



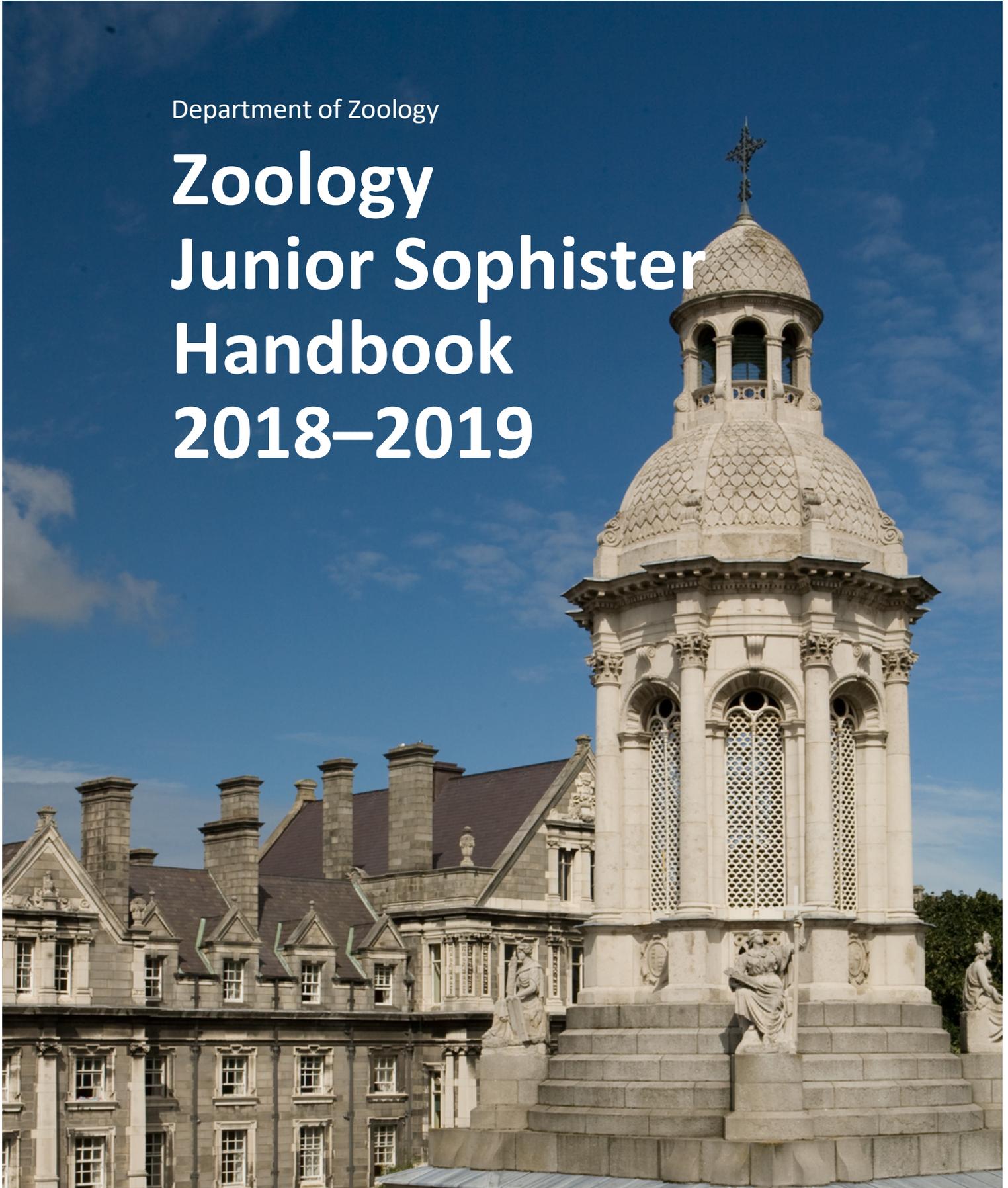
Trinity College Dublin

Coláiste na Tríonóide, Baile Átha Cliath

The University of Dublin

Department of Zoology

Zoology Junior Sophister Handbook 2018–2019



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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, blackboard 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 Zoology Moderatorship provides specific knowledge about animal biology and the associated academic disciplines including physiology, ecology, conservation, embryonic development, evolution, parasitology, entomology and wildlife biology in both marine and terrestrial environments. In addition, the courses and activities undertaken through the Junior and Senior Sophister years also provide opportunities for you to learn and practice high level skills in evaluation of evidence, critical thinking, quantitative analysis and written and oral communication. This broad and transferable skill set provides you with a scientific framework from which to think creatively and explore the natural world and its interactions with human society.

Our graduates develop an excellent foundation for a wide range of careers. We are proud of the achievements of our graduates who have succeeded across a wide range of industries including: academic research, education, veterinary, medical, journalism, technology, banking, exploration, tourism, environmental consultancy, career development, conservation, natural resource management, public service, aquaculture and film-making. Throughout your time here we are committed to providing you with inspiration, guidance, feedback and practice to enable you to embark on fulfilling and life-long learning in zoology and the natural sciences, regardless of your destination after graduation.

We look forward to working with you during your Sophister years and trust that you will find Zoology as fascinating and rewarding as we do.

Yvonne Buckley

Professor of Zoology & Head of Discipline

A Word from the Course Co-ordinator

Welcome to Zoology! This year marks a big change from the Fresh years, as we move to smaller more intimate class sizes, and focus in depth on our subjects. With about 50% of the credits going for continuous assessment, and semesterised exams, you need to get off to a strong start. Particularly we want to help you to become an independent, critical and creative thinker who has a self-motivated passion to learn. Our modules are designed to encourage and reward these skills and there is an increased onus on you to take responsibility for your own learning and development than in previous years. If you have questions or problems 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

Overview

Junior Sophister students in Zoology follow a training programme that consists of core theory and practical modules relating to ecology, biodiversity, physiology and key skills in fieldwork and experimental design and analysis.

In the Senior Sophister year, in addition to coursework, students will take part in interactive tutorials and seminar presentations based on detailed literature analysis. They will also carry out and write-up an independent piece of research while working with one of the departmental research groups.

Descriptions of all modules available to Junior Sophister students in Zoology are given in this handbook.

Programme Structure & Learning Outcomes

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

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

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

Summary of the Junior Sophister Programme

Module Code	Module Title	ECTS Credits	Semester
CORE MODULES (55 Credits)			
ZO3000	Marine Biology	5	1
ZO3003	Animal Diversity	10	1
ZO3010	Fundamentals of Ecology	5	1
ZO3020	Behavioural Ecology	5	1
ZO3030	Introduction to Parasitology	5	2
ZO3050	Introduction to Developmental Biology	5	2
ZO3070	Experimental Design and Analysis	5	2
ZO3085	Wildlife Biology and Terrestrial Ecology	5	2
ZO3090	Desk Study: Zoology and Society	5	2
BO3122	Entomology	5	2
ELECTIVE MODULE (5 Credits)			
	Broad Curriculum	5	?

Please note: Students are expected to make a contribution towards the transport and accommodation costs of the field components of modules ZO3000 and ZO3085, which is usually between €250 – €300 each. Eligible students may apply to the Student Assistance Fund (http://www.tcd.ie/Senior_Tutor/) for financial assistance.

Broad Curriculum Modules

Attendance at a Broad Curriculum module (5 credits) is mandatory, and exceptions will only be made where no suitable Broad Curriculum module is available. In addition to a number of Cross-Faculty modules available, students may choose from one of a number of language modules, offered by the Centre for Language and Communication Studies (CLCS) at any one of four levels. Broad Curriculum Modules are generally assessed 100% CA.

See (https://www.tcd.ie/Broad_Curriculum/index.php) for further details. All places are allocated on a first-come, first-served basis and strictly subject to timetable constraints. Any queries regarding cross-faculty modules should be addressed to bccourse@tcd.ie and regarding language modules, to cicsinfo@tcd.ie.

To check times/day/venue of Broad Curriculum modules please see the timetable on the Broad Curriculum Webpage.

https://www.tcd.ie/Broad_Curriculum/cross-faculty-modules/timetable.php

Brief Description of Junior Sophister Modules

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

ZO3000 Marine Biology

(5 credits – Semester 1, Part 1 – 5 day field course plus 10 contact hours)

Module Personnel:

Dr Nessa O'Connor, Dr Nick Payne

Module Content:

This two-part module commences with a 5-day residential field course at Portaferry, Co. Down, followed by a series of lectures in the latter part of the semester. The field course is designed to teach students some of the key techniques and skills required for field-based environmental biology and to introduce key concepts in marine biology. This includes common species identification, benthic and pelagic sampling methods and experimental design. Students are required to keep detailed field notebooks.

This module introduces students to the oceanographic and ecological processes that underpin marine ecosystems and their associated biodiversity and functioning. Topics include: characteristic features of different marine ecosystems (e.g. rocky shores, coral reefs, deep seas); application (fisheries and aquaculture) and human impacts on marine ecosystems (disturbances, pollution and climate change).

Learning Outcomes:

1. Describe basic principles of oceanography and factors that affect organisms living in marine environments.
2. Identify and describe the characteristic features of important marine ecosystems including: rocky shores, estuaries, saltmarshes, seagrass beds, mangroves, coral reefs, shallow seas and the deep sea.
3. Identify and describe human impacts on marine ecosystems.
4. Discuss key issues relating to fisheries, aquaculture, marine conservation and coastal management.
5. Use several field-based practical techniques and quantitative methods in the marine environment.
6. Identify common marine species and describe their key distinguishing features.

Recommended Reading List:

Hayward, P., Nelson-Smith, T & Shields, C. 1996. *(Collins Pocket Guide to the) Sea shore of Britain and Europe*. HarperCollins, London (ISBN 0002199556)

Kaiser, MJ et al. (2011) *Marine Ecology: Processes, Systems, and Impacts*. (2nd Edition) Oxford University Press.

Speight, M & Henderson, P (2010) *Marine Ecology: Concepts and Applications*. Wiley Blackwell.

Little, C, Williams G. A & Trowbridge, CD (2009) *The Biology of Rocky Shores*. (2nd Edition) Oxford University Press.

Assessment Details:

50% continuous assessment (based on field course notebooks and the level of general participation): 50% annual written examination.

ZO3003 Animal Diversity

(10 credits – Semester 1, Part 1 & 2 – 80 contact hours)

Module Personnel:

Dr Andrew Jackson, Dr Nessa O'Connor, Dr Colleen Farmer

Module Content:

This module provides a detailed consideration and comparison of the structure, life cycles and general biology of animal groups, based on lectures and practicals, with additional self-learning exercises. The practical work involves online information and demonstrations of material from the Zoological Department's extensive collections. The module will take an evolutionary and comparative rather than taxonomic perspective on animal diversity. The module will open by considering the origin of multicellular animal life in the oceans and the origin of the chordates and vertebrates, followed by the conquest of land by the tetrapods and the escape into the air by the birds. Throughout, the module will use form and function to draw comparisons across taxonomic groups, such as considering locomotion such as flight across birds, mammals, reptiles and insects. The module will conclude by taking a macro-ecological perspective on the diversity of animal life in order to identify the main drivers of diversity at global, long term scales.

Learning Outcomes:

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

1. give examples of the major animal taxa and compare their physiology, anatomy and ecology.
2. explain recent views on the origins of the vertebrates and appreciate the palaeontological, anatomical and genetic evidence for such views.
3. describe the basic anatomy, and adaptive features of the vertebrate classes and give a reasoned identification of representative specimens of the classes (and in some cases orders & families) of the vertebrates.
4. use allometric scaling approaches to compare form and function across taxonomic scales.
5. review the palaeontological evidence for such evolutionary transitions as the conquest of the land by tetrapods; the origin and radiation of amniotes; the evolutionary transition from dinosaurs to birds, and the evolution of endothermy in mammals, birds, fishes, and non-avian reptiles.

6. explain the main macro-ecological processes that drive the origination and extinction of species on global scales.

Recommended Reading List:

Hickman, Keen, Larson, Eisenhour, l'Anson & Roberts. 2014. Integrated Principals of Zoology. ISBN 978-1259562310

Kardong. 2014. Vertebrates: Comparative Anatomy, Function, Evolution. ISBN 978-0078023026

Assessment Details:

50% continuous assessment (including practical spot-tests): 50% annual written examination.

ZO3010 Fundamentals of Ecology

(5 credits – Semester 1, Part 1 – 35 Contact Hours)

Module Personnel:

Dr Ian Donohue, Prof. Fraser Mitchell

Module Content

This module examines the factors that affect the distribution, growth and survival of plant and animal communities. It describes how organisms interact with their environment and the role that they have in ecosystem and community structure. There is an introduction to the concepts and models that help to explain and predict organism distributions and interactions. The module comprises interrelated components of lectures, practical sessions and fieldwork. It has been designed to provide a foundation to ecological theory and its application.

Learning Outcomes:

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

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

Recommended Reading List:

Begon, M., Townsend, C.R. & Harper, J.L. (2006) *Ecology: from Individuals to Ecosystems*. Fourth edition. Blackwell Publishing.

Townsend, Begon & Harper (2008) *Essentials of Ecology*. Third edition. Blackwell Publishing.

Assessment Details:

50% continuous assessment: 50% annual written examination.

ZO3020 Behavioural Ecology

(5 credits – Semester 1, Part 1 – 30 Contact Hours)

Module Personnel:

Prof. Nicola Marples

Module Content:

This lecture and practical module gives a broad grounding in the theoretical and practical basis of behavioural ecology. The subject is introduced with an overview of the diverse influences on an animal's behaviour. Following this, the roles of perception and attention in learning are explored, before moving on to a more classic behavioural ecology course, covering how animals obtain food, avoid predators, breed and communicate. The practical work provides students with experience in studying behaviour in both the field and the laboratory, and provides training in behavioural recording techniques. It guides students through appropriate statistical analysis of the data sets collected in the practicals, and in their presentation in written form.

Learning Outcomes:

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

1. outline the basic principles of behavioural ecology supported by a number of experimental examples
2. appreciate the uses of theoretical modelling relating to behavioural studies.
3. recognise the breadth of influences on an animal's behaviour.
4. have experience of the practical aspects of studying animal behaviour and the ability to design and carry out quantitative behavioural observations.
6. devise, carry out, analyse and write up simple experiments on animal behaviour.
7. appreciate the use of the most common statistical tests used in behavioural analysis.
8. read a scientific paper with full appreciation of the reasons for the types content and methods of data presentation.

Recommended Reading List:

Krebs, John R. and Davies, Nicholas B. 1993. **An Introduction to Behavioural Ecology** (3rd edition) Blackwell Science, Oxford. (ISBN 0632035463)

Alcock, John. 2009. **Animal Behaviour: An Evolutionary Approach** (9th edition) Sinauer Associates, Sunderland, Mass. (ISBN 9780878932252)

Barnard, Christopher J. 2003. **Animal Behaviour: Mechanism, Development, Function and Evolution**. Prentice Hall, Harlow. (ISBN 0130899364)

Assessment Details:

50% continuous assessment: 50% annual written examination.

ZO3030 Introduction to Parasitology

(5 credits – Semester 2, Part 1 – 30 Contact Hours)

Module Personnel:

Prof. Celia Holland

Module Content:

The significance of the host-parasite relationship and the processes associated with the definition of parasitism are discussed in this module. Examples from important parasite phyla are reviewed with a focus upon life cycle strategies, ecology, pathology and control. The epidemiology of parasitic diseases including important differences between microparasites and macroparasites are defined. The significance of parasite distributions within host populations is highlighted. External and internal factors, which influence parasite populations, are outlined and particular attention is paid to host behaviour, genetics and immunity. The concept of a parasite community at the infracommunity and component community level is developed. The challenges associated with parasite control are explored. The practical work provides access to a wide range of parasitic material and gives emphasis to the diversity of parasitic lifestyles and forms. A number of the sessions are experimental in nature and explore parasitic adaptations for infection, the significance of parasite distributions in infected hosts, behavioural changes in parasitised hosts and the nature of parasite communities.

Learning Outcomes:

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

1. know the broad context of the host-parasite relationship and recall key definitions of parasitism.
2. identify a range of parasites from four major groups and recognize the epidemiological differences between microparasites and macroparasites
3. explore three internal factors that influence parasite populations and develop an understanding of strategies for parasite control.
4. locate and identify parasites from a range of hosts in the laboratory.
5. explore the impact of parasitism on host fitness and behaviour.
6. sample hosts for parasite community analyses.
7. become familiar with aspects of experimental design and write up the results of a laboratory experiment in the form of a scientific paper.
8. present a lightning talk on a parasite of your choice

Recommended Reading List:

Goater, T.M., Goater, C.P. and Esch, G.W. (2014). **Parasitism: The Diversity and Ecology of Animal Parasites**. 2nd Edition. Publisher Cambridge University Press, Cambridge (ISBN 978-0-521-12205-4).

A range of scientific papers posted on Blackboard.

Assessment Details:

50% continuous assessment (practical write-up): 50% annual written examination.

Write up the results of ONE practical session as a scientific paper

Employ statistical analysis for this exercise

ZO3050 Introduction to Developmental Biology

(5 credits – Semester 2, Part 2 – 35 Contact Hours)

Module Personnel:

Dr Rebecca Rolfe

Module Content:

This module consists of a series of lectures, tutorials and laboratory sessions that deals with a range of developmental topics emphasising a molecular approach to understanding the principles of animal development. A number of animal model systems will be dealt with and the contribution of each to our overall understanding of development discussed. Specific topics will include the following: Developmental genetics: the identification of genes that regulate development in *Drosophila* and vertebrates, Positional determination: how the body plan of the embryo is laid down including the role of homeo-box genes, Induction: the role of cell and tissue interactions and signalling cascades, Developmental neurobiology: positional determination within the vertebrate central nervous system, neuronal diversity and axonal guidance, neural crest cells and development of the peripheral nervous system. Other topics include limb development, organogenesis, and evolutionary developmental biology.

Learning Outcomes:

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

1. demonstrate familiarity with the key principles of embryonic development
2. demonstrate familiarity with the model animals that are used for developmental studies and why they have been so important.
3. describe the key events in building a complex multicellular animal, the common and species specific features
4. integrate an understanding of molecular control of cell differentiation and the key molecules involved with morphological events in the embryo e.g. the molecules associated with neural tube patterning.
5. observe and identify key features of vertebrate embryos and use morphological criteria to uncover the stage of embryonic development.
6. demonstrate familiarity with internet resources that aid modern developmental research
7. work in groups to carry out desk-top research using genome project resources.
8. demonstrate improved laboratory record keeping through practical assignments and feedback

Recommended Reading List:

Gilbert, Scott F. 2014. **Developmental Biology** (10th edition) Sinauer Associates, Sunderland, Mass. (ISBN 78-0-87893-978-7)

Wolpert, Lewis and Tickle, Cheryll. 2011. **Principles of Development** (4th edition) Oxford University Press, Oxford. (ISBN 9780199549078 (pbk.))

Assessment Details:

50% continuous assessment (laboratory report and group desk top project): 50% annual written examination.

3 independent laboratory reports 1 per week, with feedback each week

Group project

Practical (5x 3hrs) and Tutorial (5) participation

Laboratory submissions based on developmental models used

Desk-top project using online recourses to examine key developmental genes

ZO3070 Experimental Design and Analysis

(5 credits – Semester 2, Part 1 & 2 – 28 Contact Hours)

Module Personnel:

Prof. Celia Holland

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 module consists of two parts. The emphasis will be practical with a more 'hands on' approach rather than the theory of statistics. Initially students will be taught about experimental design, data collection and sampling and the use of spreadsheets for data entry. This will lead on to preliminary data exploration and issues of normality. Emphasis will be placed upon the importance of visually exploring the data prior to the use of statistical tests. Summary statistics, including measures of centre and spread, skewness, kurtosis, percentiles and boxplots, will be covered. Then the module will move on to explore the concept of hypothesis testing and the need to compare two or more means. This will involve the use of t-tests and analysis of variance. Other types of data will also be introduced including the analysis of frequencies. The relationship between two variables in the context of regression analysis will also be explored. Finally a data set will be used to bring the entire process together starting with simple data exploration through summary statistics to more complex analyses. The aim of the second part of the module is to address, in more detail, the fundamentals of experimental design and to explore how previous projects were conducted. In addition, students will learn how to write a moderatorship project proposal.

Learning Outcomes:

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

1. address the fundamentals of experimental design and use hypothesis testing to answer biological questions.
2. appreciate instruments for data collection, and how to explore and analyse data within the context of research design.

3. code data using an Excel spreadsheet and explore these data using graphical and summary techniques.
4. outline the requirements of parametric statistical tests and recognize the applicability of four such tests.
5. calculate statistical tests by hand and use the statistical package R to explore and analyse data.
6. write a moderatorship project proposal, design an experiment and analyse the findings of a scientific paper in a group setting.

Recommended Reading List:

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

Assessment Details:

100% continuous assessment (three assessments – data analysis exercise (Part 1), designing an experiment, writing a moderatorship project proposal (Part 2)).

ZO3085 Wildlife Biology and Terrestrial Ecology

(5 credits – Semester 2, Part 1 – 5 day field course plus 15 contact hours)

Module Personnel:

Dr John Rochford, Prof. Nicola Marples, Prof. Yvonne Buckley, Dr Ian Donohue

Module Content:

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

The lecture series will be complemented, by a five day residential field course in Glendalough, Co Wicklow, during which field techniques used for the study of terrestrial ecosystems will be introduced, with an emphasis on habitat and population assessment of mammals, insects and birds and their interactions with plants and the abiotic environment. The date for this field trip is to be confirmed, but will most likely take place in either week 36 or 37. Field visits will help with an understanding of contrasting habitats and approaches to conservation management. Students will carry out and present a mini-project during the last two days of the course.

Learning Outcomes:

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

1. demonstrate the relationship between determinants of the patterns of terrestrial biodiversity and the practice of wildlife management and conservation
2. recognise and evaluate the main factors influencing the conservation status of species, in particular habitat selection and requirements, population processes and interspecific interactions
3. explain the origin, diversity and status of the current Irish vertebrate fauna.
4. census mammals and insects safely using a variety of the most commonly used methods, and birds by sight and song.
5. construct habitat maps and appreciate the importance of scale in such maps.
6. assess anthropogenic effects on the environment and evaluate some control measures used to minimise them in nature reserves.
7. design, conduct and present a small scale field study investigating an ecological question.

Recommended Reading List:

Primack, Richard B. 2010. **Essentials of Conservation Biology** (5th edition). Sinauer Associates, Sunderland, Mass. (ISBN 9780878936403)

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

Assessment Details:

50% continuous assessment (based on project, field notebook and presentation, all completed during the course): 50% annual written examination.

ZO3090 Desk Study: Zoology and Society

(5 ECTS credits – Semester 2)

Module Personnel:

Dr. Pepijn Luijckx, All Staff

Module Content:

Students will research, in the scientific literature, synthesise and write an extended essay on a selected topic of current interest concerning Zoology and Society (sociological, ethical, medical or environmental). The finished product will conform to the general format of a scientific review article.

Learning Outcomes:

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

1. Search, locate and critically assess scientific literature and databases on issues related to Zoology and Society.
2. Demonstrate the skills to critique published material and to differentiate between primary, secondary and tertiary sources.
3. Develop and convey clear and logical arguments with respect to such topical issues.

4. Write an effective scientific review.
5. Articulate the contribution, including the ethical dimension, made by Zoology to society, in the realms of the environment, agriculture, human behaviour and health.

Assessment Details:

100% CA

This module will be examined by an essay, not exceed 4,000 words (excluding references), to be completed and submitted by the end of week 28.

BO3122 Entomology

(5 credits – Semester 2, Part 2 – 30 Contact Hours)

Module Personnel:

Prof. Jane Stout

Module Content:

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, the student will be able to:

1. Categorise insects according to their key features into the main order groups; know the distinction between insects and other arthropods
2. Describe some of the range of behaviours employed by insects for foraging, defending and reproducing
3. Develop understanding of the role of insects in ecosystem processes and their interactions with other organisms
4. Explain their value as providers of ecosystem services
5. Quantify the economic importance of insects (both positive and negative) to humans
6. Evaluate the conservation biology of insects at national and international levels

Recommended Reading List:

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

Assessment Details:

50% continuous assessment (submission of work from practicals, case study, poster presentation and report): 50% annual written examination.

Programme Regulations

Attendance

Attendance at all lectures, tutorials and practical sessions is compulsory for Junior Sophister students in Zoology (see College Calendar, Section H – General Regulations and Information). Students who have been unable, through illness or other unavoidable cause, to attend any part of the course are required to notify the relevant lecturer and submit a medical certificate or other relevant document to the Executive Officer in the Zoology Department Office on the day of their return to College. Attendance at all sessions will be recorded and unexplained absence on any more than two occasions may result in a Non-Satisfactory return, following an interview with the Coordinator of the Zoology Moderatorship. Students reported as Non-Satisfactory in both terms of a given year may be refused permission to take their annual examinations and may be required by the Senior Lecturer to repeat their year.

Assessment 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. Most Zoology modules are assessed, at least in part, by work completed during or immediately after the delivery of the module (practical write-ups, spot-tests, mini projects, web CT exercises, laboratory reports, etc.). The dates for completion and submission of individual in-course assessments, and other pertinent information, will be given to you at the start of each module by the module coordinator.

Module Code	Module Title	ECTS Credits	EX	CA
CORE MODULES (55 Credits)				
ZO3000	Marine Biology	5	50%	50%
ZO3003	Animal Diversity	10	50%	50%
ZO3010	Fundamentals of Ecology	5	50%	50%
ZO3020	Behavioural Ecology	5	50%	50%
ZO3030	Introduction to Parasitology	5	50%	50%
ZO3050	Introduction to Developmental Biology	5	50%	50%
ZO3070	Experimental Design and Analysis	5		100%
ZO3085	Wildlife Biology and Terrestrial Ecology	5	50%	50%
ZO3090	Desk Study: Zoology and Society	5		100%
BO3122	Entomology	5	50%	50%
ELECTIVE MODULE (5 Credits)				
	Broad Curriculum	5		(100%) TBC

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.

Contribution of grades to overall degree:

The Junior Sophister examinations (assessments and papers) form part of the examination grade for the Moderatorship in Zoology, contributing 20% to the overall degree award, with the remaining 80% coming from the Senior 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/AppealsPolicy.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	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.
III	45-49	WEAK ANSWER; limited understanding and knowledge of subject. Serious omissions, errors and misunderstandings, so that answer is no more than adequate.
	40-44	VERY WEAK ANSWER; a poor answer, lacking substance but giving some relevant information. Information given may not be in context or well explained, but will contain passages and words, which indicate a marginally adequate understanding.
F-1	30-39	MARGINAL FAIL; inadequate answer, with no substance or understanding, but with a vague knowledge relevant to the question.
F-2	0-29	UTTER FAILURE; with little hint of knowledge. Errors serious and absurd. Could also be a trivial response to the misinterpretation of a question.
U.G		Ungraded

The J.B.Gatenby Prize

This prize, founded in 1968 by Mrs R.R. Edwards in memory of the late Professor J.B. Gatenby, is awarded annually to the member of the Junior Sophister class who carried out the best practical work during the year. Current value - €65.

General Information

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/>

Most practical classes for Junior Sophister Zoology are held in BIOLAB1, 2 or 3 in the Biology Teaching Centre. Practical work for ZO3003, using the Zoological Collections, is carried out in the Zoology Museum. Specific safety issues relating to the teaching laboratories will be explained to you before you commence 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

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 Department Office as appropriate.

The Zoological Society

A number of societies run by students, and affiliated to the Central Societies Committee, cover interests relevant to students in Zoology, the most important of which is the Dublin University Zoological Society.

ZOOSOC <http://trinitysocieties.ie/society/?socid=120> was founded in 1974 and promotes an awareness of all aspects of zoology and natural history. It holds regular meetings and field trips, and its members have participated in numerous wildlife surveys and fundraising campaigns.