



Trinity College Dublin

Coláiste na Tríonóide, Baile Átha Cliath

The University of Dublin

Department of Zoology

# Zoology Senior Sophister Handbook 2018–2019



## Contents

WELCOME .....	4
THE PROGRAMME .....	4
Bologna and the European Credit Transfer .....	5
Staff Contacts .....	6
Summary of the Senior Sophister Programme .....	7
Brief Description of Junior Sophister Modules .....	8
PROGRAMME REGULATIONS .....	19
Assessment and Awards .....	19
Semesterised Structure .....	20
Access to Scripts .....	20
Plagiarism .....	21
2017-18 Calendar Entry on Plagiarism .....	21
Grading Guidelines .....	22
Prizes in Zoology .....	26
GENERAL INFORMATION .....	27
Work Stations .....	27
Health and Safety .....	27
Illness/Disability .....	27
Information on Departmental Procedures, Safety and Security .....	28
Ethics .....	28

## A Note on this Handbook

This handbook applies to all students taking the Zoology 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 retain for future reference.

The information provided in this handbook is accurate at time of preparation. Any necessary revisions will be notified to students via email and on the Zoology notice board, and will be updated on the Zoology website. Please note that, in the event of any conflict or inconsistency between the General Regulations published in the College Calendar and information contained in course handbooks, the provisions of the General Regulations will prevail.

## Welcome

The discipline of Zoology at Trinity aims to make discoveries, educate and engage society in the science of whole organism biology, ecology & conservation, with a particular focus on animals. Through our research, education and engagement with society we seek to advance scientific understanding and contribute solutions to global challenges to the environment, health and human wellbeing.

The general philosophy behind the Senior Sophister year is to equip and encourage you to develop independence of thought and learning practices. You will develop the skills to enable you to succeed in your future employment or advance to further formal study and, crucially, equip you for the life-long learning which is essential for adapting to new information, work practices and cultures.

You will have the opportunity to specialize in the areas that most interest and inspire you, with electives available across a wide range of systems and levels of organization from the sub-cellular to the landscape level. You will undertake an independent research project and attend seminars at the cutting edge of international research through our seminar series. We hope that the deep knowledge you will gain of your chosen elective modules and research topics will provide you with a solid scientific framework from which to think creatively and explore the natural world and its interactions with human society.

*Yvonne Buckley*  
Professor of Zoology & Head of Discipline

## A Word from the Course Co-ordinator

Welcome to your Senior Sophister year in Zoology. This is what the last three years have been all about – you are now on the threshold of graduation as a Zoologist. The coming year will be a lot of hard work but also, we hope, fun: we want to instil a passion to continue learning beyond your degree. The programme is intensive and there are numerous submission and presentation deadlines that must be met.

With almost 50% of the credits going for continuous assessment, and semesterised exams, you will need to hit the ground running. During your education, you have been trained to take on more responsibility for your own learning, and this final year epitomises this. To succeed, you will need to be self-motivated, think and work independently, develop good time management and excellent note taking and synthesis skills. Make use of all the resources and facilities that are available, attend the regular meetings with your project supervisor and, if you have any problems or issues with any part of the programme, speak with the lecturer concerned or call in to see me in my office.

*Andrew Jackson*  
Zoology Course Co-ordinator

## Programme Structure

Zoology is the scientific study of all aspects of animal biology, from the cell to ecosystems. This encompasses a knowledge, not only of the structure and function of different species, but also of the complex relationships which govern the way in which animals relate to each other and to their surroundings. It provides an integrated view of all biological levels from the gene to the organism and higher.

Zoology provides fundamental knowledge relating to three areas of concern to society, namely the environment and its conservation, food production, and human and animal health and wellbeing. There is a growing awareness of environmental issues, including the conservation of biodiversity and the effects of climate change, to which zoologists contribute at all levels from research to policy making. Zoological research is also important in relation to food products and their pests while studies on a range of animals provide a basis for medical biology. Aspects of both environmental and medical biology feature strongly in the teaching and research programmes of the Zoology Department at TCD.

On successful completion of the two-year Sophister programme in Zoology, students will be able to:

- set out the important basic concepts and current research developments in animal biology and associated disciplines
- structure the diversity and evolution of the animal kingdom
- design useful experiments
- demonstrate technical competence in the handling of research facilities and operate safely in a laboratory environment, both individually and as a team member
- design sampling programmes and carry out fieldwork using standard procedures
- communicate effectively both orally and in a variety of contemporary scientific writing styles.
- use appropriate editing, web-based, graphical and analytical software to analyse and interpret data and prepare reports and assignments.
- critically analyse experimental results (including those obtained personally) and use appropriate statistical and other quantitative procedures for data handling
- proficiently search and critically assess scientific literature and databases
- apply a scientific approach to problem solving
- articulate the contribution, including the ethical dimension, made by Zoology to society, in the realms of the environment, agriculture, natural resource management, human behaviour and health.

## **Bologna and the European Credit Transfer System**

Under the Bologna Process, to which Ireland is a party, and which is designed to encourage student mobility and the international recognition of qualifications, the European Credit Transfer and Accumulation System (ECTS) has been introduced in Trinity College Dublin, and applies to all undergraduate and taught postgraduate programmes.

ECTS credits represent the student workload required to achieve the desired outcomes of modules and programmes, where 60 credits is the norm for full-time study over one full academic year. It should be noted that as one ECTS credit is considered to account for between 20 and 25 hours of student participation in a course, 60 credits, therefore, amounts to between 1,200 and 1,500 hours - that is an average of 40 to 50 hours per week over the 30 weeks of the University year. In Science and Technology, approximately 30-40% of that total may involve 'contact hours'.

The ECTS credit weighting for a given 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, and so on as appropriate. There is no intrinsic relationship between the credit weighting of a module and its level of difficulty.

Credits are obtained by individual students upon successful completion of the academic year or programme. However, one-year and part-year visiting students are awarded credit for all individual modules successfully completed.

Senior Sophister students in Zoology take 40 credits of 'Core' Modules and 20 credits of 'Elective' Modules as follows: 20 Credits of 'Electives' chosen from a programme of tutorials and a Tropical Ecology Field Course, 10 credits of General Zoology, a 5 credit module of Data Handling, a 5 credit module of Research Comprehension, a 5 credit Zoology and Society Desk Study and a Research Project, which counts for 15 credits

## Contacts:

		Email (@tcd.ie)	Phone (896-)
Prof. Yvonne <b>BUCKLEY</b>	Professor of Zoology Head of Discipline	buckleyy	3172
Dr Ian <b>DONOHUE</b>	Associate Professor	ian.donohue	1356
Dr Colleen <b>FARMER</b>	Assistant Professor	cfarmer	1036
Prof. Celia <b>HOLLAND</b>	Professor	cholland	1096
Dr Andrew <b>JACKSON</b>	Associate Professor Zoology Course Coordinator	jacksoan	2728
Dr Pepijn <b>LUIJCKX</b>	Assistant Professor		
Prof. Nicola <b>MARPLES</b>	Professor	nmarples	1063
Dr Nessa <b>O'CONNOR</b>	Assistant Professor	n.oconnor	1926
Dr Nick Payne	Assistant Professor	paynen	
Dr Jay <b>PIGGOT</b>	Assistant Professor	piggottjj	1642
Dr Rebecca <b>ROLFE</b>	Research and Teaching Fellow	rolfere	3822
Dr John <b>ROCHFORD</b>	Associate Professor	rchfordj	2237
Prof. James <b>WILSON</b>	Adjunct Professor	jwilson	
Prof. Peter <b>WILSON</b>	Adjunct Professor	pwil @eircom.net	1135

Ms Alison <b>BOYCE</b>	Senior Technical Officer Zoology Safety Officer	aboyce zoosafe	3506
Ms Sinead <b>KELLY</b>	Technical Officer	kellys76	3506
Dr Martyn <b>LINNIE</b>	Chief Technical Officer 1	mlinnie	1679
Ms Fiona <b>MOLONEY</b>	Senior Executive Officer	zoobot	1366

Prof. Patrick <b>WYSE- JACKSON</b>	Head of School	wysjcknp	2920
Dr Mark <b>HENNESSY</b>	Director of Teaching and Learning (Undergraduate)	mhnnessy	1881
Ms Mary <b>FOODY</b>	School Administrator	schnatsc	2920

## Summary of the Senior Sophister Programme

Module Code	Module Title	ECTS Credits	Semester
-------------	--------------	--------------	----------

### ***CORE MODULES (40 Credits)***

ZO4030	Data Handling	5	1
ZO4060	Research Comprehension	5	1 & 2
ZO4020	General Zoology	5	2
FB4000	Research Project	20	1 & 2

### ***ELECTIVE MODULE (25 Credits – selected from)***

ZO4012	Advances in Parasitology	5	2
ZO4013	Conservation and Wildlife Management	5	1
ZO4015	Evolution	5	1
ZO4017	Tropical Ecology (including Field Course)	5	1
ZO4018	Comparative Physiology	5	1
ZO4092	Environmental Impact Assessment	5	2
BO4107	Plant-Animal Interactions	5	2

Please note: Students are expected to make a contribution towards the transport and accommodation costs of the field components of module ZO4017 (based in the Rift Valley of Kenya), which is €1,750. Eligible students may apply to the Student Assistance Fund ([http://www.tcd.ie/Senior\\_Tutor/](http://www.tcd.ie/Senior_Tutor/)) for financial assistance.

You will select 5 out of the 7 Elective Modules. It is up to you to balance your credits between the two semesters. Bear in the mind that Semester 1 is already quite busy with the Research Project and Data Handling in particular and if you

## Brief Description of Senior Sophister Modules

*Where more than one lecturer is involved, the name of the module coordinator is given in italics*

### **CORE MODULES:**

---

#### **ZO4030 Data Handling**

(5 credits – Semester 1, Part 1 & 2)

##### **Module Personnel:**

Dr Andrew Jackson

##### **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 tutorial sessions per week spanning all of semester 1. 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 analyzing 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. Write a short document in the format and style of a peer reviewed science publication and self-assess each classmates' documents.

##### **Assessment Details:**

100% continuous assessment with 3 assignments spread over the semester.

## **ZO4060 Research Comprehension**

(5 credits – Semester 1 & 2, Part 1 & 2)

### **Module Personnel:**

*Dr Pepijn Luijckx*

### **Module structure:**

No matter what you do when you graduate, in most jobs you will be expected to read, understand and interpret data. Often this will be in a subject you are unfamiliar with, or will use unfamiliar methods or study organisms. The aim of this module is to help you to develop the ability to understand and interpret research from a broad range of scientific areas, and then to develop opinions about this research and how it fits into the “big picture”. This module also aims to improve your ability to communicate all kinds of scientific research to a general audience, a skill that is currently in great demand.

### **Learning Outcomes:**

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

### **Assessment Component Breakdown**

40% CA, 60% Written Exam

**Blog posts:** A number of blog posts will be written on the content of the seminars.

2 hour end of year written exam.

## **ZO4020 General Zoology**

(5 credits – Semester 2)

### **Module Personnel:**

*Dr Andrew Jackson, Dr John Rochford, All Zoology Staff*

### **Module Content:**

This module provides an opportunity for students to revise and study, in greater depth, topics spanning the breadth of the Zoology programme. Students are expected to integrate their approach to the material covered in their Junior Sophister year in greater depth with the perspectives and skills they develop during their final year through independent learning. There is no contact hours associated with this module which expects that you undertake independent learning, commit to personal development through reflection over your entire education so far in your degree, and rewards those with a passion for continued learning.

### **Learning Outcomes:**

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

1. Describe the diversity and evolution of the animal kingdom.
2. Recognise, on the basis of diagnostic features, representatives of the major taxa of invertebrates and vertebrates.
3. Explain important basic concepts and current developments in key areas of the core zoology programme including ecology, behaviour, parasitology and developmental biology.
4. State confidently the theoretical and practical aspects relating to essential laboratory techniques, particularly molecular approaches.

### **Assessment Details:**

This module is examined in a three-hour lab-based short answer paper in the final Moderatorship examination.

---

## **FB4000 Research Project**

(20 credits –Semester 1 & 2)

### **Module Personnel:**

*Prof. Yvonne Buckley, All Zoology & Botany Staff*

### **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. They will submit a research proposal before the practical work begins as part of the Junior Sophister ZO3070 Experimental Design & Analysis module. As part of FB4000 they will submit a thesis and present a poster on the results. For the project, they will be expected to outline clearly a scientific problem, review the associated literature, design and execute an appropriate research programme, analyse and present the results and draw clear conclusions 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 FB4000 Blackboard site.

### **Learning Outcomes:**

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

1. Formulate scientific questions, apply a scientific approach to problem solving
2. Plan an investigation and utilise the principles of good experimental, observational or computational design
3. Conduct an in-depth scientific review of a subject
4. Organise desktop, computational, field or laboratory based research including: logistics, recording, archiving, qualitative or numerical analysis and presentation and interpretation of data
5. Manage a project through continuous assessment of progress and improvement of skills
6. Effectively work with a team including their supervisor and other members of the research team
7. 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
8. Present and communicate results in the form of a dissertation and poster presentation

### **Assessment Details:**

Continuous assessment: Thesis (18 ECTS credits), poster presentation (2 ECTS credit)

## ***ELECTIVE MODULES:***

---

### ***ZO4012 Advances in Parasitology***

(5 credits – Semester 2, Part 1)

#### ***Module Personnel:***

Prof. Celia Holland

#### ***Module Content:***

This module consists of two parts. The first part (A) explores the significance and impact of parasitism upon humans. Some of the topics discussed during the module illuminate the practical challenges of designing and undertaking parasitological research in human subjects. In contrast, other topics highlight the relative merits of using animal model systems under experimental conditions as compared to field-based studies in human subjects. The topics are as follows - the impact of parasitism upon cognitive development in growing children; co-infection: challenges and solutions; epidemiology of helminths: aggregation and predisposition; the ultimate challenge - parasite control.

The second part (B) focuses upon more ecological aspects of Parasitology with a particular emphasis upon the impact of parasites at the level of the ecosystem and within wild animal hosts. The topics include parasites as ecosystem engineers, parasites and introduced species and the use of wild mammal host-parasite systems to model human parasitism.

#### ***Learning Outcomes:***

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

1. demonstrate familiarity with the conduct of human studies under field conditions in developing countries
2. describe the impact of parasitism upon human hosts
3. explore the pros and cons of using animal models in parasitological studies
4. delineate the mechanisms of interaction between co-infections
5. define parasite aggregation and predisposition
6. identify the challenges associated with anti-parasite chemotherapy and vaccination
7. evaluate the use of wild rodent parasite communities as models of human infection
8. demonstrate understanding of the role of parasites in an ecosystem
9. assess the role of introduced host species in parasite transmission
10. demonstrate the skills to critique a scientific paper
11. discuss and debate various contributions to a particular topic

#### ***Assessment Details:***

This module is assessed 20% by continuous assessment and 80% by questions on an annual examination paper.

---

## **ZO4013 Conservation and Wildlife Management**

(5 credits – Semester 1, Part 1 & 2)

### **Module Personnel:**

Dr John Rochford, Prof. Peter Wilson

### **Module Content:**

This module, which consists of both lectures and tutorials, looks at some of the practical applications of wildlife biology to the conservation and management of animals, both *in-* and *ex-situ*, including the role of zoos in captive breeding programmes. Among the topics covered are: planning for wildlife management, wildlife survey and census techniques, the principles of managing wildlife for sustainable harvest or control, management of scarce or endangered species, practical issues associated with the *ex-situ* management of species, and the design and management of conservation areas. In the second part of the module, we will concentrate on anthropogenic impacts on biodiversity conservation, including the development and implementation of biodiversity conservation strategies in the wake of the Convention on Biological Diversity, other national and international wildlife legislation, biosecurity and the role of Invasive Alien Species, Biological Data Management and the development of Species Action Plans, and the role of reintroductions in biodiversity conservation.

### **Learning Outcomes:**

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

1. outline the goals and history of sustainable wildlife management
2. determine and evaluate strategies for exploitation and control of animal resources
3. implement techniques for establishing and maintaining the conservation status of species
4. describe the relationship between *in-* and *ex-situ* conservation measures
5. evaluate the selection, design and management of protected areas for wildlife

### **Recommended Reading List:**

Primack, Richard B. 2010. Essentials of Conservation Biology (5<sup>th</sup> edition).

Publisher – Sinauer Associates, Sunderland, Mass. (ISBN 9780878936403)

Groom, Martha J., Meffe, G.K. and Carroll, C.R. 2006. Principles of Conservation Biology (3<sup>rd</sup> edition). Publisher – Sinauer Associates, Sunderland, Mass. (ISBN 0878935185)

### **Assessment Details:**

This module is assessed 50% by continuous assessment and 50% by questions on an annual examination paper.

---

---

## **ZO4015 Evolution**

(5 credits – Semester 1, Part 1 & 2)

### **Module Personnel:**

Dr Nicola Marples

### **Module Content:**

This module covers a number of different topics of current importance in evolutionary thinking. Most of the work is done outside of the weekly meeting times, in a series of worksheets completed online, which are designed to help you learn about the topic. There is a verbal discussion each week to allow you to air your thoughts and raise questions – these sessions are neither tutorials nor lectures; their content is largely up to you. The module is designed to give you a good contemporary insight into the

processes underlying evolution and the controversies still hotly debated. The topics to be covered include Units of selection, Individuals vs genes, Replicators and Vehicles, Sociality and altruism, Imperfection of adaptation, Evolution of complex organs, Evolution of sex, Speciation, and Macroevolution.

### **Learning Outcomes:**

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

1. demonstrate a thorough grounding in most important aspects of evolutionary theory.
2. show familiarity with the most influential writers in evolutionary thinking in recent years.
3. confidently discuss evolutionary topics with a group of interested academics.
4. show discernment to recognise a spurious argument, and expose its weaknesses.
5. investigate any topic using a web-based resource.

### **Assessment Details:**

This module is assessed 100% by questions on an annual examination paper.

---

## **ZO4017 Tropical Ecology**

(5 credits – Semester 1, Part 1)

### **Module Personnel:**

*Dr Ian Donohue*, Prof Nicola Marples, Dr John Rochford, Dr Ruth Kelly, Mr Colm Ennis

### **Module Content:**

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

- Quantifying biodiversity and the factors that underpin biodiversity in the tropics
- Economics of wildlife management
- Behaviour on the savannah
- Sustainable development of tropical ecosystems

### **Learning Outcomes:**

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

1. demonstrate holistic knowledge of East African geology, landscapes and ecosystems and the extent and nature of human interactions within them;
2. understand the principles underpinning the ecology of tropical grasslands, forests, freshwaters and alkaline waters and be able to explain these to a layperson;
3. be able to evaluate the importance of natural background environmental fluctuations compared to those caused by human impact;
4. be able to synthesise and reconcile the conflicting arguments for the future of each of the ecosystems visited;
5. be able to design and develop a group research project on a tropical ecosystem of their choice;

be able to make a competent oral presentation, supported by a written synthesis, of their research proposal.

### **Assessment Details:**

This module is assessed 50% by continuous assessment and 50% by questions on an annual examination paper.

## **ZO4018 - Comparative Physiology**

(5 credits – Semester 1, Part 2)

### **Module Personnel:**

Dr Colleen Farmer

### **Module Content:**

This module provides a detailed consideration and comparison of the physiological basis for how diverse animals work. It takes a fundamental, biophysical approach to the study of structure and function in animals ranging from simple to complex. The module begins by considering the importance of size to physiological processes such as gas exchange and locomotion in tiny animals such as spiders and bees to large animals such as elephants and whales, and progresses to compare and contrast biochemical and cellular processes, tissue function and organization, organ systems in diverse lineages, and how these systems are regulated and integrated by the whole animal. It emphasizes evolutionary changes in physiological systems, comparing the similarities and differences found in a range of animals that have adapted to different environments and different lifestyles.

### **Learning Outcomes:**

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

- Evaluate literature of the physiological sciences
- Describe contemporary experimental methods for exploring physiology
- Know basic biosynthetic pathways
- Know basic principles of gas exchange
- Know how physiological systems are integrated
- Know how energy is acquired and transformed by animals
- Engage in Socratic dialogue

### **Assessment Details:**

This module is assessed 50% by continuous assessment and 50% by questions on an annual examination paper.

---

## **ZO4092 Environmental Impact Assessment**

(5 credits – Semester 2, Part 1)

### **Module Personnel:**

Dr John Rochford

### **Module Content:**

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

### **Learning Outcomes:**

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

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

### **Assessment Details:**

This module is assessed 50% by continuous assessment and 50% by questions on an annual examination paper.

---

## **BO4107 Plant Animal Interactions**

(5 credits – Semester 2, Part 2)

### **Module Personnel:**

*Dr Jane Stout, Dr Ruth Kelly*

### **Module Content:**

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

The aims of the module are:

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 and field experiments to examine plant-animal interactions.

### **Learning Outcomes:**

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

1. 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.
2. Carry out laboratory work investigating pollination syndromes, plant-pollinator interaction networks and plant and animal adaptations to herbivory, and analyse and interpret data collected.
3. Work as a team to obtain, organise and present material on current topics in the field.

### **Assessment Details:**

This module is assessed 50% by continuous assessment and 50% by questions on an annual examination paper.

---

## Programme Regulations

### Assessments and Award

The assessment value is based on the ECTS credit value of the modules concerned. Your performance will be assessed by Continuous Assessment and Written Examination, and an interview (*Viva voce*) may be requested by the external examiner.

The following modules are assessed 100% by Continuous Assessment:

Module Code	Module Name	ECTS Credits	EX	CA
<b>CORE MODULE</b>				
ZO4030	Data Handling	5		100%
FB4000	Research Project (Thesis and Presentation)	20		100%

All of the remaining modules are assessed, at least in part, by examination.

Module Code	Module Name	ECTS Credits	EX	CA
<b>CORE MODULE</b>				
ZO4020	General Zoology	5		100%
ZO4060	Research Comprehension	5	60%	40%
<b>ELECTIVE MODULE</b>				
ZO4012	Advances in Parasitology	5	80%	20%
ZO4013	Conservation and Wildlife Management	5	50%	50%
ZO4015	Evolution	5	100%	
ZO4017	Tropical Ecology	5	50%	50%
ZO4018	Comparative Physiology	5	50%	50%
ZO4092	Environmental Impact Assessment	5	50%	50%
B04107	Plant Animal Interactions	5	50%	50%

Assessments MUST be handed in on time. Work submitted after the due date WILL have marks deducted at the rate of 5% of the marks, per day, unless good cause (e.g. medical certificate) is provided. Assessments received one week or more after the due date will receive no mark. Unless otherwise directed by your module coordinator, all assignments should be submitted through Blackboard. Submission to Blackboard is your own responsibility to check. Problems submitting to Blackboard are your own responsibility to circumvent, and only centrally notified problems with Blackboard or Trinity IT services will be accepted as viable excuses for late submission. Problems with laptops, computers, internet access will not be deemed viable excuses. You are advised to submit your work in advance of the deadline, in order that issues arising can be circumvented in the remaining time. This is an important part of developing your own

responsibility for meeting deadlines. By way of example, we as academics apply for research grants that might be the only means to keep our research group active for up to 5 years in duration. All aspects of successful and complete submission are entirely our responsibility, and we are never given a second chance if we miss a deadline unless their system itself collapses (and even then there are many stories of this not being considered) with the result being complete loss of what could be months worth of preparatory work on our part.

The examination for ZO4020 (General Zoology) is a 3 hour short-answer paper. All other examinations are 2 hours long, with the exception of that for BO4107, which is 1.5 hours. Further information about the form of the examination papers will be provided as part of the introductory programme and, again, closer to the date of the exams.

The Senior Sophister examinations (assessments and papers) form Part 2 of the examinations for the Moderatorship in Zoology, contributing 80% to the overall degree award, with the remaining 20% coming from the Junior Sophister examinations. The Harmonized Assessment and Progression Regulations (Model 2), as adopted by Council in 2012, shall apply to all examinations in Zoology.

Past examination papers can be viewed at:

<https://www.tcd.ie/academicregistry/exams/past-papers/annual/>

### **Semesterised Programme and Exams:**

This is the first year that Trinity College are implementing full semesterised modules and exams. The new academic year structure is available at <https://www.tcd.ie/calendar/>. You should familiarise yourself with this structure and bear in mind that the College calendar under item 17 states that your attendance in or near Dublin and at College is required between the first day of teaching term until the last day of the same teaching term. This means that the “Study/Review” weeks are still teaching weeks and you are expected to be available during them. This is particularly important for the revision week 15, during which it is entirely possible that exams will be timetabled if sufficient space and resources are not available to run them in the last week of semester 1 week 16. You will almost certainly be asked to work on, submit or attend for CA allocated assessment in any of the designated “Study/Review/revision weeks” (weeks 9, 15, 28, 34).

### **Access to Scripts (*Freedom of Information Act*)**

Following publication of the final examination results, students may have access to their examination scripts upon written application to the Head of Discipline or Course Coordinator.

## Plagiarism

Plagiarism is **academic fraud** and, as such, is an offence against University discipline. The University considers plagiarism to be a **major** offence, and subject to the disciplinary procedures of the University.

In order to support students in understanding what plagiarism is and how they can avoid it, an **online central repository**, to consolidate all information and resources on plagiarism, has been set up and can be accessed at <http://tcd-ie.libguides.com/plagiarism>

## Appeals Policy

Trinity College Dublin, the University of Dublin, herein referred to as Trinity, recognises that in the context of its examination and assessment procedures, a student may wish to appeal a decision made in relation to their academic progress. The appeals procedure may be used only when there are eligible grounds for doing so and may not be used simply because a student is dissatisfied with the outcome of a decision concerning their academic progress. Further information can be accessed at <http://www.tcd.ie/teaching-learning/assets/pdf/academicpolicies/Appeals Policy.pdf>

## Grading Guidelines

The following guidelines are used when awarding grades for essays and examination answers in the Sophister years in Zoology

Class	Mark Range	Criteria
I	90-100	<b>EXCEPTIONAL ANSWER;</b> 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	<b>OUTSTANDING ANSWER;</b> 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	<b>INSIGHTFUL ANSWER;</b> 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	<b>VERY COMPREHENSIVE ANSWER;</b> 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	<b>LESS COMPREHENSIVE ANSWER;</b> 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	<b>SOUND BUT INCOMPLETE ANSWER;</b> 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	<b>INCOMPLETE ANSWER;</b> 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.
III	45-49	<b>WEAK ANSWER;</b> limited understanding and knowledge of subject. Serious omissions, errors and misunderstandings, so that answer is no more than adequate.
	40-44	<b>VERY WEAK ANSWER;</b> 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	<b>MARGINAL FAIL;</b> inadequate answer, with no substance or understanding, but with a vague knowledge relevant to the question.
F-2	0-29	<b>UTTER FAILURE;</b> with little hint of knowledge. Errors serious and absurd. Could also be a trivial response to the misinterpretation of a question.
U.G		Ungraded

The following guidelines are used Project/Dissertation Assessment in Zoology.

Class	Mark Range	Criteria
I	85-100	An exceptional project report showing broad understanding of the project area and excellent knowledge of the relevant literature. Exemplary presentation and analysis of results, logical organisation and ability to critically evaluate and discuss results coupled with insight and originality.
	70-84	A very good project report showing evidence of wide reading, with clear presentation and thorough analysis of results and an ability to critically evaluate and discuss research findings. Clear indication of some insight and originality. A very competent and well presented report overall but falling short of excellence in each and every aspect.
II-1	60-69	A good project report which shows a reasonably good understanding of the problem and some knowledge of the relevant literature. Mostly sound presentation and analysis of results but with occasional lapses. Some relevant interpretation and critical evaluation of results, though somewhat limited in scope. General standard of presentation and organisation adequate to good.
II-2	50-59	A moderately good project report which shows some understanding of the problem but limited knowledge and appreciation of the relevant literature. Presentation, analysis and interpretation of the results at a basic level and showing little or no originality or critical evaluation. Insufficient attention to organisation and presentation of the report.
III	40-49	A weak project report showing only limited understanding of the problem and superficial knowledge of the relevant literature. Results presented in a confused or inappropriate manner and incomplete or erroneous analysis. Discussion and interpretation of result severely limited, including some basic misapprehensions, and lacking any originality or critical evaluation. General standard of presentation poor.

Fail	20-39	An unsatisfactory project containing substantial errors and omissions. Very limited understanding, or in some cases misunderstanding of the problem and very restricted and superficial appreciation of the relevant literature. Very poor, confused and, in some cases, incomplete presentation of the results and limited analysis of the results including some serious errors. Severely limited discussion and interpretation of the results revealing little or no ability to relate experimental results to the existing literature. Very poor overall standard of presentation.
	0-19	A very poor project report containing every conceivable error and fault. Showing virtually no real understanding or appreciation of the problem and of the literature pertaining to it. Chaotic presentation of results, and in some cases incompletely presented and virtually non-existent or inappropriate or plainly wrong analysis. Discussion and interpretation seriously confused or wholly erroneous revealing basic misapprehensions.

## **Prizes in Zoology**

A candidate who has shown exceptional merit at the degree examination may be awarded a **Gold Medal** by the Board of College on the nomination of the examiners.

Other College prizes relevant to the Zoology Moderatorship are:

### ***E.A. Collen Prize in Zoology***

The prize was founded in 1990 by a bequest from Mrs E.A. Collen. The income from the fund is awarded annually to a student who has completed a Moderatorship in Zoology and has been accepted by Trinity College as a candidate for a higher degree. It is intended to encourage research in Zoology and is awarded on the recommendation of the Head of Discipline. *Value €115.*

### ***Maureen de Burgh Memorial Prize in Marine Biology***

The prize was established in 1986 by subscription in memory of Dr Maureen de Burgh, a former member of the department, to promote research in marine biology. It is awarded annually to a postgraduate or undergraduate student to cover expenses related to research in marine biology at Trinity College, on the recommendation of the Professor of Zoology and one other lecturer in the department. *Value €140.*

### ***W.C. Campbell Moderatorship Prize in Zoology***

This prize was established in 2017 by a gift from Professor William C. Campbell from his 2015 Nobel prize in Physiology or Medicine, which was awarded for discoveries concerning a novel therapy against infections caused by roundworm parasites. The gift is a token of gratitude for Prof. Campbell's undergraduate education in the Natural Sciences, and for the inspiring mentorship of Dr James Desmond Smyth of the Zoology Department. It is awarded annually to a student with the best overall Moderatorship result in Zoology. Value, €200.

### ***W.C. Campbell Undergraduate Research Prize in Zoology***

This prize was established in 2017 by a gift from Professor William C. Campbell from his 2015 Nobel prize in Physiology or Medicine, which was awarded for discoveries concerning a novel therapy against infections caused by roundworm parasites. The gift is a token of gratitude for Prof. Campbell's undergraduate education in the Natural Sciences, and for the inspiring mentorship of Dr James Desmond Smyth of the Zoology Department. It is awarded annually to an undergraduate student with the best overall undergraduate research project result in Zoology. Value, €200.

## General Information

### Work Stations

For your project you will be working in the field, the aquarium or laboratory of your supervisor, in association with a number of postgraduates. Tutorials are generally held in the Auk Room in the Zoology building.

### Health and Safety

The **Safety, Health and Welfare at Work Act 2005** places legal responsibility on students to take care of their own safety and that of others around them. The Medical Declaration forms signed in Junior Freshman year stated your agreement to abide by College's safety policies. These policies cover work in the laboratory, the field and all activities on campus. You must read the Faculty of Engineering, Mathematics and Science Health and Safety Guidance Manual to inform yourself of these procedures, which can be found on the Faculty local home page at: <https://ems.tcd.ie/local/>

Specific safety issues relating to the research laboratories will be explained to you before you commence any practical work. These will include information on chemical, biological, mechanical and fieldwork hazards. If you are unsure of any aspect of safety, it is your duty to ask questions until you fully understand the risks and the protections in place to mitigate them.

Fire drills are held regularly. On hearing a fire alarm you must listen to all instruction given and gather at the Assembly Point until you are permitted to return to the building. Do not bring your belongings or ignore the alarm. This may delay your exit from the building.

The Discipline of Zoology has further health and safety information important to you on its local access page at: <https://www.tcd.ie/Zoology/local/> If you have any questions regarding Safety, Health or Welfare please contact [Zoosafe@tcd.ie](mailto:Zoosafe@tcd.ie)

### Illness/Disability

Issues regarding welfare and wellbeing are best brought to your tutor's attention or to the College Health Service. Students with a medical condition or disability that is likely to impair their performance in courses or examinations (e.g. asthma, dyslexia, etc.) are encouraged to inform the Zoology Moderatorship Coordinator, in confidence. Please be aware of, and use where necessary, the various student support services in College. Information relating to all support services is available at: <http://www.tcd.ie/students/supports-services/> Medical certificates, LENS reports, etc. should be lodged, at the time of issue, with your Tutor, and copies submitted to the Executive Officer in the Zoology/Botany Course Office.

## Information on Discipline Procedures, Safety and Security

A copy of the review of the disciplines procedures will be given to you at the start of Semester 1. Detailed information about access and security, and the use of Zoology's facilities is provided in the document.

Also, please review the **Introduction to Zoology** presentation at:

<https://www.tcd.ie/Zoology/local/>

You must read the **General Information on Procedures, Safety and Security** document (also at: <https://www.tcd.ie/Zoology/local/> ) and pay particular attention to the sections on Lone or Out of Hours working. Undergraduates must vacate the building before 9pm and are not permitted to use any laboratory facilities after 6pm, unsupervised.

All projects must be risk assessed. In particular the possibility of afterhours work should be assessed and signed by your supervisor. You will find the Out of Hours Risk Assessment form on the local webpage.

Procedures are also in place for booking, cold rooms, incubators and histological equipment. Certain labs need to be reserved well in advance. Please look for booking forms on lab doors, equipment or ask your supervisor or a technical officer.

## Ethics

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

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

For further details please follow this link: [www.naturalscience.tcd.ie/research/ethics](http://www.naturalscience.tcd.ie/research/ethics)