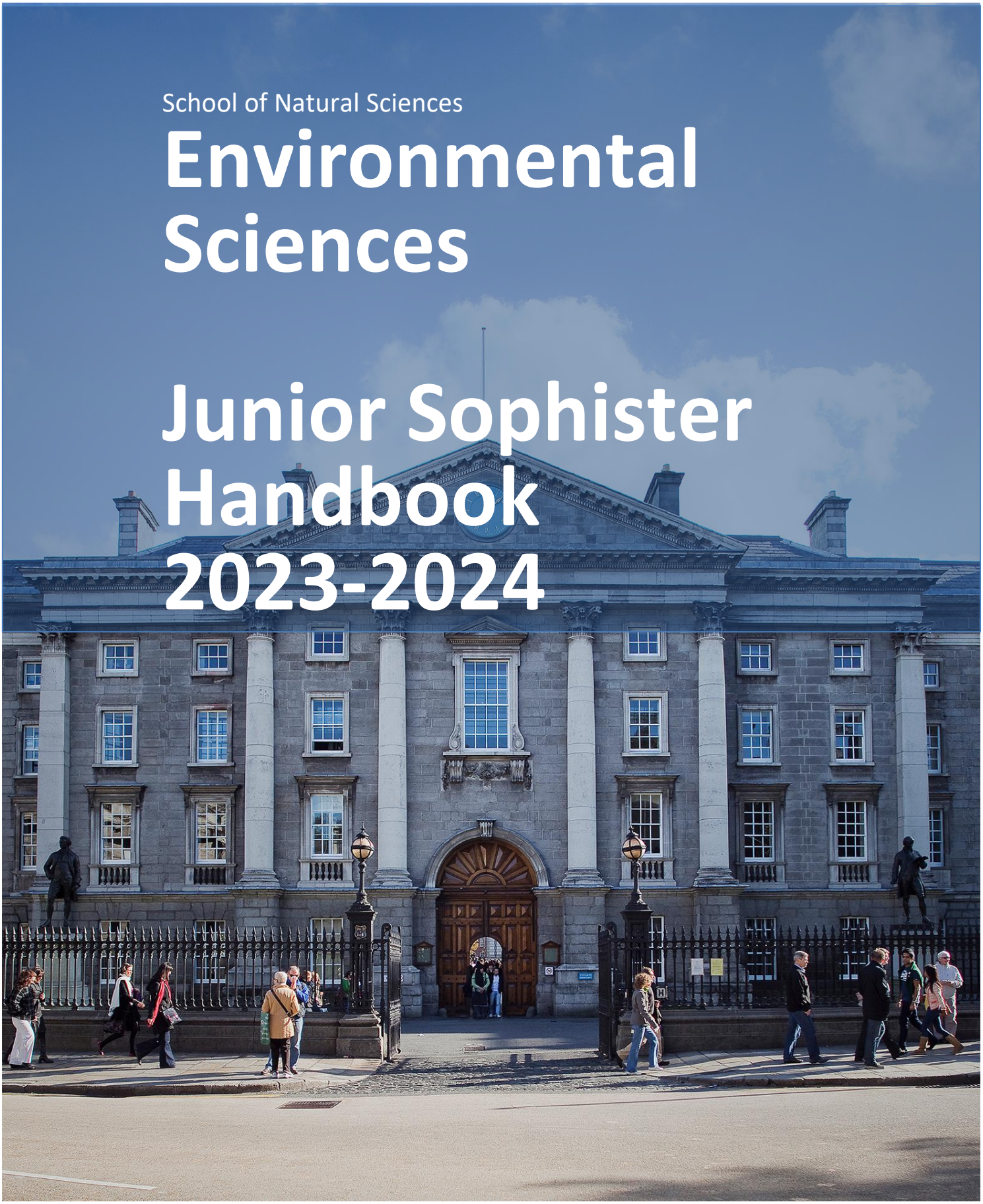
Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

School of Natural Sciences

Environmental Sciences

Junior Sophister Handbook 2023-2024



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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 handbook 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 academic field, comprising a study of the frequently complex interactions between the biological, chemical and physical components of our environment. The environmental science discipline has evolved in recent decades as key environmental challenges such as climate change, pollution, sustainable development, deforestation and desertification to name a few, have become the focus of scientists, policy makers and the general public. 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 involves a fundamental understanding of the physical and life sciences in addition to 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 and laboratory skills represent a core component of the programme and these are blended with the theoretical content to provide our graduates with the training required to become highly successful practitioners in this field.

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.

Dr Jeremy Piggott
Environmental Science Course Director
September 2023

Course objectives and learning outcomes

Our mission is to:

- make you aware of the basic concepts, key challenges 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.

Significant emphasis in this Moderatorship is placed on the student acquiring a broad range of laboratory and field skills that are relevant to Environmental Science practitioners. While the School makes every effort to keep expenditure for field courses as low as possible, however, it is necessary that students should budget appropriately. For information on financial assistance, contact: Senior Tutor's Office, House No. 27 (stosec@tcd.ie), 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.

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 40 core Credits and up to 15 Credits of open modules depending on where your elective is in the academic year. Open module scenario selection is determined by where your Trinity Elective takes place during the academic year, further information on Trinity Electives can be found at https://www.tcd.ie/trinity-electives/electives/

Some modules are examined entirely by in-course assessment; most are assessed by a combination of in-course assessment and examination. Further details on the assessment breakdown for each module can be found in the module descriptors below.

Junior Sophister Environmental Sciences Course Structure

Environmental Sciences	
Semester 1 (S1)	**Semester 2 (S2)**
Core Modules	
BOU33108 Plants in the Irish Environment (5 credits)	BOU33105 Global Environmental Change (5 credits)
ZOU33010 Fundamentals of Ecology (5 credits)	GGU33931 Environmental Governance 1 (5 credits)
ESU33040 Environmental Monitoring (5 credits)	ZOU33070: Experimental Design and Analysis (5 credits)
BOU33123 Soil Science (5 credits)	ESU33004: Scientific Writing & Communication (5 Credits)
Open Modules – Scenario 1	
GSU33003 Ice Age Earth (5 credits) **OR** BOU33100 Plant Physiology (5 credits) **OR** GLU33002 Blue Earth: Understanding the Function of Marine Ecosystems (5 credits) **OR** BOU33126 Mycology (5 credits)	GLU33009 Hydrology and Groundwater Quality (5 credits) **OR** BOU33121 Field Skills in Plant and Environmental Sciences (5 credits) **OR** ZOU33086 Terrestrial Wildlife and Field Ecology (5 credits) **OR** BOU33122: Entomology (5 credits)
Trinity Elective (5 credits)	
Open Modules - Scenario 2	
GSU33003 Ice Age Earth (5 credits) **OR** BOU33100 Plant Physiology (5 credits) **OR** GLU33002 Blue Earth: Understanding the Function of Marine Ecosystems (5 credits) **OR** BOU33126 Mycology (5 credits)	GLU33009 Hydrology and Groundwater Quality (5 credits) **OR** BOU33121 Field Skills in Plant and Environmental Sciences (5 credits) **OR** ZOU33086 Terrestrial Wildlife and Field Ecology (5 credits) **OR** BOU33122: Entomology (5 credits)
	Trinity Elective (5 credits)
Open Modules- Scenario 3	
GSU33003 Ice Age Earth (5 credits) **OR** BOU33100 Plant Physiology (5 credits) **OR** GLU33002 Blue Earth: Understanding the Function of Marine Ecosystems (5 credits) **OR** BOU33126 Mycology (5 credits)	GLU33009 Hydrology and Groundwater Quality (5 credits) **OR** BOU33121 Field Skills in Plant and Environmental Sciences (5 credits) **OR** ZOU33086 Terrestrial Wildlife and Field Ecology (5 credits) **OR** BOU33122: Entomology (5 credits)
Trinity Elective (5 credits)	Trinity Elective (5 credits)

Please note: Students are expected to make a contribution towards the transport and accommodation costs of the field components of module ZOU33086, which is usually between €250 – €300 each. Eligible students may apply to the Student Assistance Fund (http://www.tcd.ie/Senior_Tutor/) for financial assistance.

Please note: Students taking BOU33121 will be required to pay a 400euro deposit prior to the last day of October.

Core Module Descriptions

BOU33108: PLANTS AND THE IRISH ENVIRONMENT
Course type: Core
Coordinator: Dr Carla Harper
ECTS Credits: 5 Credits
Assessment: 100% Continuous assessment

Description:
This module combines an introduction to the Botany and Environmental Sciences moderatorships with a series of field-based activities including a residential field-trip during the first week of the teaching term (Week 3). 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.

ZOU33010 Fundamentals of Ecology
(5 credits – Semester 1 – 35 Contact Hours)

Module Personnel:
Dr Ian Donohue, Prof. Fraser Mitchell

Module Content
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. The module comprises interrelated components of lectures, practical sessions and fieldwork. It has been designed to provide a foundation to ecological theory and its application.

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

1. Define what we mean by ecology and describe its principles and practice.
2. Show a firm methodological and theoretical understanding of the study of the distribution and abundance of species.
3. Describe and evaluate unifying concepts of distributions and ecological processes (e.g. feeding strategies, interspecific interactions, etc.).
4. Show, through practical exercises, a good approach to project work.
5. Show enhanced communication skills through a variety of techniques.

Recommended Reading List:

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.

Assessment Details:

50% examination, 50% continuous assessment.

ESU33040: ENVIRONMENTAL MONITORING

Course type: Core

Coordinator: Professor Jeremy Piggott

ECTS Credits: 5

Assessment: 100% Continuous assessment

Description:

This module covers the tools and sampling approaches, both traditional and novel, used to characterize and monitor the quality of the environment across Europe. Students will be provided with relevant background information to understand the principles and applications of monitoring programmes. Techniques taught encompass the collection and analysis of chemical and biological samples and their application to environmental quality indices. Students will have the opportunity to apply some of these techniques during two field trips (freshwater and marine) and to a range of sample types (water, sediment, invertebrates) in subsequent laboratory sessions. Field trips will conclude with a written report, detailing student's findings in a scientific format.

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

BOU33105: GLOBAL ENVIRONMENTAL CHANGE

Course type: Core

Coordinator: Professor Michael Williams

ECTS Credits: 5

Assessment: 50% Examination, 50% Continuous assessment

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, and focusses on aspects of sustainability and how this is assessed for various production systems.

Learning Outcomes:
On successful completion of this module you will 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.
- Understand concepts of sustainability and methods of assessment

Indicative Reading:

- IPCC (2013) AR5 Climate Change 2013: The Physical Science Basis.
- IPCC (2019) Climate Change and Land.

BOU33123: SOIL SCIENCE
Course type: Core
Coordinator: Professor Matthew 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:

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.

GGU33931: ENVIRONMENTAL GOVERNANCE 1
Course type: Core
Coordinator: Professor Rory Rowan
ECTS Credits: 5
Assessment: 100% Continuous assessment

Description:
The "environment" emerged as a new object of concern in the 1960s. Since then, and largely through the work of citizens, scientists, environmental justice movements, and NGOs, many different environmental problems have come to light - from chemical contamination to climate change, from oil spills to plastic-filled oceans. Despite growing awareness of these many forms of environmental degradation and risk, the political and societal response has been far from adequate. How can we explain this? One starting point is to interrogate the contested history and development of environmental politics since the 1960s. What we learn from such an approach is that there have been radically different ways of framing environmental problems, giving rise to radically different proposals on how to deal with these problems. This historically informed understanding thus invites us to consider how re-framing current environmental problems may help us to orientate society towards a more just and sustainable future.

This module will introduce students to the emergence of environmental politics as a unique field of policy-making, scientific production, and conflict since the 1960s. It will discuss key texts, writers and thinkers, whose work has been instrumental in shaping how we think about the environment, as well as how private, public and civil society actors have responded to environmental problems in recent times.

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

- Understand the key developments and debates within modern environmentalism over the past fifty years;
- Identify and discuss the key thinkers and texts that have shaped modern environmental thinking;
- Debate the nature and impact of different environmental policies and initiatives at local, national and global scales;

- Use the critical analytic skills developed through the module to better examine a range of sources including documentary films, government reports, academic papers, and more.

ZOU33070 Experimental Design and Analysis
(5 credits – Semester 2 – 28 Contact Hours – Core Module)
Module Personnel:
Dr. Silvia Caldararu

Module Content:
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 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. 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 module will also cover fundamentals of big data in ecology.

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

1. Understand the fundamentals of experimental design and data collection
2. Use hypothesis testing to answer biological questions.
3. Explore and analyse data within the context of research design.
4. Use basic statistical tests as appropriate for different research questions and understand the requirements and limitations of each test
5. Learn how to use the programming language R for statistical analysis and plotting

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).

Assessment Details:
100% continuous assessment (designing an experiment, data analysis exercise, figure design, practical attendance and completion).

ESU33004 Scientific Writing and Communication
Module personnel: Professor Carla Harper & Professor Pepijn Luijckx
ECTS Credits: 5
Assessment: 100% Continuous assessment

Description:
Scientific communication and writing are used to communicate knowledge to other researchers through the publication of research articles, reports and oral and poster presentations. Writing such articles or essays and presenting scientific results can be difficult and challenging. The aim of this module is to introduce students to scientific writing and presentation techniques. Throughout the duration of the semester, students will be presented with a brief overview of the steps involved in reading, publishing, organising, and disseminating research findings. To experience this process students will undertake desk-based research, using scientific literature to synthesise and write an extended essay on a selected topic of interest related to a key challenge in Environmental Science or Zoology (depending on your discipline). The finished essay will consist of a general-format scientific review article.

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

- Comprehend the peer-review process for scientific literature.
- Search, locate and critically assess scientific literature and databases on issues related to environmental science.
- Demonstrate the skills to critique published material and to differentiate between primary, secondary and tertiary sources.
- Develop and convey clear and logical arguments with respect to topical issues.
- Be able to effectively communicate scientific arguments both orally and in writing.
- Evaluate reference management software tools for individual needs.

Indicative Reading List

- Wallisch, P. 2020. How to read a scientific article: The QDAFI method of structured relevant gist. In: *Critical Reading Across the Curriculum. Volume 2: Social and Natural Sciences.* A. Borst, R. DiYanni (Eds.) John Wiley & Sons, Inc. (Hoboken, New Jersey, USA). p. 152–164.
- Machi, L.A., McEvoy, B.T. 2016. *The Literature Review: Six Steps to Success. 3rd Edition.* SAGE Publications Ltd. 188 pp.
- Turbek, S.P., T.M. Chock, K.Donahue, C.A. Havrilla, A.M. Oliverio, S.K. Polutchko, L.G. Shoemaker, L. Vimercati. 2016. Scientific Writing Made Easy: A Step-by-step Guide to Undergraduate Writing in the Biological Sciences. *Bulletin of the Ecological Society of America* 97 (4): 417–426. doi:10.1002/bes2.1258
- See also 'Additional resources' on p. 425 of Turbek et al. 2016
- Rowland, F. 2002. The peer-review process. *Learned Publishing* 15 (4): 247–258.

Open Module Descriptions

GSU33003: ICE AGE EARTH
Course type: Open
Coordinator: Professor Robin Edwards
ECTS Credits: 5
Assessment: 50% Exam and 50% 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

Indicative Reading List

- Bradshaw, R.H.W. & Sykes, M. (2014). *Ecosystem Dynamics: From the Past to the Future.* Wiley Blackwell. 334pp. Located in Botany Library.
- Roberts, N. (2014). *The Holocene. An Environmental history.* (3rd Edition). Wiley Blackwell. 376pp. Located in Botany Library.
- Ruddiman, W.F. (2014) *Earth's Climate Past and Future*. 3rd Ed. WH Freeman & Co. 445 pp. Located in the Freeman Library.

BOU33100: PLANT PHYSIOLOGY

Course type: Open
Coordinator: Professor Michael Williams
ECTS Credits: 5
Assessment: 50% Examination, 50% Continuous assessment

Description:
This module covers major biochemical and physiological aspects of photosynthesis, respiration, resource capture and growth at both the cell and whole plant level. Continual assessment for this module will be a mini review on a given subject area relevant to photosynthesis, and an exercise in writing a scientific paper where raw data from a growth study of plants maintained at different light intensities will be supplied.

Learning outcomes:

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

- Describe how plants perceive light.
- Explain how plants use light as both a source of energy and an environmental signal.
- Describe the various pathways of photosynthesis at the level of the cell and the whole plant.
- Describe the interplay between photosynthesis and respiration in a plant cell.
- Describe the role of light in controlling germination, growth and flowering in higher plants.

Indicative Reading List

- Taiz, L. & Zeiger, L. (2014). *Plant Physiology.* (6th Edition). Sinauer Associates, Massachusetts. 581.1 N12*4

GLU33002: BLUE EARTH: UNDERSTANDING THE FUNCTION OF MARINE ECOSYSTEMS
Course type: Open
Coordinator: Professor Carlos Rocha
ECTS Credits: 5
Assessment: 100% continuous assessment

Description:
This is an introductory course in marine biogeochemistry. The ocean plays a central role in Earth's climate system, and marine biogeochemical processes regulate the impact of human activity on the global environment. Marine biogeochemistry hence provides a working knowledge of how the earth system functions and reacts to human activity, providing insights into how life formed, evolved, is sustained, and is endangered on Earth. This knowledge provides an understanding of how to adapt to climate and environmental change, enhance food production, manage fisheries and aquaculture, mitigate pollution, and innovate by developing new products including more sustainable food and decarbonation technologies.

This module concentrates on the marine biogeochemical phenomena that regulate the earth's climate and control the diversity, distribution, and productivity of marine life. Topics covered include the physical, biological, geological, and chemical processes that control the creation, distribution, and fate of organic matter in the marine environment, the composition of seawater and the atmosphere, and the formation and preservation of marine sediments. The course will prepare students for related courses, field and laboratory work in the marine, earth, and environmental sciences and careers in the marine & environmental sector.

Indicative Reading List

- Libes, Susan. 2009. Introduction to Marine Biogeochemistry. 2nd edition. Academic Press, 928 pp. ISBN: 9780120885305; eBook ISBN: 9780080916644. Accessible through Stella @ TCD Library.
- Middelburg, Jack J. 2019. Marine Carbon Biogeochemistry – A primer for Earth System Scientists (Open Access). Download link *here*

BOU33126: Mycology

Course Type:	Open
Co-ordinator:	Professor Carla Harper
Assessment:	100% Continual Assessment
ECTS:	5 credits
Semester:	1

Description:
Mycology, or the study of fungi and fungus-like organisms, is a fundamentally important aspect of biology that impacts nearly all of portions of our daily lives. From the food and drinks we enjoy (e.g., bread, beer, cheese) to medically important fungi, to the ecological roles that fungi play as symbionts, fungi are everywhere. This module will focus on the biology and taxonomy of fungi and fungus-like organisms (e.g., slime moulds, oomycetes, lichens), as well as an introduction to the ecological role(s) they play. There will be a focus on the mycological biodiversity of Ireland.

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

1. Understand the basic biology of fungi and fungus-like organisms.
2. Be able to identify and distinguish the different characteristics of the major lineages of fungi and fungus-like organisms.
3. Demonstrate a basic understanding of the taxonomy of the fungi and fungus-like organisms and how they relate to other organisms.
4. Collect and identify fresh fungi and fungus-like organisms.
5. Describe and understand the various interactions and ecological strategies of fungi and fungus-like organisms.
6. Understand the importance and impact of fungi in our daily lives.

Recommended reading list:

Webster, J, Weber, R. 2007. Introduction to Fungi. 3rd Revised Ed. Cambridge University Press, Cambridge, UK. 867 pp.

Watkinson, SC, Boddy, L, Money, N, 2015. The Fungi. 3rd Ed. Elsevier Science Publishing Co., Inc. Academic Press, inc. San Diego, CA, USA. 466 pp.

McCoy, P. 2016. Radical Mycology: A treatise on seeing and working with fungi. Chthaeus Press, Portland, OR, USA. 672 pp.

Peterson, RL, Massicotte, HB, Melville, LH. 2004. Mycorrhizas: Anatomy and cell biology. CABI Publishing, Wallingford, Oxon, UK. 173 pp.

Sterry, P, Hughes, B. 2009. Collins Complete British Mushrooms and Toadstools: The essential photograph guide to Britain's fungi. Harper Collins Publishers, London, UK. 384 pp.

GLU33009: HYDROLOGY AND GROUNDWATER QUALITY

Course type: Open

Coordinator: Professor Eyad Abushandi

ECTS Credits: 5

Assessment: 50% Continuous assessment, 50% Examination

Description:

This module 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.

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 groundwater quality component includes groundwater chemistry and natural groundwater quality problems; groundwater quality issues in rural and industrial settings; groundwater vulnerability and protection. The interaction of groundwater and surface water quality is also considered.

This module is taught by a combination of lectures, data practicals and independent reading of research literature provided online on Blackboard. The key information from the lecture presentations is made available on-line. The data practicals include a mixture of formative and summative assessment. These practicals are marked and returned to the students with comments in advance of the exam.

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.

BOU33121: FIELD SKILLS IN PLANT AND ENVIRONMENTAL SCIENCE (Canary Islands Field Trip)
Course type: Open
Coordinator: Dr Peter Moonlight & Dr Jessica Knapp
ECTS Credits: 5
Assessment: 100% Continuous assessment

Description:

This module combines a lecture series with a residential field trip to the Canary Islands. The Canary Islands represent very different environments to Ireland: they have different ecology, different threats and pressures. They also contain highly variable landscapes and there are lots of different types of habitats in small area. In addition, they are home to many endemic species, particularly plants, which are not found anywhere else in the world, and face many man-made environmental challenges. The lecture series explores the geography, flora and fauna of the Canary Islands, as well as the history of the islands, and the impacts that humans have and continue to have on its ecosystems.

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

There are four main aims of this module:

1. To introduce students to highly diverse subtropical island flora, with complex biogeographical composition;
2. 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;
3. To assess the threat to biodiversity posed by human activities;
4. To develop students' knowledge of field-based plant and animal identification, and how to conduct field research. To do this, a series of 8 lectures will be given prior to going on an 8-day residential fieldcourse in Gran Canaria.

BOU33122: ENTOMOLOGY
Course type: Optional
Coordinator: Dr Jessica Knapp
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

ZOU33086 Terrestrial Wildlife and Field Ecology
(5 credits –Semester 2 – 5 day field course plus 10 contact hours)

Module Personnel:
Prof. Yvonne Buckley, Dr John Rochford, Prof. Nicola Marples, Dr Pepijn Luijckx

Module Content:
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 35 (Trinity Week), 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.

In the event of continuing restrictions related to Covid-19 this module will be delivered as either 1) a series of daytrips to sites in the Dublin area OR 2) a combination of online teaching and daytrips in the Dublin area OR 3) a combination of online teaching with field activities local to your own location. In all cases you will need to be available for teaching activities during the scheduled week and we will let you know as far in advance as possible which teaching modes will be used.

Learning Outcomes:
On successful completion of this elective, the student will be able to:
1. Demonstrate the relationship between determinants of the patterns of terrestrial biodiversity and the practice of wildlife management and conservation
2. Recognise and evaluate the main factors influencing the conservation status of species, in particular habitat selection and requirements, population processes and interspecific interactions
3. Explain the origin, diversity and status of the current Irish vertebrate fauna
4. Census mammals and insects safely using a variety of the most commonly used methods, and birds by sight and song
5. Construct habitat maps and appreciate the importance of scale in such maps
6. Assess anthropogenic effects on the environment and evaluate some control measures used to minimise them in nature reserves

7. 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). Sinauer Associates, Sunderland, Mass. (ISBN 9780878936403)
Groom, Martha J., Meffe, G.K. and Carroll, C.R. 2006. **Principles of Conservation Biology** (3rd edition). Sinauer Associates, Sunderland, Mass. (ISBN 0878935185)

Assessment Details:
50% continuous assessment (based on field course activities and tasks): 50% annual written examination.

TRINITY ELECTIVE
Course type: Open
ECTS Credits: 5
Assessment: 100% Continuous assessment

Students are allowed to choose any Trinity Elective modules except for BC BOT

Academic Year 2023/2024

A full listing of the Academic Year Calendar 2023/2024 can be viewed here https://www.tcd.ie/calendar/academic-year-structure/academic-year-structure.pdf

External Examiner
An external examiner, currently Professor Mairi Knight from the University of Plymouth (Professor Mairi Knight - University of Plymouth) moderates the 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. Currently 30% of the overall mark for the moderatorship 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 including continuous assessment, examinations and the submission of a thesis associated with the research project (FBU44000).

You should take care not to engage in plagiarism when completing all assessment 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. For further details it is advised that all students consult the College policy dealing with plagiarism (see section on plagiarism below).

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:

- In accordance with college policy, all assessments must be submitted via Blackboard. Where this is not possible assignments 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/Academic Integrity

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 the following links

- Academic Integrity homepage https://libguides.tcd.ie/academic-integrity
- Ready Steady Write tutorial: https://libguides.tcd.ie/academic-integrity/ready-steady-write
- Coversheet declaration: https://libguides.tcd.ie/academic-integrity/declaration
- Levels and consequences: https://libguides.tcd.ie/academic-integrity/levels-and-consequences

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 [TCD username and password required]

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	80-100	Exceptional project report showing deep understanding of the topic and literature similar to that expected in a published paper. Clear grasp and expression of the justification for the research, with clear explanation of the importance and implications of the work within the subject area. Methods described with the clarity and detail expected in a published paper, showing sound experimental design. Exceptional presentation, analysis and exploration of results focussed on the question asked, using the most appropriate analyses for the question and data. Thoughtful, critical evaluation of the findings, discussed insightfully in their full context within the literature. Excellent presentation of the finished thesis, which contains very few, if any, editorial errors.
	70-79	Excellent project report showing evidence of wide reading and broad understanding of the topic, with clear presentation, focused and thorough analysis of results and a demonstrated ability to critically evaluate and discuss research findings. Clear indication of insight, originality, and appreciation of the implications of the findings for the research field. An excellent, highly competent and well-presented report overall but falling short of outstanding in at least one aspect.
II-1	65-69	A very good project report, showing a reasonably wide understanding of the topic and its associated literature, with some indication of how the research adds to the field. Methods described clearly and in sufficient detail for someone to repeat the work, and showing sound experimental design, or the appreciation of how it could have been made sound. Competent analysis of the results and valid and accurate interpretation of the findings. Results presented accurately using appropriate figures and/or tables. Accurate appreciation of any shortcomings of the experimental design and the implications for interpretation. Discussion of the results puts them into some level of context but may not reflect all the implications for the research field.

	60-64	A good project report, showing some understanding of the wider topic and its associated literature, with some indication of the relevance of the research. Methods described clearly, though perhaps not in sufficient detail for someone else to repeat the work. Sound experimental design, or some appreciation of how it could have been made sound. Competent analysis of the results, though perhaps through the use of simpler tests than would be ideal. Accurate presentation of results, though perhaps not with the best choice of graphics. Interpretation of findings mostly valid and accurate. Some appreciation of any major shortcomings in experimental design and the implications for interpretation. Discussion may focus mostly on the findings, with only occasional references to other work, though those contextual references should be present.
II-2	50-59	A moderately weak project report which shows some understanding of the research question, but lacks a strong grasp of the wider research topic or the relevance of the project. Methods mostly described clearly, but there may be lapses in detail. Experimental design may not be entirely sound, and any weakness may be undescribed. Analysis of the results generally sound but may be simple and contain errors such as incorrect statistical reporting or the use of less than ideal graphs. Interpretation of the findings may not be entirely accurate, and shortcomings in the design or analysis unlikely to be taken into account during interpretation, but some level of interpretation of the results must be present. Discussion may focus solely on the findings of the work, and may lack references to other work, though some indication of the relevance of the project should be present. Insufficient attention paid to organisation and presentation of the report.
III	40-49	A weak project showing only limited understanding of the research question, reported without understanding of the wider context or relevance of the project. Methods not complete. Experimental design may contain obvious unrecognised flaws and may not be described completely. Analysis of results simple and may show basic errors. Interpretation of results may be limited or absent. Discussion may be minimal and restricted to the direct findings of the project. General standard of presentation poor.
Fail	20-39	An unsatisfactory or incomplete project report, lacking sections or with little content in some. Very limited understanding of the question or failure to express it at all. Methods may be incomplete, possibly lacking description of experimental design. Results may be incomplete, with poor choice of graphics and / or tables. Analysis of data may be lacking or contain fundamental errors. Interpretation of the results likely to be limited or absent. Discussion restricted to a restatement of results. Very poor overall standard of presentation.

	0-19	An extremely poor project report containing very little substance and showing no real understanding or awareness of the problem. No attempt at a relevant literature review or relevant support from published work. Methods chaotic or incomprehensible. Almost absent or completely absent presentation of results. Any analysis of results incorrect or inappropriate. Clear inability to interpret results in relation to other work or ideas. Very poor overall standard of presentation.

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 (stosec@tcd.ie)
- Student Counselling Service, 199/200 Pearse Street, College, Email: student-counselling@tcd.ie; (01) 896 1407
- Niteline: (each night of term, 9pm - 2.30am) at 1800 793 793 see poster below
- 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

NiteLine

NITELINE IS A LISTENING SERVICE, FOR STUDENTS, RUN BY STUDENTS

Free to contact via phone or instant messaging, we are open from 9 pm-2:30 am every night of term

There is no problem too big or too small - we just give our callers space to talk

We are also an information service, meaning we can direct callers to more specific services - including services specific to their college

NiteLine Dublin is founded on four key pillars:

Anonymous
Confidential
Non-Directive
Non-Judgemental

11

Calls averaged per night in the 2019/20 academic year

The most common call topics were college, mental health, and loneliness - but we are here to listen to whatever is on your mind

103

Volunteers in NiteLine in the 2020/21 academic year

Aside from our Public Faces (pictured above) all of our volunteers are anonymous. Volunteers go through 24 hours of rigorous training in active listening and much more. Apply to be a volunteer at niteline.ie

103,000

Students covered by NiteLine, supported by 150 Staff Ambassadors

NiteLine relies on the help of affiliate Student Unions, counselling services and other staff to reach and support students. To become a staff ambassador, or to register interest in affiliating with NiteLine, visit niteline.ie

Our Affiliate Colleges: Trinity College Dublin, DUBLIN, UCD, NCAD DUBLIN National College of Art and Design, DBS Dublin Business School, Maynooth University National University of Ireland Maynooth, RCSI

PHONE US: 1800 793 793
INSTANT MESSAGE US: NITELINE.IE
FIND OUT MORE INFO: INFO@NITELINE.ORG
FIND US ON INSTAGRAM: @NITELINEDUBLIN

Good Governance Awards 2020 Winner

WINNER OF THE CARMICHAEL CENTRE GOOD GOVERNANCE AWARD

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 – Dr Elaine Treacy
treacyel@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 not 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 undertaken. 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, this is particularly important for modules that include fieldwork activities. 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, which can be found 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.

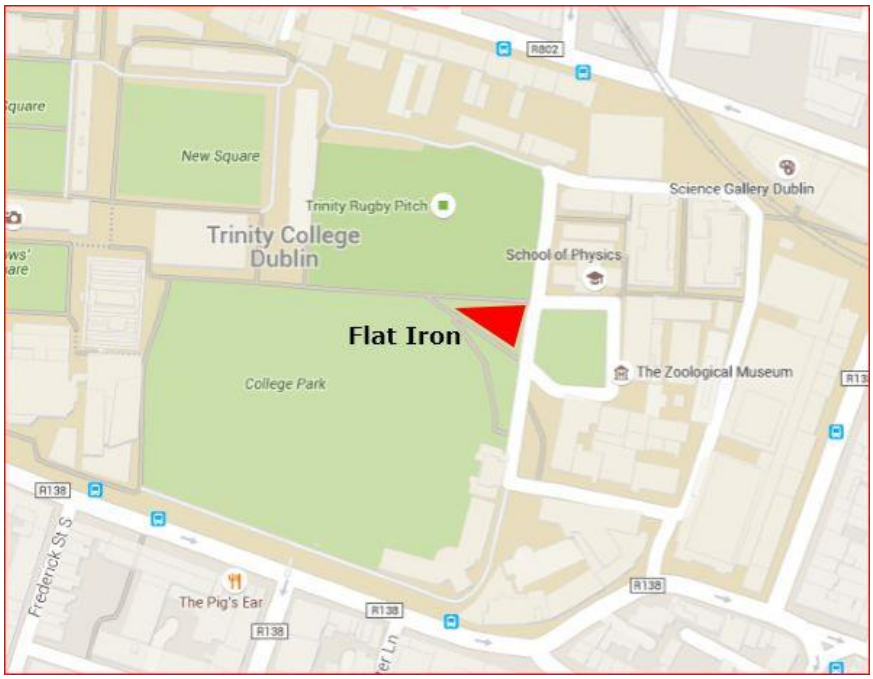
Note the position of fire extinguishers in your working area. Please note you are not permitted to use a fire extinguisher unless you have attended the College's training course.

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.

General Information

Central Societies Committee **http://trinitysocieties.ie/**

TCD Environmental Science Society **http://trinitysocieties.ie/society/?socid=34** & Facebook group **https://www.facebook.com/TCDEnvironmentalSociety/**

Dublin University Central Athletics Club DUCAC **http://www.tcd.ie/Sport/student-sport/ducac/?nodeId=94&title=Sports_Clubs**

Trinity College Students Union **https://www.tcdsu.org/**

Trinity College Graduate Students Union **https://www.tcdgsu.ie/**

Key Locations

Academic Registry **https://www.tcd.ie/academicregistry/**

TCD Portal my.tcd.ie

Blackboard **https://tcd.blackboard.com/webapps/login/**

Staff Contacts

Staff	Office location	Ext	Email
Teaching staff			
Prof Yvonne Buckley	Zoology Building	3172	buckleyy@tcd.ie
Prof Marcus Collier	Centre for the Environment	1641	colliema@tcd.ie
Dr. Silvia Caldararu	Aras an Phiarsaigh		caldaras@tcd.ie
Prof Ian Donohue	Zoology Building	1356	ian.donohue@tcd.ie
Prof Robbie Goodhue	Museum Building	1419	goodhuer@tcd.ie
Prof Carla Harper	Botany Building	1809	charper@tcd.ie
Prof Niamh Harty	Civil Engineering	1302	Niamh.Harty@tcd.ie
Prof Andrew Jackson	Zoology Building	2278	jackson@tcd.ie
Prof Pepijn Lujckx	Zoology Building	1926	luijckxp@tcd.ie
Prof Nicola Marples	Zoology Building	2527	nmarples@tcd.ie
Prof Jennifer McElwain	Botany Building	2294	jmcelwai@tcd.ie
Prof Fraser Mitchell	Botany Building	1811	fmitchll@tcd.ie
Prof John Rochford	Zoology Building	2237	rchfordj@tcd.ie
Prof Rory Rowan	Museum Building		rowanro@tcd.ie
Prof Matthew 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
Dr Jessica Knapp	Botany Building		KNAPPJ@tcd.ie
Dr Richard Nair	Botany Building		richard.nair@tcd.ie
Dr Peter Moonlight	Botany Building		MOONLIGP@tcd.ie
Dr Jenny Bortoluzzi	Zoology Building		bortoluj@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 Sinead Kelly	Zoology Building	3506	kellys76@tcd.ie

Administrative Staff

Ms Mandy Lockhart	Undergraduate Teaching Office, Room 0.2, Botany Building	1274	ZOBOES@tcd.ie
Ms Fiona Moloney	Undergraduate Teaching Office, Zoology Building	1366	ZOBOES@tcd.ie