Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

School of Natural Sciences

Environmental Sciences

Junior Sophister Handbook 2017-2018

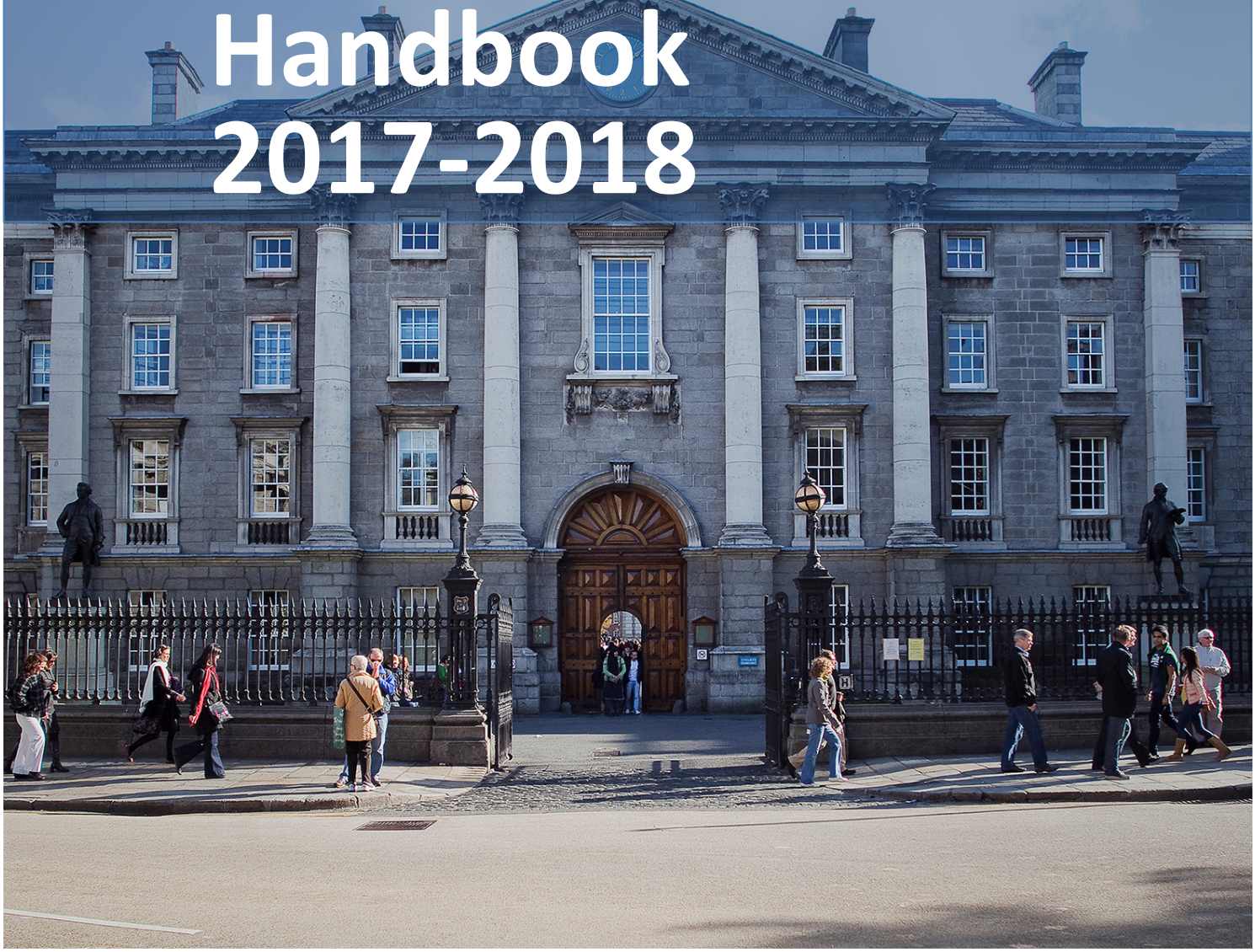


Table of Contents

The Programme

Programme Regulations

General Information

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.

Prof. 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.

Emphasis in the Moderatorship is on the student acquiring laboratory and field skills. To reflect this, there are a number of field excursions that students may choose in the Junior and Senior Sophister years. An introductory Autumn field

trip begins the Junior Sophister year (as part of the module in Plants and the Irish Environment) where the student is introduced to skills in data collection and analysis. This involves three days' field and laboratory studies in a range of ecosystems, including woodlands, bogs, salt-marshes and sand-dunes.

Also during the Junior Sophistor year, in the second semester, Environmental Sciences students will take a field course in Glendalough (as part of the module in Wildlife Biology and Terrestrial Ecology) and may also attend the optional residential field course in Field Skills in Plant & Environmental Science that takes place in Gran Canaria. 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 Sophister Environmental Science Moderatorship Programme consists of 60 European Credit Transfer Systems (ECTS Credits) per year. Junior Sophisters take a total of 50 mandatory Credits and optional modules up to 10 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%
BO3018	Plants and the Irish Environment	5	-	100%
BO3123	Soil Science	5	50%	50%
ES3053	Freshwater Hydrobiology	5	-	100%
ES3040	Environmental Monitoring	5	50%	50%
GG3030	Environmental Governance	10	50%	50%
GL3423	Hydrology and Water Quality	5	70%	30%
ZO3010	Fundamentals of Ecology	5	50%	50%
ZO3085	Wildlife Biology	5	50%	50%
ZO3070	Experimental Design & Analysis	5	-	100%
	TOTAL ECTS	**50**		

Optional Modules (students choose 10 credits from the following modules)

Module Code	Modules	ECTS	Exam%	CA%
BC	Broad Curriculum	5	-	100%
BO3120	Environmental Dynamics	5	-	100%
BO3121	Field Skills in Plant & Environmental Science	5	-	100%
BO3122	Entomology	5	50%	50%
BO3124	Economic Botany	5	-	100%
	TOTAL CREDITS REQUIRED	**10**		

Module descriptions

COMPULSORY MODULES

BO3108: PLANTS AND THE IRISH ENVIRONMENT
Course type: Mandatory
Coordinator: Professor John Parnell
ECTS Credits: 5 Credits
Assessment: 100% Continuous assessment

Description:
This module combines an introduction to the Plant Sciences and Environmental Sciences moderatorships with a series of field-based activities including a residential field-trip during the first week of term (Week 5). There will also be a lecture given during the field trip and three following it on specific aspects of the Irish flora.

Learning outcomes:
- Collect and accurately record various types of data from a range of local habitats using several different methods.
- Identify native species.
- Interpret relationships between plants, and between plants and the physical environment.
- Contrast ecological sampling techniques and assess their relative merits.
- Analyse in detail the natural and cultural landscape.

BO3123: SOIL SCIENCE
Course type: Mandatory
Coordinator: Professor Matt Saunders
ECTS Credits: 5
Assessment: 50% Continuous assessment, 50% Examination

Description:
Soils are important for plants as they provide the key resources required for growth and also essential structural support. This module will provide an overview of the fundamental concepts of soil formation and characterisation; how soil characteristics influence plant distribution and productivity through water and nutrient availability; how soil organisms (bacteria, fungi) interact with plants and how soils influence global biogeochemical cycles (carbon and nitrogen). Particular focus will be given to the role of soils in the production of food, fuel and fibre and how sustainable land management practices are required to ensure the long-term health and fertility of soil systems.

Learning outcomes:
On successful completion of this module, students should be able to:
- Describe the nature of soil and the terms used to describe the major physical and chemical characteristics of soil.
- Understand how soils are formed and how they are influenced by natural and anthropogenic processes.

- Compare and contrast the role of soils in plant productivity such as through plant water relations and mineral nutrition.
- Appraise the issues of sustainable soil management and the impacts of intensive land use on soil quality and fertility.
- Demonstrate an understanding of biogeochemical cycling within soil systems and the role of soils in the mitigation of climate change.

Indicative Reading List:

- Foth, HD. (1990). Fundamentals of soil science. Wiley, Chichester.
- Hartlemink, AE., McBratney, AB., White, RE. (Eds) (2009). Soil Science, Earthscan, London.
- Lal, R. (2006). Encyclopedia of soil science. Taylor and Francis. Oxford.
- McLaren, RG., Cameron, KC. (1996). Soil science: sustainable production and environmental protection. Oxford University Press, Oxford.
- Weil, RR., Brady, NC. (2016). The nature and properties of soil. Pearson, London.
- White, RE. (2006). Principles and practice of soil science: the soil as a natural resource. Blackwell Science, Oxford

ES3053: FRESHWATER HYDROBIOLOGY
Course type: Mandatory
Coordinator: Professor Nick Gray
ECTS Credits: 5
Assessment: 100% Continuous assessment

Description:
This is an introductory module in freshwater systems (lakes and rivers) that explore the effect of water quality on the biota and community structure.
Areas studied include: Factors that determine the distribution of biota: Natural dispersion; flow, substrate; dissolved solids; dissolved oxygen and temperature; suspended solids. Aquatic ecosystems: Community structure; identification of organisms; functional feeding groups; P:R, plants, allochtonous and autochotonus inputs; habitat zonation; river and lake ecosystems; feeding guilds; microbial oxygen demand (inc. self-purification, oxygen balance, re-aeration, the oxygen-sag curve). Water pollution: Toxic substances; suspended solids (inert and oxidizable), deoxygenation, non-toxic salts (inc. salinization, eutrohication and algal toxins); heated water, effect on buffering system; diffuse pollution; afforestation; response to climate change.

Water basin management: Basic management processes; Water Framework Directive; water quality and regulation. Water quality assessment: Physico-chemical and biological surveillance; Sampling surface waters (inc. designing sampling programmers, mixing, safety in the field, hydrological measurements; chemical and biological sampling); Biological data (inc. pollution and diversity indices; multivariate analysis); Chemical data (inc. chemical indices; mass balance and modelling). The module comprises lectures, field and laboratory work.

Required Course Text:
Gray, N. F. (2010) Water Technology: an introduction for environmental scientists and engineers. (3rd edition) Elsevier, Oxford.

ES3040: ENVIRONMENTAL MONITORING
Course type: Mandatory
Coordinator: Professor Jeremy Piggott
ECTS Credits: 5
Assessment: 50% Examination, 50% Continuous assessment

Description:
This module covers the tools and sampling approaches used to characterize and monitor the quality of the environment. Techniques encompass the collection and analysis of chemical and biological samples and their application to environmental quality indices. Students will have the opportunity to apply the techniques to a range of sample types, such as those such as those collected from terrestrial and aquatic environments. Techniques include both traditional and novel methods being applied in environmental monitoring programs across Europe. Visits to laboratories in other institutions are included.

Learning Outcomes:
On successful completion of this module you will be able to:

- Explain the tools and sampling approaches used to characterize and monitor the quality of the environment
- Select appropriate procedures for the collection and analysis of environmental samples (chemical and biological samples)
- Carry out a range of analysis procedures in the field and laboratory
- Present and interpret results of chemical/biological analyses and application to relevant environmental quality indices

GG3030: ENVIRONMENTAL GOVERNANCE
Course type: Mandatory
Coordinator: Professor Patrick Bresnihan
ECTS Credits: 10
Assessment: 50% Continuous assessment, 50% Examination

Description:
This module focuses on the way in which environmental issues are governed by the state, the private sector, publics and civil society. The module will expand student's knowledge of fundamental concepts of nature, culture and environment, and the politics of environmental valuation and protection.

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

- Identify and articulate theoretical aspects of governance and environmental governance.
- Discuss the roles of governance actors (public, private and civil society) in the environmental field.

- Critically debate the nature and impact of governing tools and technologies that operate at a range of scales (and across scales) from the local to the global.
- Outline the nature of governing with respect to select areas of the environment.
- 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.

Key Texts:

- Evans, G. (2012) Environmental Governance, Routledge, London.
- Doyle, T. and McEachern, D. (2008) Environment and Politics, Routledge, London.
- Baker, S. (2006) Sustainable Development, Routledge, London.
- Roberts, J. (2004) Environmental Policy, Routledge, London.

GL3423: HYDROLOGY AND WATER QUALITY
Course type: Mandatory
Coordinator: Professor Catherine Coxon
ECTS Credits: 5
Assessment: 30% Continuous assessment, 70% Examination

Description:
This course aims to provide students with an understanding of hydrological processes, following the different pathways of water through the terrestrial part of the hydrological cycle. It also aims to familiarise students with the factors affecting groundwater quality, and to develop an understanding of groundwater quality issues in the context of integrated catchment management.

Module content:
The hydrology component of this module includes the following topics: the hydrological cycle and catchment water balances; rainfall and evapotranspiration; soil water and hillslope hydrology; river flow; hydrogeology; groundwater – surface water interaction. The water quality component is focussed primarily on groundwater, with topics including groundwater chemistry and natural groundwater quality problems; groundwater quality issues in rural and industrial settings; groundwater quality monitoring; groundwater vulnerability and protection. The interaction of groundwater and surface water quality is also considered.

Learning outcomes:
On completion of this module, the student should be able to:

- Evaluate the role of different hydrological pathways in a range of catchment settings.
- Carry out calculations relating to catchment water balance, river flow and groundwater movement.
- Analyse the factors controlling aquifer hydrochemistry and contaminant transport processes.
- Assess groundwater quality problems in both rural and industrial settings.

- Evaluate groundwater vulnerability to pollution; understand the role of groundwater protection schemes and of integrated catchment management.

ZO3010: FUNDAMENTALS OF ECOLOGY
Course type: Mandatory
Coordinator: Professor Ian Donohue
ECTS Credits: 5
Assessment: 50% Continuous assessment, 50% Examination

Description:
This module examines the factors that affect the distribution, growth and survival of plant and animal communities. It describes how organisms interact with their environment and the role that they have in ecosystem and community structure. There is an introduction to the concepts and models that help to explain and predict organism distributions and interactions.

Learning outcomes:
On successful completion of this module students should be able to:
- Define what we mean by ecology and describe its principles and practice.
- Show a firm methodological and theoretical understanding of the study of the distribution and abundance of species.
- Describe and evaluate unifying concepts of distributions and ecological processes (e.g. feeding strategies, interspecific interactions, etc.).
- Show, through practical exercises, a good approach to project work.
- Show enhanced communication skills through a variety of techniques.

Key Texts:
- Begon, M., Townsend, C.R. & Harper, J.L. (2006) Ecology: from Individuals to Ecosystems. Fourth edition. Blackwell Publishing.
- Townsend, Begon & Harper (2008) Essentials of Ecology. Third edition. Blackwell Publishing.

ZO3085: WILDLIFE BIOLOGY
Course type: Mandatory
Coordinator: Professor John Rochford
ECTS Credits: 5
Assessment: 50% Continuous assessment, 50% Examination

Description:
This two-part module begins with a series of lectures in Hilary Term, which offer an introduction to terrestrial biodiversity and wildlife biology, both globally and regionally. Topics covered will include: assessment of biodiversity from individual, population, community and landscape scales and the importance of foraging ecology, habitat selection, inter- and intra-specific competition, territoriality, dispersion, population dynamics and regulation for determining diversity and distribution of animals. There will also be a particular focus on the origins, development and current status of the Irish vertebrate fauna. The lecture series will be complemented, in Week 34, by a five-day residential field course in

Glendalough, Co Wicklow, during which field techniques used for the study of terrestrial ecosystems will be introduced, with an emphasis on habitat and population assessment of mammals, insects and birds and their interactions with plants and the abiotic environment. Field visits will help with an understanding of contrasting habitats and approaches to conservation management. Students will carry out and present a mini-project during the last two days of the course.

Learning Outcomes:
On successful completion of this module, the student will be able to:

- Demonstrate the relationship between determinants of the patterns of terrestrial biodiversity and the practice of wildlife management and conservation
- Recognise and evaluate the main factors influencing the conservation status of species, in particular habitat selection and requirements, population processes and interspecific interactions
- Explain the origin, diversity and status of the current Irish vertebrate fauna.
- Census mammals and insects safely using a variety of the most commonly used methods, and birds by sight and song.
- Construct habitat maps and appreciate the importance of scale in such maps.
- Assess anthropogenic effects on the environment and evaluate some control measures used to minimise them in nature reserves.
- Design, conduct and present a small scale field study investigating an ecological question.

Recommended Reading List:

- Primack, Richard B. 2010. **Essentials of Conservation Biology** (5th edition). Publisher– Sinauer Associates, Sunderland, Mass. (ISBN 9780878936403)
- Groom, Martha J., Meffe, G.K. and Carroll, C.R. 2006. **Principles of Conservation Biology** (3rd edition). Publisher– Sinauer Associates, Sunderland, Mass. (ISBN 0878935185)

ZO3070: EXPERIMENTAL DESIGN AND ANALYSIS
Course type: Mandatory
Coordinator: Professor Celia Holland
ECTS Credits: 5
Assessment: 100% Continuous assessment

Description:
This module will aim to put data collection and analysis in the context of research design and will be an important foundation for the Senior Sophister research project. The module consists of two parts. The emphasis will be practical with a more 'hands on' approach rather than the theory of statistics. Initially students will be taught about experimental design, data collection and sampling and the use of spreadsheets for data entry. This will lead on to preliminary data exploration and issues of normality. Emphasis will be placed upon the importance of visually exploring the data prior to the use of statistical

tests. Summary statistics, including measures of centre and spread, skewness, kurtosis, percentiles and boxplots, will be covered. Then the module will move on to explore the concept of hypothesis testing and the need to compare two or more means. This will involve the use of t-tests and analysis of variance. Other types of data will also be introduced including the analysis of frequencies. The relationship between two variables in the context of regression analysis will also be explored. Finally a data set will be used to bring the entire process together starting with simple data exploration through summary statistics to more complex analyses. The aim of the second part of the module is to address, in more detail, the fundamentals of experimental design and to explore how previous projects were conducted. In addition, students will learn how to write a moderatorship project proposal.

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

- address the fundamentals of experimental design and use hypothesis testing to answer biological questions.
- appreciate instruments for data collection, and how to explore and analyse data within the context of research design.
- code data using an Excel spreadsheet and explore these data using graphical and summary techniques.
- outline the requirements of parametric statistical tests and recognize the applicability of four such tests.
- calculate statistical tests by hand and use the statistical package R to explore and analyse data.
- write a moderatorship project proposal, design an experiment and analyse the findings of a scientific paper in a group setting.

Recommended Reading List:
Ruxton, Graeme D. and Colegrave, Nick. 2011. Experimental design for the life sciences (3rd edition) Publisher – Oxford University Press, Oxford (ISBN 9780199569120).

OPTIONAL MODULES

BC BROAD CURRICULUM
Course type: Optional
ECTS Credits: 5
Assessment: 100% Continuous assessment

Students are allowed to choose any Broad Curriculum course except for BC BOT

BO3120: ENVIRONMENTAL DYNAMICS
Course type: Optional
Coordinator: Professor Fraser Mitchell
ECTS Credits: 5
Assessment: 100% Continuous assessment

Description:
The last 2.6 million years of Earth history have witnessed dramatic climatic and environmental changes. This module provides an overview of these major environmental changes, their causes, and their significance for human development. It contrasts 'glacial' and 'interglacial' worlds, examines the nature of the transitions between them, explores some potential causes of change, and illustrates their environmental impacts. In the process, a range of key environmental records are considered, along with the "proxies" used to develop them.

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

- Explain why global climates have varied dramatically over the last 2.6 million years.
- Describe the spatial and temporal variation in past climate change
- Describe the long term impact of climate change on ecosystems
- Describe the techniques used to reconstruct past climates
- Describe the techniques used to reconstruct past ecosystems
- Evaluate the contribution of climate and human activity to ecosystem dynamics
- Relate the relevance to past ecosystem change to current and future ecosystem function.

BO3121: FIELD SKILLS IN PLANT AND ENVIRONMENTAL SCIENCE
Course type: Optional
Coordinator: Professor Jane Stout
ECTS Credits: 5
Assessment: 100% Continuous assessment

Description:
The aims of the module are:

- To introduce a subtropical island flora with a high floristic diversity and a complex biogeographical make-up.

- To record the plant communities across a range of environments, differing in rainfall, altitude, degree of disturbance, etc. and to investigate the ecophysiology of the native flora over the range of habitats studied.
- To assess the threat to biodiversity posed by human activities.
- To develop your knowledge of field-based plant and animal identification.

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

- Describe the link between environmental conditions and vegetation community composition and structure (i.e. understand why certain plants grow in different places – what morphological, physiological and ecological traits have evolved for live in particular environments and how are plants affected by human activities?)
- Sample vegetation in the field accurately and representatively in a diversity of natural and anthropogenic ecosystems (i.e. be able to design appropriate sampling according to different habitat types to make ecological assessments)
- Outline what should be in an Environmental Impact Assessment Scoping report and conduct a scoping exercise for a hypothetical development in the Canary islands
- Design, conduct and analyse a field experiment and present the results in both written and oral format
- Demonstrate transferrable field skills including making accurate and appropriate field notes, team work, risk assessment

Indicative Reading List:
Reading lists (journal articles) will be given during lectures and prior to fieldcourse.

BO3122: ENTOMOLOGY
Course type: Optional
Coordinator: Professor Jane Stout
ECTS Credits: 5
Assessment: 50% Continuous assessment, 50% Examination

Description:
There are more species of insects on Earth than any other group of organisms and they are of massive ecological and economic importance. This module will address behavioural, social, ecological and applied aspects of entomology, including their role in delivering ecosystem services (such as biocontrol and pollination), invasive species (such as fire ants and harlequin ladybirds) and conservation (both in Ireland and internationally). The practicals will provide students with the skills for sampling and identification of insects, which will be further enhanced through an individual project.

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

- Categorise insects according to their key features into the main order groups; know the distinction between insects and other arthropods

- Describe some of the range of behaviours employed by insects for foraging, defending and reproducing
- Develop understanding of the role of insects in ecosystem processes and their interactions with other organisms
- Explain their value as providers of ecosystem services
- Quantify the economic importance of insects (both positive and negative) to humans
- Evaluate the conservation biology of insects at national and international levels

Indicative Reading List
Price PW, Denno RF, Eubanks MD, Finke DL, Kaplan I (2011) Insect Ecology: Behavior, Populations and Communities. Cambridge University Press

BO3124: ECONOMIC BOTANY
Course type: Optional
Coordinator: Professor Mike Williams
ECTS Credits: 5
Assessment: 100% Continuous assessment

Description:
This module represents a review of the economic importance of plants, ranging from the commercial use of algae in the food and biofuel industry, agriculturally important crops, plants as sources of pharmaceuticals to the use of non-food crops in industry. The module is entirely continually assessed. The continual assessment will be in the form of a desk-based study using FAO data on global food production, student talks on key economic crops from around the globe to practicals on brewing and tissue culture.

Learning outcomes:
On successful completion of this module students should be able to:
- Understand the importance of plants in a wide range industries
- Describe the major food crops of the world and their cultivation
- Use meta-analysis to answer key questions on sustainability of food production
- Have a working knowledge of brewing and the use of botanicals in beer making
- Produce plants from callus tissue.

Some important dates in 2017-18

2017	
Michaelmas Term (and Plants and the Irish Environment Module) begins	25th September 2017
Lectures and Tutorials begin	2nd October 2017
Study Week - no lectures	6th – 10th November 2017
Michaelmas Term ends	17th December 2017
2018	
Lectures and Tutorials begin	15th January 2018
Study Weeks - no lectures	26th February – 2ndMarch 2018
Hilary Term ends	8th April 2018
Revision period	9th – 27th April 2018
Examination period	30th April – 27th 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 or 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, mckennc6@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

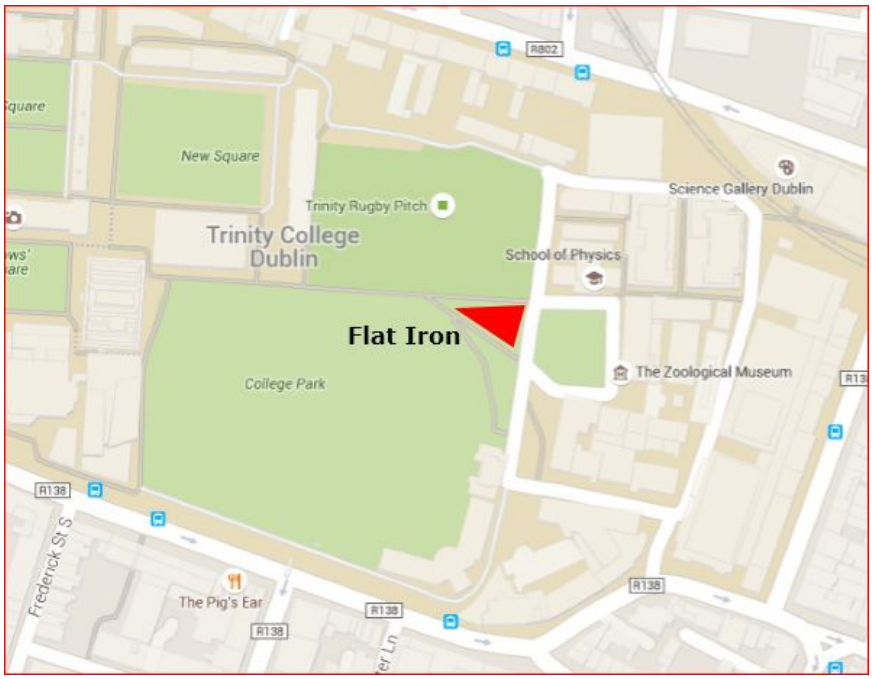
Fire Prevention
Copies of the College General Fire Notice are displayed in all Departments. Familiarise yourself with the instructions in case of fire. Any defect or potential fire hazards should be reported to the building Fire Warden.
Note the position of fire extinguishers in your working area. Please 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 and 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
Teaching staff			
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	willimsm@tcd.ie
Technical Staff			
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 Teaching Office, Zoology Building	1274	ZOBO@tcd.ie
Ms Fiona Moloney		1366	ZOBO@tcd.ie