Trinity College Dublin

School of Natural Sciences

BOTANY

Sophister Years Handbook 2024 - 2025

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A note on this Handbook

This handbook applies to all students taking the Botany 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 the time of preparation. Any necessary revisions will be notified to students via email. 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 student's 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.

Introduction

Welcome everyone to the Botany Discipline, a leading centre of teaching and research in Botany. Our interests range over the areas of plant systematics, plant community ecology, and environment and sustainability. We study plants because they are of vital importance; as the source of all our food, the oxygen we breathe and most of the medicines we use. They are central to the processes of global climate change and to the provision of food and energy for an expanding human population. In the face of such change their conservation is increasingly vital.

This booklet has been prepared as a guide to your Sophister (3rd and 4th) years in Botany. It provides details of the core teaching staff, their research interests, the modules on offer and how your work will be assessed and examined as well as details of departmental procedures.

As Sophister students you are an integral part of the Botany Discipline - which operates as a teaching and research unit within the School of Natural Sciences. In order to function efficiently we have adopted working procedures with which you are expected to conform, especially with regard to health and safety and security.

Botany encompasses a broad range of subject areas, including:

- Ecology & Conservation
- Plant Biochemistry
- Plant Molecular Biology
- Classical and Molecular Taxonomy
- Quaternary Ecology
- Soil Science
- Vegetation modelling
- Carbon cycling
- Biogeography
- Plant Physiology
- Ecophysiology
- Genetics
- Plant Animal Interactions
- Horticulture
- Palaeobotany
- Plant Evolution

Your Sophister years are also designed to offer you opportunities to gain skills in communication, numeracy and scientific problem solving, and in your final year you will have the opportunity to choose certain topics for in-depth investigation. The Botany Discipline's Web page (http://www.tcd.ie/Botany) is a very useful source of information, particularly on research and teaching, which is not duplicated in this booklet.

Dr. Silvia Caldararu
Course Coordinator
September 2024

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Academic Year 2024-2025

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

Botany moderatorship learning outcomes

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

- Demonstrate in written, oral and visual form a foundation level of knowledge and understanding of the biological, physical and quantitative sciences underpinning Botany.
- Demonstrate awareness, particularly in relation to the contributions that plant science makes to society, such as maintaining biodiversity, assessing the impacts of global change, reducing environmental pollution and ensuring sustainable food and energy production, taking into account scientific, social, political, moral and ethical considerations.
- Articulate the fundamental concepts in plant science.
- Discuss current research developments in plant science.
- Review and criticise published scientific information.
- Utilise innovative techniques and modern research facilities to develop combined theoretical and technical competence so enabling the development of high-quality independent research and of the ability to work accurately, efficiently and safely in both field and laboratory environments.
- Demonstrate numerical competency and the ability to analyse quantitative data by appropriate statistical tests, using spreadsheets and other software.
- Collaborate effectively in teams and work independently.
- Communicate accurately, clearly, persuasively and imaginatively, in both oral and written form.

Description of the European credit transfer system

The European Credit Transfer and Accumulation System (ECTS) 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 ECTS 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, clinical attendance, 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 39 weeks from the start of Michaelmas Term (semester one) 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 125 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.

Moderatorship course structure - junior sophisters (year 3)

The JS year consists of a diverse programme of on-line and face-to-face lectures, laboratory practicals, tutorials and seminars, totalling 40 core credits. The remaining 20 credits are made up of a mix of open modules and Trinity Electives according to three scenarios listed below, these scenarios dependent on whether the student chooses one or two Trinity Elective modules, and in which semester the Trinity Electives occur. These modules are indicated in greater detail on the following pages.

Trinity Elective Information is available at: https://www.tcd.ie/trinity-electives/electives/ Lectures for these modules are timed to coincide with free slots in your timetable. Most modules are scheduled to run at lunchtimes so that space is available in our timetable to allow you to take one of these modules.

Assessment criteria are outlined at https://www.tcd.ie/trinity-electives/electives/

Botany – Junior Sophister (Year 3)	
Semester 1 (S1)	Semester 2 (S2)
Core Modules	
BOU33100: Plant Physiology (5 Credits)	BOU33107: Plant Molecular Biology (5 Credits)
ZOU33010: Fundamentals of Ecology (5 Credits)	ZOU33070: Experimental Design and Analysis (5 Credits)
BOU33108: Plants and the Irish Environment (5 Credits)	BOU33112: Diversity & Systematics of Land Plants (5 Credits)
	BOU33121: Field Skills in Plant and Environmental Sciences (5 Credits - Gran Canaria field trip)
ESU33004: Scientific Writing and Communication (5 credits)	
Open Modules Scenario I	
In addition to the 5 credits of Trinity Electives, choose one module from the following three: GSU33003: Ice Age Earth (5 credits) BOU33123: Soil Science (5 Credits) BOU33114: Conservation Horticulture (5 credits)	Students will automatically be enrolled on the below two modules: BOU33105: Global Environmental Change (5 Credits) BOU33122: Entomology (5 credits)
Trinity Elective (5 credits)	

Open Modules Scenario II	
Choose <u>two</u> modules from the following three: GSU33003: Ice Age Earth (5 Credits) BOU33123: Soil Science (5 Credits) BOU33114: Conservation Horticulture (5 credits)	In addition to the 5 credits of Trinity Electives, choose <u>one</u> module from the following two: BOU33105: Global Environmental Change (5 Credits) BOU33122: Entomology (5 credits)
	Trinity Elective (5 credits)

Open Modules Scenario III	
In addition to the 5 credits of Trinity Electives, choose <u>one</u> module from the following three: GSU33003: Ice Age Earth (5 Credits) BOU33123: Soil Science (5 Credits) BOU33114: Conservation Horticulture (5 credits)	In addition to the 5 credits of Trinity Electives, choose <u>one</u> module from the following two: BOU33105: Global Environmental Change (5 Credits) BOU33122: Entomology (5 Credits)
Trinity Elective (5 Credits)	Trinity Elective (5 Credits)

Moderatorship course structure - senior sophisters (year 4)

In the Senior Sophister year, students attend a series of lectures, laboratory and field work practicals, seminars, tutorials and workshops. In addition, students are required to undertake a 20 credit research project which culminates in the submission of a dissertation. The year consists of a total of 50 credits of core modules and 10 credits of open modules. These modules are indicated in greater detail in the following pages.

Botany – Senior Sophister (Year 4)	
Semester 1 (S1)	Semester 2 (S2)
Core Modules	
ZOU44030: Data Handling (5 credits)	BOU44112: Plants and the Planet (5 credits)
BOU44108: Plant -Environment Interactions (5 credits)	BOU44103: Plant Conservation and Biodiversity (5 credits)
BOU44109: Vegetation Description and Analysis (5 credits)	BOU44110: The Evolution of Plants and Plant Atmosphere Interactions (5 credits)
	FBU44000: Capstone Project (20 credits)
Open Modules	
Choose two modules from the selection below	
BOU44107: Plant Animal Interactions (5 credits) BOU44060: Plant Breeding and Biotechnology (5 credits) BOU44111: Restoration Ecology and Re-wilding (5 credits)	

Sophister module descriptions

The modules listed below offer you a high-quality, broad-based learning experience, which we hope you will find interesting, exciting and technically challenging.

All modules directly reflect, and build-on, the research interests and activities of the Department's staff.

The staff member responsible for coordinating each module is indicated by their initials after the heading 'Lecturer(s)' and other staff members who contribute to the module are indicated immediately afterwards in brackets.

Some modules have indicative readings lists (books) associated with them. Multiple copies of most recommended texts are in the Hamilton library (codes given for some of these).
N.B. Additional reading will be recommended by lecturers for ALL modules.

Student Contact Hours	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 approximately 125 hours for a 5 Credit module and 250 hours for a 10 Credit module.

Trinity Electives

Any of the offered Trinity Elective modules may be taken as long as they can be accommodated in the timetable. Further information and how to apply for your Trinity Electives can be found here https://www.tcd.ie/trinity-electives/electives/

Junior sophister core modules

BOU33100: Plant Physiology

Co-ordinator:	Dr. Richard Nair
Other lecturer(s):	Silvia Caldararu, Christos Chondrogiannis, Matt Saunders
Assessment:	50% Examination, 50% Continual Assessment
ECTS:	5 credits
Semester:	1

Description:
This module covers major biochemical and physiological processes in plants which control plant function and underly plant diversity, with a focus on photosynthesis. Students will be introduced to concepts in plant physiology at cell, leaf, and whole plant level as an introduction to the field of plant physiology and as underlying principles across botany and environmental science. 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 from raw data from a growth study of plants maintained at different light intensities.

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

- **Describe leaf- and cell level photosynthetic structure and function, including the various photosynthetic pathways**
- **Describe physiological processes at plant and cell level, including respiration, growth and acquisition and metabolism of major nutrients**
- **Describe how higher plants sense light and other environmental signals and use these signals to control germination, growth and flowering**
- **Understand basic principles of how plants as sessile organisms respond to stress and variable environments**
- **Acquire, analyse and interpret basic plant physiological data in lab settings**
- **Contextualise plant physiology concepts across larger fields of plant evolution, ecology, climate, biodiversity and food security**

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

ZOU33010 Fundamentals of Ecology

Co-ordinator(s): Prof. Ian Donohue, Prof. Fraser Mitchell
Assessment: 50% Examination, 50% Continual Assessment
ECTS: 5 credits
Semester: 1
Contact hours: 35 hours

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:
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.

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.

BOU33108: Plants and the Irish Environment

Co-ordinator:	Dr. Marcus Collier
Other Lecturers:	Fraser Mitchell, Trevor Hodkinson, Jenny McElwain, Matthew Saunders, Marcus Collier, Peter Moonlight & Richard Nair
Assessment:	100% Continual Assessment
ECTS:	5 credits
Semester:	1

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 series of lectures given following the field trip on specific aspects of the Irish flora.

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

- 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.

ESU33004: Scientific Writing and Communication

Co-ordinator:	Dr. Pepijn Luijckx
Other Lecturers:	All members of academic staff
Assessment:	100% Continual Assessment
ECTS:	5 credits
Semester:	1 and 2

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 both semesters, 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, Botany 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, you 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 in multiple mediums and platforms.
- Understanding the role of AI in scientific communication.

Recommended 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.

BOU33107: Plant Molecular Biology

Co-ordinator:	Prof. Trevor Hodkinson
Assessment:	50% Examination, 50% Continual Assessment
ECTS:	5 credits
Semester:	2

Description:
Plant Molecular Biology plays a major part in most fields of botanical research including ecology, systematics and physiology. The aim of this module is to cover the fundamentals of plant molecular biology and to explore applied aspects, including molecular systematics, molecular ecology, conservation genetics and genetic engineering.

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

1. Demonstrate an understanding of the core elements within the field of Plant Molecular Biology that will enable them to build upon this knowledge and help them better understand other modules.
2. Work competently in a molecular biology research laboratory. Although the module is not vocational, it provides a large amount of hands-on laboratory experience.

General texts (specific references will be provided during the module):

- Judd W.S., Campbell C.S, Kellogg E.A. & Stevens P.F. (2nd, 2003 and 3rd, 2007 editions) Plant Systematics: a phylogenetic Approach. Sinauer Associates, Inc. Publishers
- Chrispeels M.J. and Gepts P. 2017. Plants, genes, and agriculture sustainability through biotechnology. Oxford University Press.

ZOU33070: Experimental Design and Analysis

Co-ordinator:	Dr. Silvia Caldararu
Other Lecturers:	
Assessment:	100% Continual Assessment
ECTS:	5 credits
Semester:	2

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:
- Understand the fundamentals of experimental design and data collection.
- Use hypothesis testing to answer biological questions.
- Explore and analyse data within the context of research design.
- Use basic statistical tests as appropriate for different research questions and understand the requirements and limitations of each test.
- 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).

BOU33112: Diversity & Systematics of Land Plants

Co-ordinator:	Dr Ailbhe Brazel
Other Lecturer:	Peter Moonlight, Trevor Hodkinson
Assessment:	50% Continual Assessment & 50% Exam
ECTS:	5 credits
Semester:	2

Description:
There are over 400,000 land plant species known to science. This module will explore the evolution and classification of land plants (embryophytes) and how to identify them in the field. By undertaking this module you will become acquainted with the evolutionary history, life cycle and general distinguishing attributes of the major land plant evolutionary groups: Bryophytes (mosses, hornworts and liverworts), Monilophytes (ferns and fern alies), Lycophytes, Gymnosperms (e.g. conifers, cycads) and Angiosperms (flowering plants). The module will discuss evolutionary origins, various systems of classification, compare and contrast molecular and morphological phylogenetic signals and discuss various large groups of land plants with a particular focus on the most ancient (bryophytes) and the most recent and highly diverse (Angiosperms, flowering plants). This module will include laboratory practical classes, self-guided fieldwork and lectures. Students will produce their own herbarium plant collection on a small selection of native species in the Irish flora as part of the module.

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

- Describe and discuss land plant classification, identification and evolution at family and order level worldwide.
- Describe and discuss higher plant classification, identification and evolution at generic and specific level in Ireland.
- Know the key characteristics of some of the most commonly encountered Angiosperms in Ireland.
- Know about the phylogenetic signals produced by molecular and morphological data.
- Develop team-working and team-assessment skills. Develop an in-depth knowledge of a selected plant family.
- Understand basic botanical nomenclature needed to describe plant morphology and use taxonomic keys.
- Be capable of identifying various plant species in the Irish flora using taxonomic keys in standard works of reference.
- Describe the evolution of plant life cycles and understand the evolutionary advantages and limitations of gametophyte dominant versus sporophyte dominant strategies.

Indicative Reading:
Heywood, V.H., Brummitt, R.K., Culham, A., & Seberg, O. (2007). *Flowering Plant Families of the World*. Royal Botanic Gardens, Kew. 424 pp. S-LEN 582.13 P7;2; S-LEN 582.13 P7;3; 582.13 +P7;1
Judd W.S et al. (2008) Plant Systematics. A phylogenetivc approach. Sinauer.
Simpson, M.G. (2006). *Plant Systematics.* Wiley Elsevier Academic Pres. 580pp. Located in Botany Library.

Soltis, D., Soltis, P., Endress, P., Chase, M.W., Manchester, S., Judd, W., Majure, L. & Mavrovdiev, E. (2019). Phylogeny and evolution of the Angiosperms: revised and updated edition. 2nd Ed. University of Chicago Press. Located in the Botany Library.
Willis, K.J. & McElwain, J.C. (2014). *The Evolution of Plants* (2nd edition). Oxford. 424 pp. Located in Botany Library

Also, various papers posted on Blackboard.

BOU33121: Field Skills in Plant and Environmental Science (Canary Islands)

Co-ordinator:	Dr. Peter Moonlight (Spring Field Course leader)
Other Lecturers:	Trevor Hodkinson, Stephen Waldren, Jessica Knapp, Sarah Larragy, Jenny McElwain
Assessment:	100% Continual Assessment
ECTS:	5 credits
Semester:	2

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 and 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 field course in Gran Canaria.

Junior sophister open modules

GSU33003: Ice Age Earth

Co-ordinator:	Prof. Robin Edwards
Assessment:	50% exam & 50% Continual Assessment
ECTS:	5
Semester:	1

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:
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.

BOU33105: Global Environmental Change

Co-ordinator:	Dr. Matthew Saunders
Assessment:	50% Examination, 50% Continual Assessment
ECTS:	5 credits
Semester:	1

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 students should be able to:

- Understand the various elements of current global environmental change and the contribution of the major drivers of these changes.
- Understand the prevailing hypotheses as to the mechanisms and ultimate causes of global environmental change and the extent to which processes operate at different temporal and spatial scales.
- Appreciate the nature of the interactions between environmental change and ecosystem processes.
- Understand concepts of sustainability and methods of assessment

Indicative Reading:
IPCC. (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change: Vol. In Press*. Cambridge University Press. https://doi.org/10.1017/9781009157896
IPCC (2019) Climate Change and Land.

BOU33123: Soil Science

Co-ordinator:	Dr. Matthew Saunders
Other Lecturer(s):	Paul Dowding and Gary Lanigan
Assessment:	50% Examination, 50% Continual Assessment
ECTS:	5 credits
Semester:	2

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.

BOU33122: Entomology

Co-ordinator: Dr Sarah Larragy / Dr. Jessica Knapp
Assessment: 50% Continual Assessment, 50% Examination
ECTS: 5 credits
Semester: 2

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

BOU33114: Conservation horticulture

Co-ordinators: Dr. Ailbhe Brazel and Dr. Darrach Lupton (National Botanic Gardens Glasnevin)
Assessment: 100% Continual Assessment
ECTS: 5 credits
Semester: 2

Description:
The loss of plant diversity is happening at an extraordinarily fast rate, the urgent need for conservation action has never been so crucial. Botanic Gardens are well-positioned to take on this challenge – they have a large pool of specialist horticultural expertise trained in propagation and cultivation techniques, scientific staff with an understanding of population and genetic basis of a conservation collection, and the accurate record-keeping and management of genetically representative living plant collections – skills and knowledge essential to the successful recovery of threatened plant species. Conservation horticulture is an emerging field in plant science that brings together the disciplines of conservation and horticulture. It remains formally undefined; however we define it here, as the practice within mainly Botanic Gardens and Arboreta of targeting, collecting and maintaining living plant collections that are representative of the genetic diversity of wild populations for *ex situ* conservation and habitat restoration purposes. This unique, timely and highly practical-focused module will be co-taught by staff at Trinity College Botanic Garden, Trinity Botany Department and the National Botanic Gardens, Glasnevin. Five practical sessions in hands-on conservation horticulture will be held at NBG and TCBG. 10 lectures will cover theory and both global and national case studies. One optional full Saturday field excursion will show case examples of good conservation horticulture practice in Ireland.

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

- Able to explain the fundamental role of Botanic Gardens and Arboreta in local and global plant conservation.
- Able to describe both national and international policy frameworks for plant conservation.
- Familiar with basic hands-on horticulture practice used in plant conservation including growing a wide range of taxa from diverse habitats, soil mixes, tree conservation etc.
- Familiar with hands-on plant propagation techniques of different plant types (e.g. woody perennials, bulbs, ferns, palms, cycads, orchids.) used in conservation horticulture.
- Familiar with the practices of seed collecting and seed banking as tools in plant conservation.
- Able to describe basic practices of maintenance of a living plant collection including pest management, ethical plant trade, integrated pest management and plant passports/ plant quarantine.
- Able to research and describe successful case studies of conservation horticulture globally.

Indicative Reading:
A Handbook for Botanic Gardens on the Reintroduction of Plants to the Wild By J. Akeroyd (Editor) and Peter Wyse Jackson (Editor) Botanic Gardens Conservation International, 1995 ISBN: 0952027526
Restoring Diversity: Strategies for Reintroduction of Endangered Plants By Donald A. Falk (Editor), Constance I. Millar (Editor) and Margaret Olwell (Editor) Island Press, 1996 ISBN: 1559632976
Medicinal Plants: Conservation, Cultivation and Preservation by A. Chopra Daya Publishing House (August 1, 2007) ISBN: 817035486Ω

Senior sophister core modules

ZOU44030 Data Handling

Co-ordinator: Dr. Andrew Jackson, Prof. Yvonne Buckley
Assessment: This module is assessed 35% by continuous assessment and 65% by questions on an annual examination paper.
ECTS: 5 credits
Semester: 1

Module Content:
Being able to form research questions and challenge our hypotheses by collecting and analysing data forms the basis of scientific inquiry. An understanding of data analysis is an essential skill set for all scientists. This module will consist of 2 to 3 tutorial sessions per week spanning all of semester 1 in a flipped-classroom format with an active-learning ethos. One of the tutorials each week will be used to develop class-directed questions relevant to current scientific thinking. As a class, we will form hypotheses, collect data and develop appropriate analytical techniques to answer our research questions. Concurrently, online material including video podcasts will be used to develop hands-on skills in the use of the very powerful and flexible statistics package R for data analysis. The module will start with basic probability theory, introduce different statistical distributions and culminate in learning how General Linear Models form a common framework for conceptualizing and analysing your data. At the end of the module you will have analysed a wide variety of data types and will have used the transferable and widely applicable statistics package R to analyse your data.

Learning Outcomes:
On successful completion of this module, students will be able to:
1. Summarise and communicate quantitative results graphically and textually to scientific standards.
2. Apply appropriate statistical analyses of commonly encountered data types.
3. Explain the context of the analyses within a hypothesis driven framework of scientific logic.
4. Use the R statistical computing language for data analysis.
5. Create R notebooks for documenting analyses and sharing with collaborators.

BOU44108: Plant-Environment Interactions

Co-ordinator:	Dr. Matthew Saunders
Assessment:	50% Examination, 50% Continual Assessment
ECTS:	5 credits
Semester:	1

Description:
Plant growth is significantly influenced by the surrounding physical, chemical and biological environment. This module will address the key inter-related concepts of carbon assimilation and sequestration, plant water relations and energy balance components across the soil-plant-atmosphere continuum. Moreover, and as plants do not occur in isolation, this module will examine how fungi and fungus-like (e.g., Oomycota) interact with plants and the surrounding environment at multiple levels (soil interactions, roots, stems, leaves, and plant reproductive structures). The physiological response of plants to respond to a broad range of environmental conditions including abiotic and biotic extreme events will be explored, and the implications for natural and production-based systems will be assessed.

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

- Demonstrate an understanding of how environmental factors influence the physiological performance of plants at various stages of growth and across multiple spatial and temporal scales (leaf, whole plant, and ecosystem).
- Investigate using suitable methodological approaches how to monitor and quantify the impacts of key environmental drivers on physiological processes.
- Compare and contrast how plant systems respond to eternal drivers such as future climatic variability and land-use pressures.
- Demonstrate an understanding of the various interactions and ecological strategies among fungi, fungus-like organisms, and plants.
- Distinguish how these concepts can be implemented and utilised to address key issues in the sustainable management of land and the provision of food, fuel and fibre.

Indicative Reading:
Hall, D.O., Scurlock, J.M.O., Bolhar-Nordenkampf, H.R., Leegood, R.C. & Long, S.P. (eds) (1993). Photosynthesis and Production in a Changing Environment - A Field and Laboratory Manual, Chapman and Hall, London.
Jones, H.G. (2014) Plants and Microclimate - A Quantitative Approach to Environmental Plant Physiology. Cambridge University Press, Cambridge.
Lambers, H., Chapin, F.S., Pons, T.L. (2006). Plant physiological ecology. Springer, New York, USA.
Nobel, P.N. (2005). Physiochemical and environmental plant physiology. Elsevier Academic Press, Burlington, MA, USA.
Southworth, D. (ed.) (2012). Biocomplexity of Plant-Fungal Interactions. John Wiley and Sons, Chichester, West Sussex, UK.
Taiz, L., Zeiger, E. (2010). Plant Physiology. Sinauer Associates Inc., Sunderland, Massachusetts USA

BOU44109: Vegetation Description and Analysis

Lecturer:	Prof. Stephen Waldren
Other Lecturer(s):	Jean Wilson
Assessment	100% Continual Assessment
ECTS	5
Semester:	1

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

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

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

Indicative Reading:
Kent, M. (2012) *Vegetation Description and Data Analysis – A Practical Approach*, 2nd edition; Wiley Blackwell.

BOU44112: Plants and the Planet

Co-ordinator:	Dr. Ailbhe Brazel
Other Lecturers:	All academic and research staff in the School of Natural Sciences, Botany and Zoology disciplines.
Assessment:	50% Examination, 50% Continual Assessment
ECTS:	5 credits
Semester:	2

Description:
Plants have the power to shape the world around us, and how we utilise plants and the ecosystems in which they grow can have both positive and negative implications. This module, through a series of interactive tutorials, will allow students to further explore the research undertaken in the Botany department to better understand how this work and the plants and ecosystems involved are shaping the world in which we live. Furthermore, a key component of the module involes the Ecology, Evolution and the Environment seminar series, where invited speakers from across the globe will discuss their reseach in more detail.

Learning outcomes:
On successful completion of this module students should be able to:
Demonstrate an understanding of the basics of a wide range of research issues from within and outside the Botany curriculum and be able to critically assess the information presented to them.
Describe and discuss how work being carried out in Botany and the wider scientific field of Natural Sciences contributes to both national and international research activities and how these are used to address problems of global importance.
To appraise and critique research outputs and to communicate this work in both academic and non-academic written or oral format.

Indicative Content and Learning Activities (Key Words):
Seminars: The Ecology, Evolution and the Environment seminars run throughout the academic year where invited speakers from international institutes present their research. The topics of these seminars are aligned to the content of the moderatorships offered in the School of Natural Sciences but are broad in their scope.

Tutorials: Students will have the opportunity, in small groups, to discuss the research activities of faculty members within the Botany department and to evaluate the wider literature in these areas.

Workshops: The workshops are designed to offer key transferrable skills to students and are provided by various staff members from across the university.

BOU44110: The Evolution of Plants and Plant-Atmosphere Interaction

Lecturer: Prof. Jennifer McElwain
Assessment: 70% Examination, 30% Continual Assessment
ECTS: 5
Semester: 2

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

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

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

BOU44103: Plant Conservation and Biodiversity

Co-ordinator: Prof. Stephen Waldren
Other Lecturers: Trevor Hodkinson
Assessment: 50% Examination, 50% Continual Assessment
ECTS: 5 credits
Semester: 2

Description:
Loss of biodiversity is one of the major problems facing humanity. The theoretical background to the evolution of plant diversity is firstly developed, and the principles of conservation are then used to develop approaches to conserve plant diversity. The module is taught through lectures and practical workshops.

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

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

Indicative Reading:
Lomolino, M.V., Riddle, B.R. & Whittaker, R.J(2016). *Biogeography: Biological diversity across space and time.* Sinaur Associates.759pp.
Sher, A.A. & Primack, R.B. (2019) *An Introduction to Conservation Biology*. Oxford University Press. 512 pp

FBU44000 Research Project

Co-ordinator(s): Dr. Rebecca Rolfe, All Zoology & Botany staff
Assessment: Continuous assessment: Thesis (18 ECTS credits), poster presentation (2 ECTS credits)
ECTS: 20 credits
Semester: 2

Module Content
The project provides an important opportunity for students to plan and carry out a detailed and original piece of scientific research and communicate the results. It culminates in the production of a thesis and communication of the results through a poster presentation at an undergraduate research conference. Students will be assigned to a member of staff who will support an appropriate topic and will supervise the work. As part of the project students will be expected to outline clearly a scientific problem, review the associated literature, design and execute an appropriate research programme, analyse and present the results and draw clear conclusions and record progress in a notebook (physical or electronic as appropriate). Detailed guidance notes on writing and submitting the thesis and poster may be found on the FBU44000 Blackboard site. The FBU44000 module culminates in the submission of a thesis and presentation of a poster on the results.

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

Senior sophister open modules

BOU44060: Plant Breeding and Biotechnology

Co-ordinator: Prof.Trevor Hodkinson
Other Lecturer: Dr Kamila Kwasniewska
Assessment: 50% Examination, 50% Continual Assessment
ECTS: 5 credits
Semester: 1

Description:
The module covers the principles and practice of plant breeding and biotechnology. Lectures cover key topics such as the origins of agriculture, genetic resources, disease resistance, conventional breeding, modern breeding, genetic engineering, plant microbiomes and case studies in breeding and biotechnology. Practicals cover crop diversity, polyploid estimation, crop microbiomes and at least one site visit to a Teagasc Research Centre (e.g Ashtown Dublin).

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

1. Discuss core elements within the field of plant breeding and biotechnology.
2. Show laboratory skills in plant breeding.
3. Demonstrate knowledge of plant breeding techniques.

General texts (specific references will be provided during module):

- Acquaah G. 2020. Principles of Plant Genetics and Breeding, 3rd Edition. Wiley-Blackwell.
- Hodkinson T.R. and Murphy B.R. 2019. Endophytes for a growing world. Cambridge University Press. Chapter 1.
- Chrispeels M.J. and Gepts P. 2017. Plants, genes, and agriculture sustainability through biotechnology. Oxford University Press.

BOU44111: Restoration Ecology and Rewilding

Co-ordinator:	Dr. Marcus Collier
Other Lecturers	Guest Lecturers
Assessment:	50% Examination, 50% Continual Assessment
ECTS:	5 credits
Semester:	1

Description:
Restoration ecology, like conservation biology, is a 'crisis' discipline, having emerged as a science/practice response to the social and ecological impacts directly and indirectly driven by human activities. Restoration ecology has proven to be highly effective in some cases but has also given rise to some controversy as well as policy difficulties. In recent years the phrase 'rewilding' has emerged as a concept that embodies ecological restoration but with more future-oriented targets. Rewilding and novel ecosystems are new and controversial areas within restoration ecology making it difficult to know how and when to intervene. This module will introduce you to the challenges and opportunities, failings and fallacies of the complex world of restoration ecology, rewilding, and the work of restoration ecologists. It will look at how rewilding could be the most efficient of nature-based solutions and asks if this is feasible in the modern world. As the discipline struggles to navigate global climate issues, integrate with the social sciences, incorporate politics and economics, and derive policy actions, this module will draw on case studies of restoration globally to will challenge students to rethink ecology and ecosystems in the Anthropocene. It will also discuss areas of employment where students might consider after graduation, with some invited guests providing insight into the practice of restoration and rewilding.

Learning Outcomes:
On successful completion of this module students should be able to:
- Understand the principals of restoration ecology as they apply in a modern context.
- Comprehend the nuanced nature of restoring ecosystems and habitats as well as re-introducing species in practice.
- Carry out restoration case study analysis.
- Understand the complex relationship between ecology, social values and policies.
- Evaluate the success of restored ecosystems and species.

Indicative Reading:
Aronson, J, Milton, S.J., & Blignaut, J. Eds. (2007) *Restoring Natural Capital*. Island Press
Carver, S., Convery, I., Hawkins, S., Beyers, R., Eagle, A., Kun, Z., . . . Soule, M. (2021). Guiding principles for rewilding. *Conserv Biol, 35*(6), 1882-1893. doi:10.1111/cobi.13730
GLA (Greater London Authority). (2023). *Rewilding London: Final Report of the London Rewilding Taskforce*.
Higgs, E., Falk, D. A., Guerrini, A., Hall, M., Harris, J., Hobbs, R. J., . . . Throop, W. (2014). The changing role of history in restoration ecology. *Frontiers in Ecology and the Environment, 12*(9), 499-506. doi:10.1890/110267
Hobbs, R. J., Higgs, E. S. & Hall, C. M. Eds. (2013) *Novel Ecosystems*. Wiley
Lorimer, J., Sandom, C., Jepson, P., Doughty, C., Barua, M., & Kirby, K. J. (2015). Rewilding: Science, Practice, and Politics. *40*(1), 39-62. doi:10.1146/annurev-environ-102014-021406
Marris, E. (2011) *Rambunctious Garden*. Bloomsbury

BOU44107: Plant-Animal Interactions

Co-ordinator:	Dr. Sarah Larragy
Other Lecturers:	Prof Yvonne Buckley, Dr Francesco Martini
Assessment:	50% Examination, 50% Continual Assessment
ECTS:	5 credits
Semester:	1

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

The aims of the module are:
- To promote your understanding of pure and applied ecology and evolution of plant-animal interactions
- To equip you with the basic skills for carrying out laboratory experiments to examine plant-animal interactions.

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

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

Equipment

All students taking Botany or Environmental Sciences modules should acquire:

dissection kits for laboratory work: these must include a fine forceps (blunt forceps are of little use); also, a couple of mounted needles.

- Weatherproof clothing (protection against soaking and/or chilling may be required at any season!).
- Stout footwear (suitable for both rough and wet terrain - mountaineering boots are the most generally suitable, but rubber boots may be preferred for wet lowlands).
- **Sun protection lotion.**
- Mobile phone.

Finance

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

Note:
Students will be required to pay the full amount before the start of the Field Courses.

Safety

WE WILL NOT BE HIRING OUT LAB COATS. ANY STUDENT WITHOUT A LAB COAT WILL UNFORTUNATELY NOT BE ALLOWED IN THE PRACTICAL.

LABORATORY AND FIELDWORK 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.

The Laboratory
In formal laboratory exercises you will be under supervision in a controlled environment where all reasonable safety precautions have been considered and all hazards identified. For that reason laboratory safety is reasonably taken care of provided you follow the instructions of those in control of the laboratory. However, 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. There is only so much we can do and you have a legal obligation to follow instructions, look out for yourself and do nothing to put either yourself or others at risk.

Instrumentation in a laboratory is one area where this can be a problem. If you have never used an instrument before you will not know the potential danger it may pose. Do not interfere with any piece of equipment. You may muddle through with it but you might also cause injury to yourself or others. 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 issues are 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. The forms must be returned to 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 fieldwork. These will be issued prior to the first field course.

FIRE

Fire Prevention
Copies of the College General Fire Notice are displayed in the Department. Familiarise yourself with the instructions in case of fire. Individuals are responsible for checking the fire precautions in their own work areas. Any defect or potential fire hazards should be reported to the building Fire Warden.

Note the position of fire extinguishers in your working area. Familiarise yourself with the operating sequence for each extinguisher It is a criminal offence to misuse a fire extinguisher. 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 Botany. If the alarm bells ring or someone shouts 'fire', all persons in the building must exit as rapidly as possible and assemble at the east end of the rugby pitch. For emergency exit from the Old Anatomy Building laboratories, unlock the exit doors using keys stored behind glass in a key box beside the doors.

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 so that a search can be instituted quickly.

If possible, before exiting from the building, turn off all bunsens, electrical equipment *etc*.

CLOSE ALL WINDOWS AND DOORS IN YOUR LABORATORY AND IMMEDIATE WORK AREAS.
If possible inform the Front Gate Security Officer, emergency no. ext: 1999 or the 24 hour security no. ext: 1317, who will call the fire brigade, (from a mobile call 01 8961999 or 01 8961317 if Out of Hours). Then inform the Chief Steward, ext: 1144, (01 8961144 from a mobile).
There is an emergency phone on the ground floor of the Botany Building for this purpose. Warn firemen of possible missing persons and potential hazards in the area of the fire – hazardous chemicals, pathogens, gas cylinders, *etc*.

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 Technician or another staff member. If a bomb is thought to be in the building, procedures essentially follow those employed in the case of fire except that report is made to College authorities on ext: 1999/1317 (Front Gate Security Officer & 24 hour Security) who will call the Gardai.

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. Placed on top of each box there should be an eye-wash bottle containing Sterile Saline solution. DO NOT USE AN ITEM WITHOUT SUBSEQUENTLY INFORMING A TECHNICIAN. 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 CHIEF TECHNICIAN.

All accidents must be reported to the Safety Officer and entered in the accident book which is kept in the Chief Technician's office. An accident report form will be completed. Dangerous occurrences must also be reported on the appropriate form.

In the event of serious accident or medical emergency, quickly report it to the Chief Technician (Main Building) or the senior person present and call the Front Gate Security Officer ext: 1999/1317 who will notify the Emergency Services, or if off Campus call the ambulance service at no. 999 or 6778221 (Tara Street) if necessary. In the event of eye injuries, the victim should be taken directly to the Royal Victoria Eye & Ear Hospital, Adelaide Road. During office hours medical assistance can be obtained from the Student Health Service ext: 1556/1591.

In cases involving poisoning call the Poisons Information Centre, Beaumont Hospital no. 837 9964/ 837 9966 or contact the Pharmacology Department ext: 1563.

Familiarise yourself with the standard first aid procedures to be followed in the event of acid and alkali contact with the body, reagent ingestion, cuts, electrical shock, burns, etc.

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.

Health and safety issues for laboratory and field projects must be discussed in detail with supervisors.

Sophister assessment and examinations

Junior Sophister and Senior Sophister

External Examiner
An external examiner, currently Professor Alastair Culham, University of Reading, UK, moderates the Junior and Senior Sophister examination. It is common practice for external examiners to viva some 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.
Note: 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; continuous assessment; research project including submission of a thesis, examinations, and thirty per cent of the Senior Sophister overall mark is carried forward from the Junior Sophister year.

Plagiarism/Academic Integrity

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).

Written submitted exercises will be screened by plagiarism-detecting software. Again you must display your own and your partner's names and IDs on any submitted work.

Further information on academic integrity can be found here:

- Academic Integrity homepage (formerly Avoiding Plagiarism): 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

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:

Please submit your continuous assessment either electronically or by hand, as directed by the module coordinator.

Electronic submissions are to be made through Blackboard. Depending on the module, Blackboard might or might not accept late submissions after the stated deadline. Submissions are made directly through Blackboard or via Turnitin, linked through Blackboard.

Unless otherwise instructed, assessments left in staff pigeonholes, or handed to other members of staff will not be marked.

Please remember it is important to keep all Continuous Assessment exercises handed in physically (e.g. lab books) when returned to you, until the Court of Examiners has awarded your final mark.

Late Submissions and Extensions for Module Assignments

Developing effective time management strategies and taking personal responsibility for learning is a key skill that students need to master in order to succeed at university and beyond. All students enrolled in modules delivered by the School of Natural Sciences are required to be well prepared for their continuous assignment work, and to submit their work on time and by the deadlines communicated to them by their module coordinator.

Students should note that for some modules it is not possible to grant an extension on coursework due to assignment structure and timing, this will however be clearly communicated by the module coordinator. In addition, no extensions can be given for requests arising from a lack of organisation of work around other activities, or a lack of planning on the student's part. All students must allow time for contingencies in their planning when completing assignments

If students experience ***truly exceptional and unforeseen circumstances*** that affect their ability to submit work on time, they are asked to contact their module coordinator via email in the first instance and as soon as the issue arises. The student's tutor should also be copied in on this initial email request, and all students are strongly encouraged to also approach their tutor for assistance and support in addressing any underlying reasons that are contributing to their extension request.

Extensions for module assignments and acceptance of late submissions will only be granted when supported by verified evidence of exceptional and unforeseen circumstances at the discretion of the module coordinator. If students submit work late without having been granted an extension by their module coordinator, the following reduction to the mark for the assignment will apply:

- For submissions up to three days late: 5% per day including weekends.
- Submissions received more than three days late (including weekends), without a pre-agreed extension, a medical certificate or documented evidence of significant extenuating circumstances, will not be marked.

The registered time of submission will be the time recorded on email or Blackboard for the submission.

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 independent 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 independent 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. The content is sensible and relates a reasonable narrative, if limited in synthesis and sophistication. There is reasonably good citation practice and a well-presented reference list in essays.
	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. Content may be disjointed and lacking good structure. Poor citation practice and reference list in essays.
	45-49	WEAK ANSWER; limited understanding and knowledge of subject. Serious omissions, errors and misunderstandings, so that answer is no more than adequate.

III	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

FBU44000 Thesis marking criteria

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 with minimal understanding of the wider context or relevance of the project. Must contain all major sections (Introduction, methods, results and discussion) with some relevant substance but could have gaps and inaccuracies. Methods could be basic and not complete. Experimental design may contain obvious unrecognised flaws and may not be described completely. Must contain some relevant and sensible results although they may be limited or presented in a confused or inappropriate matter. Analysis of results simple and may show basic errors. Interpretation of results is simple but may be limited. Discussion may be minimal and restricted to the direct findings of the project lacking any originality. General standard of presentation poor.
Fail	20-39	An unsatisfactory or incomplete project report, lacking sections or with trivial content in some. Very limited understanding of the research question or failure to express it at all. Very restricted and superficial appreciation of the relevant literature. Methods are incomplete, possibly lacking description of experimental design. Results may be incomplete or superficial, 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 severely limited or absent. Discussion restricted to a restatement of results or irrelevant. 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 Integrity

College policy

It is clearly understood that all members of the academic community use and build on the work and ideas of others. However, it is essential that we do so with integrity, in an open and explicit manner, and with due acknowledgement. Any action or attempted action that undermines academic integrity and may result in an unfair academic advantage or disadvantage for any member of the academic community or wider society may be considered as academic misconduct. Examples of academic misconduct include, but are not limited to:

- plagiarism - presenting work/ideas taken from other sources without proper acknowledgement. Submitting work as one's own for assessment or examination, which has been done in whole or in part by someone else, or submitting work which has been created using artificial intelligence tools, where this has not been expressly permitted;
- self-plagiarism - recycling or borrowing content from the author's own previous work without citation and submitting it either for an assignment or an examination;
- collusion - undisclosed collaboration of two or more people on an assignment or task, or examination, which is supposed to be completed individually;
- falsification/fabrication;
- exam cheating - action or behaviour that violates examination rules in an attempt to give one learner an unfair advantage over another;
- fraud/impersonation - actions that are intended to deceive for unfair advantage by violating academic regulations. Using intentional deception to gain academic credit;
- contract cheating - form of academic misconduct in which a person uses an undeclared and/or unauthorised third party to assist them to produce work for academic credit or progression, whether or not payment or other favour is involved. Contract cheating is any behaviour whereby a learner arranges to have another person or entity ('the provider') complete (in whole or in part) any assessment (e.g. exam, test, quiz, assignment, paper, project, problems) for the learner. If the provider is also a student, both students are in violation.

Further examples of the above available at www.tcd.ie/teaching-learning/academic-integrity.
Additional information on Plagiarism and the General Regulations that pertain to Plagiarism can be found in the University Calendar, Parts II and III at http://www.tcd.ie/calendar/. Levels of plagiarism are defined within the regulations and different sanctions are applied according to the level. See http://www.tcd.ie/calendar/. Trinity provides a central repository hosted by the Library with information on plagiarism and how it can be avoided at https://libguides.tcd.ie/academic-integrity/misconduct. Disciplinary records relating to plagiarism will be retained in accordance with the 31T Trinity Records Management Policy and Trinity Data Protection Policy and in compliance with data protection law, specifically the EU General Data Protection Regulation 2016 ("GDPR") and the Data Protection Acts 1988-2018.

Avoiding plagiarism

All students need to complete the Ready Steady Write plagiarism tutorial, a resource developed by the Centre for Academic Practice and eLearning (CAPSL) at Trinity College Dublin, to help you understand and avoid plagiarism and develop your academic writing skills and academic integrity. It is designed so that you can view it from beginning to end or in sections and topics.
Each coversheet that is attached to submitted work should contain the following completed declaration:

I have read and understood the plagiarism provisions in the General Regulations of the University Calendar for the current year, found at http://www.tcd.ie/calendar.
I have also read and understood the guide, and completed the 'Ready Steady Write' Tutorial on avoiding plagiarism, located at https://libguides.tcd.ie/academic-integrity/ready-steady-write.

Trinity Inclusive Curriculum

Trinity College Dublin is committed to a policy of equal opportunity in education, and to ensuring that students and staff have as complete and equitable access to all facets of College life as can reasonably be provided. Further guidance on the college accessible Information policy and guidelines can be found at https://www.tcd.ie/about/policies/accessible-info-policy.php.

Use of AI tools in academic work

In recent years, we have seen the rise of AI tools, including text and image generation tools, information mining and many more. Such tools are now becoming embedded in search engines and PDF readers such as Adobe. If and how to use AI in academic and scientific work is still a matter of debate in the scientific community, and opinions evolve as the algorithms themselves evolve. At College level, the use of AI falls under the general Academic Integrity policy and associated regulations. Due to the rapidly changing nature of the field of AI, students are advised to keep up to date with this policy as it might change through the academic year.

AI tools are increasingly being incorporated into workflows in professional contexts and it is important that you familiarise yourself with what AI can do and what are its limitations and pitfalls. Keep in mind that a lot of information available on the topic on the internet is biased and produced by individuals and companies that are trying to sell AI products or by people who are, rightfully, angry that their work has been used for AI training without their consent (see 'Ethical concerns' below).

The below is meant to serve as an explainer of what AI and its various forms are and of the possible caveats of using AI tools in your academic work and beyond.

Definitions

- Artificial Intelligence (AI) – In its more general and futuristic definition, artificial intelligence algorithms are those that provide human-like or beyond human-like interpretation in a way that looks like the output of human intelligence. In its present-day use, the term refers to mathematical algorithms that use advanced statistical methods to find patterns in the data provided (numbers, text, images, etc) and create the desired output.
- Training data – data that is used for an AI algorithm to 'learn' the patterns in the data and create the actual AI model that creates the output and is provided to users.
- Generative AI (GenAI) – AI algorithms that can create new content based on given training data, including text, images, sound and videos.
- Large Language Models (LLM) – a generative AI algorithm that creates text in natural language. The best known one is ChatGPT but there are many more out there with various uses.
- Machine learning (ML) – largely synonymous with AI but more frequently used in scientific papers specifically about developing or applying algorithms. You will see, for example,

studies using ML to identify plant species or to scale up measurements to areas where these measurements are not available.

Accuracy concerns
LLMs are built to mimic human language, and a model is considered good if the output looks convincingly like language. There is nothing in the LLMs training to check if the information in the text is true or accurate. The model has been trained on real text, so there is a chance that the output contains actual information, but there is also a chance that it doesn't. If asked to include reference in the text, LLMs will frequently make up plausible looking but non-existent references. While there are efforts being made to integrate LLMs with real search engines, no reliable and accurate LLM exists at the time of writing this explainer.

Ethical concerns
All AI algorithms need training data. There are of course ways to obtain such data in equitable ways, but in practice AI companies have used, art, literature, journalism and academic text without obtaining permission or paying the original authors.

Environmental concerns
Training AI algorithms requires large amounts of computational power, which in turn require a lot of energy and water. Serious concerns have been raised around the climate impact of training and using AI. As scientists and especially scientists working in the natural sciences, we cannot ignore these facts. The College has recently developed a Sustainability Strategy, which includes commitments to reducing carbon emissions from academic activities.

Should I use AI in my academic work?
There is no right or wrong answer to this question. Writing your entire assessment using an LLM will most certainly fall under the College Academic Integrity policy. Using machine learning as a statistical method for your research project will most certainly not and might create a very exciting and state of the art project. Beyond that, use your judgment, keeping in mind the caveats above. Some modules will have a specific AI policy**, and you should follow that. If in doubt, do not hesitate to ask the module coordinator.**

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. For field work, ethical consideration needs to be given to the disturbance of

species and habitats that may not be subject of your particular study, ethical considerations also need to apply to access to private land. 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

General information

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

Course Lecturer
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)
Class representatives
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: (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; Doctor: Dr David Thomas 896 1556; Health Promotion Officer, Ms Aileen McGloin 01 896 1556; Physiotherapist: Ms Karita Cullen 01 896 1591;
Welfare Officer, Students' Union, House 6, College (01) 646 8437, mailto: welfare@tcdsu.org
Chaplains; House 27, College: Fr Peter Sexton (Roman Catholic), 01 896 1260; Fr Alan O'Sullivan (Roman Catholic) 01 896 1260, Methodist, Anglican and Church of Ireland
Disability Services, Mr Declan Treanor, Printing House Square (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

Student 2 Student

From the moment you arrive in College right the way through to your end of year exams Student 2 Student (S2S) is here to make sure your first year is fun, engaging and a great foundation for the rest of your time in Trinity. You'll meet your two S2S mentors in Freshers' Week and they'll make sure you know other people in your course before your classes even start. They'll keep in regular touch with you throughout your first year and invite you to events on and off campus. They'll also give you useful information about your course and what to look out for. Mentors are students who have been through first year and know exactly what it feels like, so you never have to worry about asking them a question or talking to them about anything that's worrying you.

S2S also offers trained Peer Supporters if you want to talk confidentially to another student or just to meet a friendly face for a coffee and a chat. S2S is supported by the Senior Tutor's Office and the Student Counselling Service.

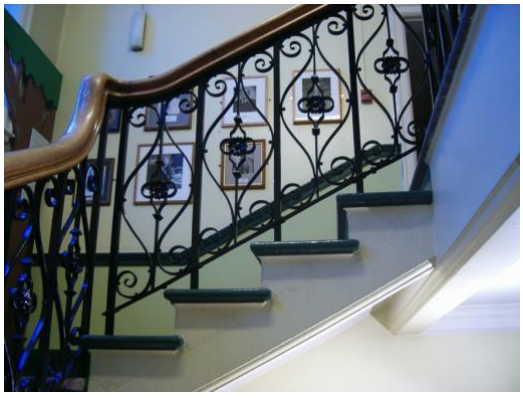
Website: http://student2student.tcd.ie
E-mail: student2student@tcd.ie
Phone: 896 2438

General Information

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



Discipline information

Departmental Office
The Executive Officers are responsible for the management of the Departmental Office. All queries regarding the Department are initially dealt with by the Executive Officers.

Chief Technician's Office
The Chief Technician is directly responsible for all the services provided by the technical staff. They are as follows:
1. Support for teaching classes and field courses.
2. Stores and purchase of consumables/equipment.

Please note:
(i) The day-to-day running of the stores is the responsibility of the Technicians. All orders sent to an outside firm or College Department must be placed by the Preparer using the Colleges Financial Information System with the correct code authorised by the Head of Botany or the Research Account Holder. No responsibility can be accepted for orders processed in any other manner.
(ii) *Undergraduates working on their research projects are expected to wash the glassware they use and return it to where it is stored.*
(iii) Any experimental material in laboratories or greenhouses must be removed at the conclusion of the practical work. Consult your supervisor or a technician regarding disposal.
(iv) The Departmental photocopier is available *only* for the copying of articles in Library journals and books that cannot be removed from the Department. The Departmental library is an extension of the College Library and therefore Copyright restrictions are identical.

Instrumentation

New Users
All new and potential users of equipment and instruments in the building must declare their intention of using such apparatus on the first occasion to a technician or a member of staff who will then arrange appropriate familiarisation briefings about the particular apparatus.

This requirement does not apply to organised practical classes where alternative arrangements will ordinarily be made (*i.e.* by demonstrators supervising use of instrument, *etc.*).

Booking of Instruments and Apparatus
Booking calendars are supplied with some of the instruments in the building. *Irrespective of whether you actually require to advance book an instrument or not, you must sign on to show that you were a user of that particular instrument.*

Borrowing of Equipment
No equipment may be loaned by undergraduates.

LIBRARY

The Botany Library rules *must* be adhered to. They are as follows:

(i) Books may be borrowed by:
- (a) Members of academic staff.
- (b) Research students in Botany.
- (c) Sophister students attending Botany classes.

Other members of the College may read in the Library but may not borrow books without the written permission of the departmental librarian.

(ii) Periodicals *may not* be borrowed from the library by *anyone.* Articles may be photocopied in the Library by arrangement with the relevant course lecturer or research supervisor. Remember the vast majority of papers are online and there is no need to do this. We keep physical journals in the library for historical reasons.

(iii) Books on loan from the College library may not be borrowed, except by members of the academic staff, who may borrow them on the same terms as from the College library.

(iv) Books marked with a red seal and books on shelves K7, 8 & 9 *must not be borrowed by anyone.*

(v) Books borrowed must be entered in the loan book in an orderly and legible form.

(vi) No more than three books may be on loan to an under-graduate student at one time.

(vii) Books borrowed must be returned within *three* weeks and may not be borrowed again by the same person until three days have elapsed since their return.

(viii) Books and periodicals should be returned to their correct shelf.

(ix) Books in the Herbarium Library may be borrowed only at the discretion of the Herbarium librarians (Prof. T. Hodkinson or P. Moonlight). Borrowings *must* be entered into the Herbarium library loan book.

(x) Missing books or periodicals should be reported to the Librarian in writing.

(xi) *PERSISTENT OFFENDERS AGAINST THE RULES WILL BE EXCLUDED FROM THE LIBRARY.*

Please Note: The Library is used for morning coffee (11.00 - 11.30 a.m.), lunch (1 – 2p.m.) and afternoon tea (4.00 - 4.20 p.m.) by the Botany staff and research students. It is also used outside these times for meetings.

BOTANIC GARDENS

Main Function of the Garden
Support of botanical teaching and research in TCD by providing living plant material, controlled growth environments, glasshouses and other experimental facilities. The Garden also houses the Irish Rare and Threatened Plant Genebank.

Main Research of the Garden
Conservation biology, taxonomy, physiological ecology, plant response to climate change.

Facilities
Four heated glasshouses, three unheated glasshouses, walk-in controlled environment chambers, seed processing facility, deep-freeze seed genebank, low temperature growth facilities, experimental plots including open top chambers, growing beds including systematic garden and arboretum, potting shed and ancillary facilities. The diverse plant collection reflects teaching and research needs.

Director:
Professor Jenny McElwain

Curator/Administrator:
Professor Stephen Waldren

Ground Staff:
Mr Michael McCann
Ms Elizabeth Bird
Dr Michelle Murray (Outreach Officer)

For further information, please see the Botanic Gardens web pages at:
https://trinitybotanicgarden.ie

HERBARIUM

Main Function of the Herbarium
Support of botanical teaching and research in systematics, ecology and physiology by providing a comprehensive reference collection of preserved plant material. The herbarium houses very large numbers of plant specimens from overseas including very many type specimens. It is of international importance.

Main Research of the Herbarium
Systematics of selected plant groups, especially from SE Asia, Europe and Central America.

Facilities
About 300,000 preserved plant specimens and an associated library of many thousand books and journals.

Herbarium Curator:
Professor Trevor Hodkinson

Deputy Curator:
Dr Peter Moonlight

Curator Hepatic Collection:
Emeritus Professor Daniel Kelly

For further information, please see the Herbarium's web pages at:
http://www.tcd.ie/Botany/herbarium/about.php