The project provides an important opportunity for students to plan and carry out a detailed and original piece of scientific research and communicate the results. It culminates in the production of a thesis and communication of the results through a poster presentation at an undergraduate research conference. Students will be assigned to a member of staff who will support an appropriate topic and will supervise the work. They will submit a research proposal before the practical work begins as part of the Junior Sophister ZO3070 Experimental Design & Analysis module, submit a thesis and present a poster on the results. For the project, they will be expected to outline clearly a scientific problem, review the associated literature, design and execute an appropriate research programme, analyse and present the results and draw clear conclusions, **all the time recording progress in a notebook, which must be made available to the project supervisor together with original data.** Detailed guidance notes on writing and submitting the thesis and poster may be found on the FB4000 Blackboard site.

Learning outcomes:

On successful completion of this module, students will be able to:

- Formulate scientific questions, apply a scientific approach to problem solving
- Plan an investigation and utilise the principles of good experimental, observational or computational design
- Conduct an in-depth scientific review of a subject
- Organise desktop, computational, field or laboratory based research including: logistics, recording, archiving, qualitative or numerical analysis and presentation and interpretation of data
- Manage a project through continuous assessment of progress and improvement of skills
- Effectively work with a team including their supervisor and other members of the research team
- Demonstrate technical competence in the handling of research facilities and operate safely in a computational, laboratory and/or field environment, both individually and as part of a team
- Present and communicate results in the form of a dissertation and presentation

ZO4030: DATA HANDLING

Course type: Mandatory

Coordinator: Professor Andrew Jackson

ECTS Credits: 5 Credits

Assessment: 100% Continuous assessment

Description:

This module will develop hypothesis testing with a revision of t-tests and explore general linear models, using ANOVA, product-moment correlation and regression. Experimental design will also be covered using ANOVA examples. Equivalent non-parametric approaches will be described. The module will go on to cover chi-squared and goodness of fit, and end with a brief introduction to multivariate statistics with a focus on ordination and classification. The module will be delivered by lectures, demonstration and discussion sessions, and by hands on use of various software packages.

Learning outcomes:

On successful completion of this module students should be able to:

- Design experiments effectively.
- Describe how various processes contribute to data variation.
- Use statistical software packages to analyse experimental data effectively.
- Apply commonly used statistical tests with discrimination and use these tests to draw valid conclusions from data.
- Present data in effective formats.
- Critically interpret and appraise commonly used methods of data analysis published in scientific literature.

ZO4060: RESEARCH COMPREHENSION

Course type: Mandatory

Coordinator: Professor Andrew Jackson

ECTS Credits: 5 Credits

Assessment: 40% Continuous assessment, 60% Examination

Description:

Research Comprehension will be made up of tutorials and weekly research seminars in the Evolutionary Biology and Ecology Seminar Series. In general, there will be a seminar on Friday followed by a tutorial about the seminar on Monday led by a member of academic staff. Tutorials will involve a discussion of the seminar and where it fits into the wider research area, and will be supplemented each week with assigned reading of papers mentioned during the seminar. There are also a few *special* tutorials throughout the year designed to introduce you to the module, provide help with thesis writing, and to prepare you for the Research Comprehension examination paper.

Aims:

No matter what you do when you graduate, in most jobs you will be expected to read, understand and interpret data. Often this will be in a subject you are unfamiliar with, or use unfamiliar methods or study organisms. The aim of this module is to help you to develop the ability to understand and interpret research from a broad range of scientific areas, and then to develop opinions about this

research and how it fits into the “big picture”. This module also aims to improve your ability to communicate all kinds of scientific research to a general audience, a skill that is currently in great demand.

Learning outcomes:

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

- Comprehend and report on scientific studies presented both orally and in primary literature.
- Identify the aims and/or hypotheses in scientific studies and analyse the research methods employed to address them.
- Interpret and generalize the results of the studies in the context of the wider subject area.
- Assess and evaluate the conclusions of the scientific study.
- Interpret graphical, tabular and pictorial representations of data and infer results in the context of the subject matter.
- Summarise scientific studies in language and style suitable for consumption by a wide audience in an online form.

Z04092: ENVIRONMENTAL IMPACT ASSESSMENT

Course type: Mandatory

Coordinator: Professor John Rochford

ECTS Credits: 5 Credits

Assessment: 50% Continuous assessment, 50% Examination

Description:

This module involves an introduction to the principles and processes of Environmental Impact Assessment, particularly in relation to national and international requirements. All stages of the EIA process, from initial project screening to the final review, are covered, with the emphasis throughout on the role of the natural scientist. Strategic Environmental Assessment is also briefly covered. In addition to the lectures, students carry out a scoping exercise for a proposed development and conduct a quality review of an actual EIS.

Learning Outcomes:

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

- Outline the development of the Environmental Impact Assessment process as a management and legislative tool from its inception in the 1960s to its present form.
- Explain the stages in the process from initial screening to post-project monitoring and auditing.
- Conduct a scoping exercise for a project and produce a draft Scoping Statement.
- Critically evaluate Environmental Impact Statements prepared for a wide range of projects.
- Compare and contrast the process of Environmental Impact Assessment with Strategic Environmental Assessment.
- Describe Appropriate Assessment in the context of Natura 2000 sites.

OPTIONAL MODULES

BO4103: PLANT CONSERVATION AND BIODIVERSITY

Course type: Optional

Coordinator: Professor Stephen Waldren

ECTS Credits: 5 Credits

Assessment: 50% Continuous assessment, 50% Examination

Description:

Loss of biodiversity is one of the major problems facing humanity. The theoretical background to the evolution of plant diversity is firstly developed, and the principles of conservation are then used to develop approaches to conserve plant diversity.

Learning outcomes:

On successful completion of this module students should be able to:

- Identify key processes that lead to the development of higher plant diversity
- Explain how patterns of plant diversity have arisen
- Assemble, manipulate and critically analyse experimental data related to plant diversity
- Describe the processes that threaten plant diversity, and evaluate the degree of threat
- Evaluate national legislation and policy related to plant diversity and its conservation
- Evaluate global and national initiatives to conserve plant diversity.

BO4107: PLANT-ANIMAL INTERACTIONS

Course type: Optional

Coordinator: Professor Jane Stout

ECTS Credits: 5 Credits

Assessment: 50% Continuous assessment, 50% Examination

Description:

In *The Origin of Species* (1859) Darwin emphasized that “plants and animals, most remote in the scale of nature, are bound together by a web of complex relations”. Plant-animal interactions have become increasingly recognized as drivers of evolutionary change and important components of ecological communities. This module will focus on pollination (the transfer of pollen between male and female reproductive structures in flowers) and herbivory (the consumption of plants by animals). The first half of the module will focus on plant-pollinator interactions, including pollinator-mediated evolution of floral traits, community level interactions, pollinator decline and conservation. The second part of the module will focus on antagonistic interactions between plants and herbivores, and explore plant and animal adaptations to herbivory, plant-herbivore dynamics and applications of interactions to ecosystem management. Practicals will investigate floral characteristics and adaptations for pollination, pollinator networks and plant and animal adaptations to herbivory.

The aims of the module are:

1. To promote your understanding of pure and applied ecology and evolution of plant-animal interactions
2. To equip you with the basic skills for carrying out laboratory and field experiments to examine plant-animal interactions.

Learning outcomes:

On successful completion of this module students should be able to:

- Synthesise and summarise aspects of the ecology and evolution of mutualistic and antagonistic plant-animal interactions, from individuals to communities, interactions between native and alien species, and applied issues.
- Carry out laboratory work investigating pollination syndromes, plant-pollinator interaction networks and plant and animal adaptations to herbivory, and analyse and interpret data collected.
- Work as a team to obtain, organise and present material on current topics in the field.

Indicative Reading List

Herrera CM, Pellmyr O (2002) Plant animal interactions: an evolutionary approach. Blackwell Science, Oxford

BO4109: VEGETATION DESCRIPTION AND ANALYSIS

Course type: Optional

Coordinator: Professor Stephen Waldren

ECTS Credits: 5 Credits

Assessment: 50% Continuous assessment, 50% Examination

Description:

This module will describe how to sample, record and lead up to detailed multivariate analyses to help define vegetation communities. Though some theoretical and historical framework will be given in lectures, the emphasis will be on practical collection, analysis and interpretation of vegetation data. Various data sets will be utilised in computer-based sessions, and field work will be used to generate a novel data set, the analysis and interpretation of which will form part of the continuous assessment for this module.

Learning Outcomes:

On successful completion of this module students should be able to:

- Employ effective methods to collect vegetation data
- Understand the theory and practice of vegetation description
- Employ a variety of measures to describe plant diversity in sampled vegetation
- Use multivariate statistical techniques to develop hypotheses about vegetation communities
- Utilise remotely sensed data and GPS in the field to map vegetation communities

BO4110: EVOLUTION OF PLANTS AND PLANT-ATMOSPHERE INTERACTION

Course type: Optional

Coordinator: Professor Jennifer McElwain

ECTS Credits: 5 Credits

Assessment: 75% Continuous assessment, 25% Examination

Description:

We are currently experiencing major changes in our climatic and atmospheric environment. Conservative estimates project that the concentration of greenhouse gas carbon dioxide will double by the end of this century and global temperatures are expected to rise by 1 to 4 degrees C. A major issue facing the scientific and political community is understanding how these projected changes will influence natural ecosystems, plant and animal ecology and biodiversity. This module will explore the evolution of plants in the context of long-term changes in climate and atmospheric composition. Examples of plant-atmosphere and plant-climate interactions in the deep geological past will be examined in addition to modern experimental studies. The course will provide a framework for understanding the nature and scale of evolution, adaptation and ecophysiological responses of plants to their atmospheric and climatic environment over the past 500 million years of Earth history. Continual assessment will be through a programme of tutorials and student reviews of primary research papers linked to lectures.

Learning Outcomes:

On successful completion of this module students should be able to:

- Describe plant evolution over the past 3,700 million years (with specific emphasis on land plant evolution over the past 500 million years based on the fossil plant record)
- Evaluate fossil plant responses to environmental extremes associated with mass extinction events in Earth history
- Describe how plant evolution influences the long-term carbon cycle, climate and atmospheric composition
- Understand global, regional, local and individual level plant responses to past changes in climate and atmospheric composition
- Use knowledge of plant-atmosphere responses in the deep geological past to evaluate the threat of ongoing anthropogenic global change

ES4020: WATER TECHNOLOGY

Course type: Optional

Coordinator: Professor Nick Gray

ECTS Credits: 5 Credits

Assessment: 50% Continuous assessment, 50% Examination

Description:

This module sets out to examine the practical aspects of managing the human water cycle from water treatment and supply through wastewater characteristics, treatment and disposal. As an introductory module it is limited in what it covers, but is primarily designed for those who are interested in a

possible future in the water industry, environmental consultancy or who want to do postgraduate studies in a water-related topic.

Learning outcomes:

On successful completion of this module students should be able to:

- Understand the principles and operation of water and wastewater treatment systems.
- Appraise the suitability of the design of treatment plants and unit processes.
- Be able to evaluate process operations and performance.
- Be able to utilize this knowledge in the design of EIAs or within an environmental management context.

ES4054: SPATIAL ANALYSIS USING GIS

Course type: Optional

Coordinator: Professor Niamh Harty

ECTS Credits: 5 Credits

Assessment: 100% Continuous assessment

Description:

This module introduces students to the framework and methods used in real-life problems related to the field of Spatial Analysis by applying the theoretical knowledge gathered during the module to live project work. The module seeks to impart the necessary skills and knowledge to enable graduates to engage as team members and leaders in the types of large and complex sustainable environment projects that are increasingly being planned across the world. It aims to help fill a major and increasingly obvious skills gap. A unique feature of this module is the use of Dublin and Ireland as a learning laboratory, where the students will take responsibility of a project. The Spatial Analysis using GIS Module is designed to introduce the student to spatial analysis using a Geographic Information Systems (GIS) platform and guide her/him through the learning process of advanced ArcGIS extensions dedicated to network analysis, spatial data mining and environmental phenomena modelling.

Learning Outcomes:

On successful completion of this module, students will be able to:

- Solve Spatial Analysis problems by applying interdisciplinary approaches.
- Discuss and debate solutions to problems in the environment.
- Communicate effectively in technical and scientific writing, and present scientific/technical ideas concisely to a technical audience that may not be expert in the specific domain of the presentation.
- Implement technical knowledge to address a spatial analysis problem.
- Be able to identify and use appropriate mathematical methods, numerical techniques and GIS tools for application to new and ill-defined spatial analysis problems.
- Have the ability to consult and work with experts in various fields in the realisation of a product or system.
- Have knowledge and understanding of concepts from a range of areas outside engineering.

- Be able to describe succinctly, the relevant advantages and disadvantages of various technologies to a lay audience, and to communicate effectively in public.

GG4026: ENVIRONMENTAL GOVERNANCE II

Course type: Optional

Coordinator: Professor Patrick Bresnihan

ECTS Credits: 10

Assessment: 100% Continuous assessment

Description:

This module considers why conflicts arise through the process of environmental governance. The focus of the module will be on developing analytical frameworks for analysing conflicts, such as political ecology, and potential mechanisms for conflict resolution. It will introduce students to the concept of governing environmental conflict through lectures, multimedia presentations, set readings and research activities, using examples from Ireland and overseas.

Learning outcomes:

- On successful completion of this module students will be able to:
- Articulate theoretical and practical issues related to the governing of environmental conflicts;
- Identify and evaluate different mechanisms for environmental conflict resolution and prevention;
- Critically analyse and reflect on information provided by variety of sources including academic papers, print and TV media and internet material covered during the module.

ZO4013: CONSERVATION AND WILDLIFE MANAGEMENT

Course type: Optional

Coordinator: Professor John Rochford

ECTS Credits: 5 Credits

Assessment: 20% Continuous assessment, 80% Examination

Description:

This module, which consists of both lectures and tutorials, looks at some of the practical applications of wildlife biology to the conservation and management of animals, both in- and ex-situ, including the role of zoos in captive breeding programmes.

Among the topics covered are:

- Planning for wildlife management.
- Wildlife survey and census techniques.
- The principles of managing wildlife for sustainable harvest or control.
- Management of scarce or endangered species.
- Practical issues associated with the ex-situ management of species.
- The design and management of conservation areas.

In the second part of the module, we will concentrate on anthropogenic impacts on biodiversity conservation, including the development and implementation of biodiversity conservation strategies in the wake of the Convention on Biological Diversity, other national and international wildlife legislation, biosecurity and the role of Invasive Alien Species, Biological Data Management and the development of Species Action Plans, and the role of reintroductions in biodiversity conservation.

Learning outcomes:

On successful completion of this elective, the student will be able to:

- Outline the goals and history of sustainable wildlife management.
- Determine and evaluate strategies for exploitation and control of animal resources.
- Implement techniques for establishing and maintaining the conservation status of species.
- Describe the relationship between in- and ex-situ conservation measures.
- Evaluate the selection, design and management of protected areas for wildlife.

ZO4017: TROPICAL ECOLOGY AND CONSERVATION

Course type: Optional

Coordinator: Professor Ian Donohue

ECTS Credits: 5 Credits

Assessment: 50% Continuous assessment, 50% Examination

Description:

The module comprises a ten-day residential field course in East Africa that will run at the beginning of November (i.e. encompassing the reading week). The course will focus on the ecology and biodiversity of a range of ecosystems and habitats (including aquatic ecosystems [freshwater rivers and lakes, wetlands and saline lakes], tropical montane forest and grasslands) and the connectivities among them. Issues and problems to do with human impacts and the conservation and management of these diverse habitats will also comprise an important element of the course. The course will focus particularly on the following three topics:

- Quantifying biodiversity and the factors that underpin biodiversity in the tropics
- Invasive species
- Sustainable development of tropical ecosystems

Learning Outcomes:

By the end of the module, typical students will:

- Demonstrate holistic knowledge of East African geology, landscapes and ecosystems and the extent and nature of human interactions within them;
- Understand the principles underpinning the ecology of tropical grasslands, forests, freshwaters and alkaline waters and be able to explain these to a layperson;
- Be able to evaluate the importance of natural background environmental fluctuations compared to those caused by human impact;

- Be able to synthesise and reconcile the conflicting arguments for the future of each of the ecosystems visited;
- Be capable of integrating these arguments into sustainable management plans, which incorporate indigenous livelihoods;
- Be able to design a group research project, conduct the research and analyse and synthesise results
- Be able to make a competent oral presentation of their research project.

Some important dates in 2017-18

| | |
|-------------------------------|--|
| 2017 | |
| Michaelmas Term begins | 25 th September 2017 |
| Lectures and Tutorials begin | 2 nd October 2017 |
| Study Week - no lectures | 6 th – 10 th November 2017 |
| Tropical Ecology Field Course | 5 th – 12 th November 2017 |
| Michaelmas Term ends | 17 th December 2017 |
| 2018 | |
| Lectures and Tutorials begin | 15 th January 2018 |
| Study Weeks - no lectures | 26 th February – 2 nd March 2018 |
| Hilary Term ends | 8 th April 2018 |
| Revision period | 9 th – 27 th April 2018 |
| Examination period | 30 th April – 27 th May 2018 |

| Teaching Term Dates 2017-2018 | | | |
|---|-------------------|---|-------------------|
| Michaelmas Term Monday 25 September 2017 – Friday 15 December 2017 | | Hilary Term Monday 15 January 2018 - Friday 6 April 2018 | |
| Week 05 | 25 Sep - 29 Sep | Week 21 | 15 Jan - 19 Jan |
| Week 06 | 02 Oct - 06 Oct | Week 22 | 22 Jan - 26 Jan |
| Week 07 | 09 Oct - 13 Oct | Week 23 | 29 Jan - 02 Feb |
| Week 08 | 16 Oct - 20 Oct | Week 24 | 05 Feb - 09 Feb |
| Week 09 | 23 Oct - 27 Oct | Week 25 | 12 Feb - 16 Feb |
| Week 10 | 30 Oct * - 03 Nov | Week 26 | 19 Feb - 23 Feb |
| Study Wk Week 11 | 06 Nov - 10 Nov | Study Wk Week 27 | 26 Feb - 02 Mar |
| Week 12 | 13 Nov - 17 Nov | Week 28 | 05 Mar - 09 Mar |
| Week 13 | 20 Nov - 24 Nov | Week 29 | 12 Mar - 16 Mar |
| Week 14 | 27 Nov - 01 Dec | Week 30 | 19 Mar *- 23 Mar |
| Week 15 | 04 Dec - 08 Dec | Week 31 | 26 Mar - 30 Mar * |
| Week 16 | 11 Dec - 15 Dec | Week 32 | 02 Apr *- 06 Apr |
| * ■ Bank/Public Holidays | | | |

Assessment and Examinations

Examination dates

Junior Sophister and Senior Sophister examinations will take place after the Trinity Term, between: 1st May – 26th May 2018.

External Examiner

An external examiner, currently Professor Guy Woodward (Imperial College London) moderates the Junior and Senior Sophister examinations. It is common practice for external examiners to viva students following the completion of their final examinations. The viva timetable will be available during the examinations.

Module assessment

Junior Sophister modules are assessed by in-course continuous assessment and/or examination. Please note that twenty per cent of the Senior Sophister overall mark is carried forward from the Junior Sophister year.

Senior Sophister modules are also assessed by in-course continuous assessment and/or examination. Your final degree classification is based on a combination of marks; continuous assessment; research project including submission of a thesis and examinations.

You should take care not to engage in plagiarism when completing exercises: for instance colluding with others to complete a word-processed practical report would be plagiarism unless approval had been sought in advance from the relevant lecturer. [see section below on College policy dealing with plagiarism.]

You must indicate on any practical write-ups the name of your Partner(s) and his/her ID number(s).

Submission of continuous assessment material

To avoid any misunderstandings arising in relation to submitting continuous assessments please adhere to the following points as they are absolute:

- Assessments must be submitted at the appropriate location (usually either the Botany or Zoology Offices, depending upon the module) before the set deadline. Students need to sign-off at the time of submission.
- Assessments left in staff pigeonholes, or handed to other members of staff will not be marked.
- For late submissions there will be a deduction of 5% per day, including weekends. Submissions received more than three days late, without a medical certificate, will not be marked. ALL LATE SUBMISSIONS MUST BE HANDED IN DIRECTLY TO THE RELEVANT OFFICE TO THE EXECUTIVE OFFICER TO BE DATE STAMPED.
- Any alternative arrangements must be approved by the staff member responsible for the assessment, and the relevant Executive Officer notified.
- Please remember it is important to keep all Continuous Assessment exercises when returned to you, until the Court of Examiners has awarded your final mark.

Plagiarism

To ensure that you have a clear understanding of what plagiarism is, how Trinity deals with cases of plagiarism, and how to avoid it, you will find a repository of information at <http://tcd-ie.libguides.com/plagiarism>.

We ask you to take the following steps:

- (i) Visit the online resources to inform yourself about how Trinity deals with plagiarism and how you can avoid it at <http://tcd-ie.libguides.com/plagiarism>. You should also familiarize yourself with the 2015-16 Calendar entry on plagiarism located on this website and the sanctions which are applied.
- (ii) Complete the 'Ready, Steady, Write' online tutorial on plagiarism at <http://tcd-ie.libguides.com/plagiarism/ready-steady-write>. Completing the tutorial is compulsory for all students.
- (iii) Familiarise yourself with the declaration that you will be asked to sign when submitting course work at <http://tcd-ie.libguides.com/plagiarism/declaration>.
- (iv) Contact your College Tutor, your Course Director, or your Lecturer if you are unsure about any aspect of plagiarism.

Ethics

In line with Trinity College Dublin's Policy on Good Research Practice, all research in the School of Natural Sciences (SNS) should be conducted according to the overarching ethical principles of "respect for the individual subject or population, beneficence and the absence of maleficence (research should have the maximum benefit with minimal harm) and justice (all research subjects and populations should be treated fairly and equally)."

All individuals involved in research should facilitate and ensure research is conducted ethically. Ethical conduct in research is a shared responsibility. Primary responsibility rests with the Principal Investigator(s). Ethical responsibilities and legal obligations may overlap. All staff and students conducting research are required to ensure that their research is carried out in compliance with this policy. Ethical review is required before any studies involving human subjects, other living organisms and natural or man-made habitats commence. This requirement applies to staff, postgraduate and undergraduate students and volunteers/interns. Field- and laboratory work cannot commence until review has been completed and/or approval has been gained. STUDENTS PLANNING TO UNDERTAKE RESEARCH SHOULD COMPLETE THE SNS Research Ethics Application.

For further details please follow this link:

www.naturalscience.tcd.ie/research/ethics

Sophister Essay & Examination Marking Guide

| Class | Mark Range | Criteria |
|-------------|---------------|---|
| I | 90-100 | EXCEPTIONAL ANSWER; This answer will show original thought and a sophisticated insight into the subject, and mastery of the available information on the subject. It should make compelling arguments for any case it is putting forward, and show a rounded view of all sides of the argument. In exam questions, important examples will be supported by attribution to relevant authors, and while not necessarily giving the exact date, should show an awareness of the approximate period. In essays, the referencing will be comprehensive and accurate. |
| | 80-89 | OUTSTANDING ANSWER; This answer will show frequent originality of thought and make new connections between pieces of evidence beyond those presented in lectures. There will be evidence of awareness of the background behind the subject area discussed, with evidence of deep understanding of more than one view on any debatable points. It will be written clearly in a style which is easy to follow. In exams, authors of important examples may be provided. In essays all important examples will be referenced accurately. |
| | 70-79 | INSIGHTFUL ANSWER; showing a grasp of the full relevance of all module material discussed, and will include one or two examples from wider reading to extend the arguments presented. It should show some original connections of concepts. There will be only minor errors in examples given. All arguments will be entirely logical, and well written. Referencing in exams will be sporadic but referencing should be present and accurate in essays. |
| II-1 | 65-69 | VERY COMPREHENSIVE ANSWER; good understanding of concepts supported by broad knowledge of subject. Notable for synthesis of information rather than originality. Evidence of relevant reading outside lecture notes and module work. Mostly accurate and logical with appropriate examples. Occasionally a lapse in detail. |
| | 60-64 | LESS COMPREHENSIVE ANSWER; mostly confined to good recall of module work. Some synthesis of information or ideas. Accurate and logical within a limited scope. Some lapses in detail tolerated. Evidence of reading assigned module literature. |
| II-2 | 55-59 | SOUND BUT INCOMPLETE ANSWER; based on module work alone but suffers from a significant omission, error or misunderstanding. Usually lacks synthesis of information or ideas. Mainly logical and accurate within its limited scope and with lapses in detail. |
| | 50-54 | INCOMPLETE ANSWER; suffers from significant omissions, errors and misunderstandings, but still with understanding of main concepts and showing sound knowledge. Several lapses in detail. |
| III | 45-49 | WEAK ANSWER; limited understanding and knowledge of subject. Serious omissions, errors and misunderstandings, so that answer is no more than adequate. |
| | 40-44 | VERY WEAK ANSWER; a poor answer, lacking substance but giving some relevant information. Information given may not be in context or well explained, but will contain passages and words, which indicate a marginally adequate understanding. |
| F-1 | 30-39 | MARGINAL FAIL; inadequate answer, with no substance or understanding, but with a vague knowledge relevant to the question. |
| F-2 | 0-29 | UTTER FAILURE; with little hint of knowledge. Errors serious and absurd. Could also be a trivial response to the misinterpretation of a question. |
| U.G | | Ungraded |

Sophister Project & Thesis Marking Guide

| Class | Mark Range | Criteria |
|-------------|---------------|--|
| I | 85-100 | Exceptional project report showing broad understanding of the project area and excellent knowledge of the relevant literature. Exemplary presentation and analysis of results, logical organisation and ability to critically evaluate and discuss results coupled with insight and originality. |
| | 70-84 | A very good project report showing evidence of wide reading, with clear presentation and thorough analysis of results and an ability to critically evaluate and discuss research findings. Clear indication of some insight and originality. A very competent and well presented report overall but falling short of excellence in each and every aspect. |
| II-1 | 60-69 | A good project report which shows a reasonably good understanding of the problem and some knowledge of the relevant literature. Mostly sound presentation and analysis of results but with occasional lapses. Some relevant interpretation and critical evaluation of results, though somewhat limited in scope. General standard of presentation and organisation adequate to good. |
| II-2 | 50-59 | A moderately good project report which shows some understanding of the problem but limited knowledge and appreciation of the relevant literature. Presentation, analysis and interpretation of the results at a basic level and showing little or no originality or critical evaluation. Insufficient attention to organisation and presentation of the report. |
| III | 40-49 | A weak project report showing only limited understanding of the problem and superficial knowledge of the relevant literature. Results presented in a confused or inappropriate manner and incomplete or erroneous analysis. Discussion and interpretation of result severely limited, including some basic misapprehensions, and lacking any originality or critical evaluation. General standard of presentation poor. |
| Fail | 20-39 | An unsatisfactory project containing substantial errors and omissions. Very limited understanding, or in some cases misunderstanding of the problem and very restricted and superficial appreciation of the relevant literature. Very poor, confused and, in some cases, incomplete presentation of the results and limited analysis of the results including some serious errors. Severely limited discussion and interpretation of the results revealing little or no ability to relate experimental results to the existing literature. Very poor overall standard of presentation. |
| Fail | 0-19 | A very poor project report containing every conceivable error and fault. Showing virtually no real understanding or appreciation of the problem and of the literature pertaining to it. Chaotic presentation of results, and in some cases incompletely presented and virtually non-existent or inappropriate or plainly wrong analysis. Discussion and interpretation seriously confused or wholly erroneous revealing basic misapprehensions. |

Academic and Personal Issues

Academic Issues

If you experience any academic problems, below are some sources of assistance:

- Module Lecturer and/or coordinator
- Course Director
- Class representatives
- Head of Discipline
- Personal tutor (or any other tutor if you cannot find yours)
- Senior Tutor
- Head of School
- Director of Teaching and Learning (Undergraduate)
- Students' Union Education Officer, (01) 646 8439, Email: education@tcdsu.org

Personal Issues

If you experience any personal problems, below are some sources of assistance:

- Personal tutor (or any other tutor if you cannot find yours)
- Senior Tutor
- Student Counselling Service, 199/200 Pearse Street, College, Email: student-counselling@tcd.ie; (01) 896 1407
- Niteline: (Thursdays to Sundays during term only, 9pm - 2.30am) at 1800 793 793
- Student Health Service, House 47 - Medical Director: Dr David McGrath 01 896 1556; Doctors: Dr Mary Sheridan, Dr Aisling Waters, Dr Niamh Murphy 896 1556; Nurse: Ms Carmel Conway 01 896 1556; Health Promotion Officer: Ms Martina Mullin 01 896 1556; Physiotherapist: Ms Karita Cullen 01 896 1591;
- Welfare Officer, Students' Union, House 6, College (01) 646 8437, Email: welfare@tcdsu.org
- Chaplains; House 27, College: Alan O'Sullivan (Roman Catholic) 896 1260; Hilary Dungan (Church of Ireland) 01 896 1402; Julian Hamilton (Presbyterian) 896 1901; Peter Sexton (Roman Catholic) 01 896 1260
- Disability Services, Mr Declan Treanor, Room 3055, Arts Building (01 896 3111), Email: disab@tcd.ie
- Any student, member of staff or other person with whom you feel able to discuss your problems

Health and Safety

LEGAL BACKGROUND

The University must exercise a "duty of care" to employees and those they supervise. This duty of care is recognised in both criminal and civil law. There is also a duty on everybody to take reasonable care for their own safety and the safety of those around them.

DISCIPLINE SAFETY OFFICERS

Botany - Botany Building , Anatomy Building & Dartry Gardens – Siobhan MacNamee, Siobhan.McNamee@tcd.ie

Environmental Science - Anatomy Building – Mark Kavanagh, kavanamg@tcd.ie

Geography - Museum Building – Terence Dunne, Terence.Dunne@tcd.ie

Geology - Museum Building, TTech Pearse St. – Cora McKenna, mckennnc6@tcd.ie

Zoology – Zoology Building – Alison Boyce, aboyce@tcd.ie

CONTRIBUTING DEPARTMENTS

Each of the four disciplines that comprise the School of Natural Sciences (i.e. Botany, Geography, Geology and Zoology) contribute courses to the Environmental Science Moderatorship. Courses will be run in the lecture and laboratory facilities in each Department building. You must make yourself aware of the safety regulations and house rules for each department. You should also become familiar with the department resources available to you, such as libraries, museums and IT facilities. Information can be found on each department web site or by contacting the Chief Technical Officer or Executive Officer.

THE LABORATORY

In formal laboratory exercises will have been risk assessed. You will be under supervision in a controlled environment where all reasonable safety precautions have been considered and all hazards identified. You have a legal obligation to follow the instructions of those in control of the laboratory. You have a duty of care for yourselves and those who may be affected by your actions. This means that your behaviour in the laboratory must be such that you do nothing to place either yourself or other laboratory users at risk. If you do not understand any instructions you must alert those in control.

Instrumentation in a laboratory is an area of high risk. . If you have never used an instrument before you will not know the potential dangers it may pose. Do not interfere with any piece of equipment or use it without prior instruction The staff, both academic and technical, along with the demonstrators, are available to instruct you so always ask to be taken through the use and dangers of any piece of equipment which you have to use.

FIELDWORK

Fieldwork is defined as any practical work carried out in the field by staff or students of the University for the purpose of teaching and/or research. By definition it occurs in places which are not under the control of the University, but where the University is responsible for the safety of its staff and students.

Please note:

Voluntary and Leisure activities are excluded.

Outside of Voluntary and Leisure activities, the Head of Discipline has overall responsibility for health and safety in their area. They are required to ensure that the risk assessment of the fieldwork is made and to ensure that a safe system of work has been established for all staff and students. This duty is frequently delegated to the member of staff organising the fieldwork. The Head of Discipline must ensure that the fieldwork meets the safety criteria of the School, and that accidents are reported and investigated. There is a Department Safety Officer, who is responsible for day-to-day safety matters.

There is a duty on the fieldwork participants to take reasonable care for their own safety and the safety of those affected by them.

Some staff and students may be unable to carry out certain types of fieldwork due to any number of physical or medical conditions and early identification of such problems is essential.

There are a number of forms that must be completed before Laboratory or Fieldwork is begun. Please note that it is compulsory for each student to fill these forms in prior to beginning fieldwork. These may include Health Declaration Forms, Code of Conduct Agreement and Risk Assessment. The forms must be returned to the relevant Discipline Safety Officer.

Relevant and suitable protective equipment must be worn. Participants must dress appropriately especially in cold and wet conditions. When the activity involves the use of boats other than registered ferries appropriate life jackets must be worn.

The School of Natural Sciences has prepared a detailed set of instructions relating to field-work. Available at:

<http://www.naturalscience.tcd.ie/healthsafety/>

FIRE

Fire Prevention

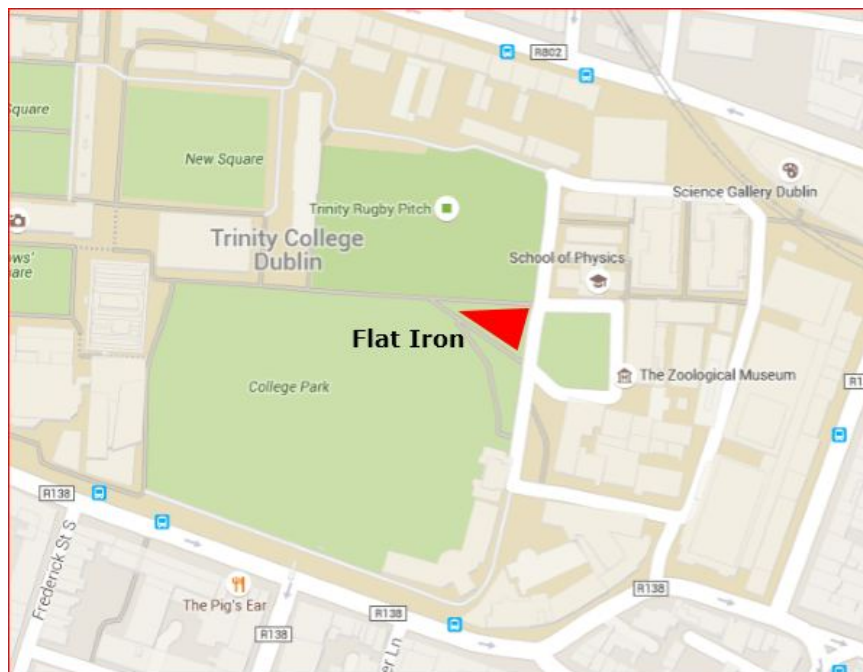
Copies of the College General Fire Notice are displayed in all Departments. Familiarise yourself with the instructions in case of fire. Any defect or potential fire hazards should be reported to the building Fire Warden. Note the position of fire extinguishers in your working area. Please note you are not permitted to use a fire extinguisher unless you have attended the College's training course.

Before leaving offices or laboratories:-

- ensure that all litter bins do not contain any smouldering materials.
- do not leave litterbins under or near to any combustible items e.g. desks, tables, shelving etc.
- close all filing cabinets and presses.
- switch off and unplug electrical equipment not in use.

In Case of Fire

- There is a fire alarm system in the buildings controlled by all Disciplines. If the alarm bells ring or someone shouts 'fire', all persons in the building must exit as rapidly as possible and assemble at the appropriate assembly point For Botany, Zoology and Centre for the Environment this is located at the Grass triangle ('Flat Iron') at east end of Boardwalk (College Park), designated Fire Point D:



At the assembly point organise yourselves into laboratory or functional groups and the senior person present must take a roll-call. Missing persons must be reported immediately.

Inform the Front Gate Security Officer, emergency no. ext: 1999 (01 896 1999 from mobile) or the 24 hour security no. ext: 1317 (01 896 1317), who will call the fire brigade.

BOMBS/HOAX BOMB CALLS/BOMB WARNINGS

Keep an eye out for suspicious packages at all times. If one is observed report it to the Chief Technical Officer or another staff member. If a bomb is thought to be in the building, procedures essentially follow those employed in the case of fire. Report to College authorities on ext: 1999/1317 (Front Gate Security Officer & 24 hour Security) who will call the Gardaí.

FIRST AID

First Aid boxes are placed in every laboratory. These boxes contain a range of dressings and bandages for treatment of minor cuts and burns. DO NOT USE AN ITEM WITHOUT SUBSEQUENTLY INFORMING A TECHNICAL OFFICER. This ensures the incident is recorded and the items used are replaced. A list of trained First Aiders is displayed on each first aid cabinet.

REPORT ANY DEFICIENCY OF THE ITEMS IN OR ON THE BOX TO THE RELEVANT CHIEF TECHNICAL OFFICER.

All accidents must be reported to the Safety Officer and entered in the accident book. An accident report form will be completed. Dangerous occurrences (near misses) must also be reported on the appropriate form.

In the event of serious accident or medical emergency requiring the emergency services, quickly report it to the Chief Technical Officer in that building or the senior person present, then call the Front Gate Security Officer ext: 1999/1317. During office hours minor medical assistance can be obtained from the Student Health Service ext: 1556/1591.

First Aid may only be carried out by a trained first aid responder. In the field, all staff and demonstrators carry an individual first aid kit. Departmental vehicles carry a more extensive kit. Report all field injuries or illness immediately to the leader of the field trip. You must always adhere to the instructions and directions of the field-leader.

Staff Contacts

| Staff | Office location | Ext | Email |
|-------------------------------|---------------------------------|------|-----------------------|
| <i>Teaching staff</i> | | | |
| Prof Yvonne Buckley | Zoology Building | 3172 | buckleyy@tcd.ie |
| Prof Patrick Bresnihan | Museum Building | 2661 | pbresnih@tcd.ie |
| Prof Catherine Coxon | Centre for the Environment | 2235 | cecoxon@tcd.ie |
| Prof Ian Donohue | Zoology Building | 1356 | ian.donohue@tcd.ie |
| Prof Robbie Goodhue | Museum Building | 1419 | goodhuer@tcd.ie |
| Prof Nick Gray | Botany Building | 1639 | nfgray@tcd.ie |
| Prof Niamh Harty | Civil Engineering | 1302 | Niamh.Harty@tcd.ie |
| Prof Celia Holland | Zoology Building | 1096 | cholland@tcd.ie |
| Prof Andrew Jackson | Zoology Building | 2278 | jackson@tcd.ie |
| Prof Nicola Marples | Zoology Building | 2527 | nmarples@tcd.ie |
| Prof Jennifer McElwain | Botany Building | | |
| Prof Fraser Mitchell | Botany Building | 1811 | fmitchll@tcd.ie |
| Prof Jeremy Piggott | Zoology Building | 1642 | Jeremy.Piggott@tcd.ie |
| Prof John Rochford | Zoology Building | 2237 | rchfordj@tcd.ie |
| Prof Matt Saunders | Botany Building | 4870 | saundem@tcd.ie |
| Prof Jane Stout | Botany Building | 3761 | jane.stout@tcd.ie |
| Prof Steve Waldren | Trinity Botanic Gardens, Dartry | 5117 | swaldren@tcd.ie |
| Prof Mike Williams | Botany Building | 2421 | willism@tcd.ie |
| <i>Technical Staff</i> | | | |
| Ms Patricia Coughlan | Botany Building | 1275 | coughlp@tcd.ie |
| Mr Mark Kavanagh | Centre for the Environment | 1017 | kavanamg@tcd.ie |
| Ms Siobhan McNamee | Botany Building | 1309 | smcnamee@tcd.ie |
| Ms Jackie Stone | Centre for the Environment | 1275 | jstone@tcd.ie |
| Dr Martyn Linnie | Zoology Building | 1679 | mlinnie@tcd.ie |
| Ms Alison Boyce | Zoology Building | 3506 | aboyce@tcd.ie |
| Ms Sarah-Louise Hassett | Zoology Building | 3506 | shassett@tcd.ie |

Executive Officers

| | | | |
|---------------------|--------------------------------------|------|-------------|
| Ms Aisling O'Mahony | Undergraduate | 1274 | ZOBO@tcd.ie |
| Ms Fiona Moloney | Teaching Office, Zoology Building | 1366 | ZOBO@tcd.ie |