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A Note on this Handbook

This handbook applies to all students taking the Comparative Biology 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 it 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. Please note that, in the event of any conflict or inconsistency between the General Regulations published in the University Calendar and information contained in course handbooks, the provisions of the General Regulations will prevail.
Introduction

The Comparative Biology Moderatorship Programme

Overall, Comparative Biology takes a broad approach to understanding the biology of organisms by comparing how biological processes work in a wide range of organisms. The comparison of a diverse range of species allows a deeper understanding of biology than studies focused on one model species such as humans.

- Comparative Biology describes the discovery of important physiological phenomena conserved across species, revealing key principles, which cannot be revealed by study of individual model organisms alone.
- Comparative Biology has a unifying significance for evolutionary biology in that the physiological processes organisms employ are best understood in the context of their evolutionary history.
- Comparative Biology is at the core of biological as well as macro-evolutionary explanations for the history of life.
- Comparative Biology is important in elucidating the effects of gene mutations/ablations affecting protein function or the environment on gene expression, development and physiology and is therefore relevant to current biomedical research.

The Comparative Biology moderatorship is designed to also encourage critical thinking, the development of numeracy and literacy, and the exploitation of sources of scientific data. The combination of scientific study with such skills provides an excellent background for a wide range of careers. The Comparative Biology moderatorship acts as a springboard for undergraduate students to go on to postgraduate degrees; e.g. Masters and PhDs in biological and/or physiological disciplines. Graduates are ideally placed to contribute to the knowledge economy and society through careers with biotechnology companies and/or industry. For example, it provides an excellent background for students who want to pursue a career in teaching biology. Other graduates will have the transferable skills to move into broader areas of education and the media, computer software development, management and business for example.

Our general strategy in the Junior Sophister year is to provide a broad coverage of the areas of significance in modern Comparative Biology, particularly in relation to the themes of molecular biology, genetics, developmental biology and physiology. In the Senior Sophister year, the emphasis is placed on the development of research, analytical and communication skills. Along with specific modules, the student has the chance to select a topic for a research project and specific areas of interest for tutorials. This guide provides descriptions of the practical work and the lecture modules that Comparative Biology Junior Sophister students follow.

We look forward to working with you during your Sophister years and trust that you will find the programme interesting and rewarding.

Trevor Hodkinson, Comparative Biology Course Coordinator
Trevor.Hodkinson@tcd.ie
# Staff Contacts

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The Programme

The Comparative Biology Moderatorship Objectives

The overall objective of the Comparative Biology moderatorship is to provide a broad training in Comparative Biology. The course integrates both animal and plant physiology, development and genetics and explores the diversity of the functional characteristics of organisms in the context of their evolutionary histories. The course is run by the School of Natural Sciences with significant input from staff in the School of Genetics and Microbiology. It meshes, in particular, with the Molecular and Comparative Physiology interdisciplinary research activity in the School of Natural Sciences and builds on a long-standing tradition of teaching Comparative Physiology of organisms in both Zoology and Botany Disciplines.

Programme Learning outcomes

Upon successful completion of this programme, students will be able to:

- Demonstrate social awareness, particularly in relation to the contributions that Comparative Biology makes to society, such as broadening the scientific base of biological science, medical research, animal and plant biotechnology
- Articulate the fundamental concepts in Comparative Biology
- Discuss current research developments in Comparative Biology
- Critically review published scientific articles in Comparative Biology
- Carry out research with technical competence and work accurately, efficiently and safely in the laboratory using modern research facilities
- Demonstrate numerical competency and the ability to analyze quantitative data by appropriate statistical tests, using spreadsheets and other software
- Produce reports using word processing and graphics
- Collaborate effectively in teams and work independently
- Communicate accurately, clearly, persuasively and imaginatively, in both oral and written form
Programme structure

The Comparative Biology moderatorship is a two-year programme based on Sophister modules from Botany, Zoology and Genetics disciplines.

Junior Sophister students in Comparative Biology follow a training programme that consists of core theory and practical modules relating to the fundamentals of organismal (i.e. plants, animals and parasites) physiology, molecular biology, genetics and developmental biology and experimental design and analysis. In addition, a series of seminars, tutorials and workshops provide core skills such as writing up laboratory reports, library on-line access, citing scientific literature, essay writing, presentation skills, plant and animal science journal clubs and preparing for the Senior Sophister Moderatorship project. Selected Broad Curriculum modules are also built into the programme. Specialisation is carried further in the Senior Sophister year where, lectures, course work, interactive tutorials and seminar presentations based on detailed literature analysis and an independent piece of research are carried out in one of the School’s research groups.

PLEASE NOTE: THE JS MARK WILL CONTRIBUTE 20% TO THE FINAL MARK FOR THE COMPARATIVE BIOLOGY MODERATORSHIP.

Information on the Disciplines involved in teaching Comparative Biology is provided at http://www.naturalscience.tcd.ie

Brief descriptions of all modules available to students in Junior Sophister Comparative Biology are given in this guide.

Students must complete modules with a minimum value of 60 credits.
Description of the European Credit Transfer System (ECTS)

The ECTS is an academic credit transfer and accumulation system representing the student workload required to achieve the specified objectives of a study programme.

The ECTS weighting for a module is a measure of the student input or workload required for that module, based on factors such as the number of contact hours, the number and length of written or verbally presented assessment exercises, class preparation and private study time, laboratory classes, examinations, clinical attendance, professional training placements, and so on as appropriate. There is no intrinsic relationship between the credit volume of a module and its level of difficulty.

In College, 1 ECTS unit is defined as 20-25 hours of student input so a 10-credit module will be designed to require 200-250 hours of student input including class contact time and assessments.

The College norm for full-time study over one academic year at undergraduate level is 60 credits.

ECTS credits are awarded to a student only upon successful completion of the course year. Progression from one year to the next is determined by the course regulations. Students who fail a year of their course will not obtain credit for that year even if they have passed certain component courses. Exceptions to this rule are one-year and part-year visiting students, who are awarded credit for individual modules successfully completed.
## Junior Sophister Modules

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
<th>ECTS Credits</th>
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<tbody>
<tr>
<td><strong>CORE MODULES (55 Credits)</strong></td>
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<tr>
<td>FB3010</td>
<td>Comparative Biology Seminars, Tutorials and Workshops</td>
<td>10</td>
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<tr>
<td>FB3030</td>
<td>Extended Essay: Comparative Biology &amp; Society</td>
<td>5</td>
</tr>
<tr>
<td>GE3M09</td>
<td>School of Genetics and Microbiology modules: Eukaryotic Molecular Biology</td>
<td>5</td>
</tr>
<tr>
<td>GE3M13</td>
<td>Neurogenetics/Drosophila</td>
<td>5</td>
</tr>
<tr>
<td>ZO3030</td>
<td>Parasitology</td>
<td>5</td>
</tr>
<tr>
<td>ZO3040</td>
<td>Comparative Physiology</td>
<td>5</td>
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<tr>
<td>ZO3050</td>
<td>Developmental Biology</td>
<td>5</td>
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<tr>
<td>ZO3070</td>
<td>Experimental Design and Analysis</td>
<td>5</td>
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<tr>
<td>BO3100</td>
<td>Plant Physiology</td>
<td>5</td>
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<tr>
<td>BO3107</td>
<td>Plant Molecular Biology</td>
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| **OPTIONAL MODULES (choose Broad Curriculum or BO3121 Canary Island Field Trip)** |               |              |
|**BROAD CURRICULUM MODULE (5 Credits)**                               |               |              |
| BROAD CURRICULUM MODULE* Choose one from the list provided on the College website: [http://www.tcd.ie/Broad_Curriculum/](http://www.tcd.ie/Broad_Curriculum/) | 5            |

Or

| **BO3121 Field Skills in Plant and Environmental Science (Canary Islands Field Trip)** |               |              |
|                                                                                     | 5            |
Brief Description of Junior Sophister Modules
Where more than one lecturer is involved, the name of the module coordinator is given in italics

FB3010  Comparative Biology Seminars, Tutorials and Workshops
(10 credits – Semesters 1 and 2)

Module Personnel:
Dr Trevor Hodkinson, Botany and Zoology Staff

Module Content:
A series of tutorials, exercises, and seminars contributed to by staff from Botany and Zoology, providing a focus for the Comparative Biology course. Consists of specific assignments, including literature reviews and presentations and will promote generic skill development.

Learning Outcomes:
On successful completion of this module, students will be able to:
• Define the term Comparative Biology in the context of the material to be covered during the course.
• Discuss current issues in Comparative Biology, based on the research interests of staff in the wider scientific context.
• Describe the types of techniques and approaches used in Comparative Biology research.
• Work in groups.
• Demonstrate their understanding of introductory topics in Comparative Biology by oral presentation and discussion.

Assessment Details: 100% continuous assessment.

FB3030  Extended Essay: Comparative Biology and Society
(5 credits – Semester 2)

Module Personnel:
Dr Trevor Hodkinson, Botany and Zoology Staff

Module structure:
This module consists of the preparation of one essay, and requires extensive literature analysis. Your essay will be on a topical problem in modern zoology or plant science or the zoological/botanical information that is relevant to a topical sociological, ethical, medical or environmental problem. It will conform to the general format of a scientific review paper. This essay is to be completed during Semester 2 (Deadline: to be announced) and shall not exceed 4,000 words (excluding references).
GE3M09 Eukaryotic Molecular Genetics
(5 credits – Semester 1)

Module Personnel:
Prof. Tony Kavanagh, Prof. Seamus Martin, Prof. Mani Ramaswami, Dr Ursula Bond and Dr Adrian Bracken

Module Content:
This module focuses on the molecular mechanisms underlying gene expression in eukaryotic organisms, the cell cycle and plant molecular genetics.

Learning Outcomes:
On successful completion of this module, students will be able to:
• Describe the general organisation and packaging of nucleic acids within the nucleus of eukaryotic cells
• Explain the basic mechanisms of RNA biogenesis in eukaryotic cells including transcription, processing and export from the nucleus
• Describe the concept of steady state levels of messenger RNAs, the balance between RNA synthesis and degradation, the basic mechanisms of mRNA degradation and the mechanisms of regulation of messenger RNA translation
• Explain the importance of folding, sub-cellular trafficking, modification and degradation of nascent proteins in eukaryotic cells and how they are achieved
• Understand the regulation of the cell cycle in eukaryotic cells.
• List the basic biological characteristics of the major pathogenic eukaryotes and explain (for specific examples covered) the molecular, cellular and biochemical properties of these organisms and how they differ from those of the host
• Devise simple experimental protocols to help demonstrate the presence and relevance of these properties
• Argue for the importance of work on these organisms to biomedical science
• Explain the experimental basis for the key knowledge in 1–3 above
• Appreciate the importance of focusing on a model organism to explore fundamental questions in biology.
• Appreciate the importance of genetic and molecular approaches in the exploration of complex questions in plant biology.
• Outline the molecular mechanisms underlying light and hormone perception and signalling.
• Outline the molecular mechanisms determining recognition and response in the interaction between plants and (a) Agrobacterium, (b) Rhizobium (c) pathogens.
• Outline the role and mechanism of recognition and response in determining the outcome of pollination in flowering plants.
• Appreciate the contribution plant genetics and biotechnology can make in agriculture and biotechnology.

Assessment Details:
JS written examination.
**GE3M13 Neurogenetics/Drosophila**
(5 credits – Semester 2)

**Module Personnel:**
Prof. Mani Ramaswami, Dr Kevin Mitchell and Dr Juan-Pablo Labrador

**Module Content:**
This module will deal at an introductory level with a number of topics at the intersection of Genetics and Neuroscience, with a focus on genetic and transgenic analyses of behavior and brain function. It will introduce the fundamentals of neuronal architecture, neuronal excitability and synaptic function, sensory systems, circadian rhythms, perception and learning and their analysis by genetic methods in model organisms (MR 8 Lectures). In addition, it will cover psychiatric genetics, cognitive genetics, including the genetic dissection of neuroimaging and EEG phenotypes, and principles of nervous system evolution (KM, 8 lectures).

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

- Outline the principles of the genetic approach to problems in neuroscience.
- Describe the application of transgenic technologies to neuroscience.
- Explain principles of coordination of cellular differentiation during development.
- Assess the genetic mechanisms underlying development of the cerebral cortex and their implication in disease.
- Describe the effects of genetic variation on neuronal structure and function.
- Explain the role of gene regulation in learning and memory.
- Describe the effects of genetic variation on behaviour, cognition and perception.
- Outline the principles of genetic screens.
- Outline the principles of the analysis of genetic interactions.

**Recommended Reading:**
1. Kandel, Schwartz and Jessell. Principles of Neural Science. 4\textsuperscript{th} or 5\textsuperscript{th} Edition.

Assessment Details:
JS written examination.

ZO3030 Introduction to Parasitology
(5 credits – Semester 2 – 30 Contact Hours)

Module Personnel:
Prof. C. 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 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.

Recommended Reading List:
ZO3040 Comparative Physiology
(5 credits – Semester 1 – 35 Contact Hours)

Module Personnel:
Prof. J. Wilson, Zoology Staff

Module Content:
This module includes lectures and a practical component, including demonstrations, histology and hands-on dissection, using examples drawn from the animal kingdom. Living animals adjust their physiological mechanisms to successfully deal with the environment, which is their natural habitat. Various adaptations are explored based on, for example, the adaptations of the respiratory system that enable some mammals to dive deep into the ocean to feed, the adaptation of the excretory system that enable animals to survive in arid conditions. The systems are compared in mammals, reptiles, fishes and birds.

Learning Outcomes:
On successful completion of this module, the student will be able to:
1. describe the mechanisms that different animals use to carry out respiration, thermoregulation, excretion, homeostasis, digestion and reproduction.
2. describe the comparative physiology and anatomy of the cardiovascular systems and nervous system.
3. outline the nature of the special senses, focusing on the comparative physiology of the eye in different animals.

Recommended Reading List:

Assessment Details:
50% continuous assessment (including a blog exercise): 50% annual written examination.
ZO3050 Introduction to Developmental Biology
(5 credits – Semester 1; 35 Contact Hours)

Module Personnel:
Dr Rebecca Rolfe

Module Content:
This module consists of a series of lectures, tutorials and practicals 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 should:
• be familiar with the key principles of embryonic development
• be familiar with the model animals that are used for developmental studies and why they have been so important.
• be able to describe the key events in building a complex multicellular animal, the common and species specific features
• be able to 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.
• be able to observe and identify key features of vertebrate embryos and use morphological criteria to uncover the stage of embryonic development.
• be familiar with internet resources that aid modern developmental research
• be able to work in groups to carry out desk-top research using genome project resources.
• have improved writing and presentation skills through tutorial assignments and feedback

Recommended reading:

Assessment: JS written examination (50%); laboratory report and tutorial assignments (50%)
**ZO3070 Experimental Design and Analysis**  
(5 credits – Semester 2 – 28 Contact Hours – Core Module)

**Module Personnel:**  
Prof. C. 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:**

Assessment Details:
50% continuous assessment (three assessments – data analysis exercise (Part 1), designing an experiment, writing a moderatorship project proposal (Part 2). 50% annual written examination.

BO3100 Plant Physiology
(5 credits – Semester 1)

Module Personnel:
Dr Michael Williams

Module Content
This module covers major biochemical and physiological aspects of photosynthesis, respiration, resource capture and growth at both the cell and whole plant level. Supporting practicals are designed to examine both the light and stromal reactions of photosynthesis and to investigate the role of light in seed germination and plant development. Continual assessment will be through a programme of practicals, tutorials and student presentations.

Learning Outcomes:
On successful completion of this module, students will be able to:
• Describe how plants perceive light
• Describe how plants use light as both a source of energy and an environmental signal
• Describe the various pathways of photosynthesis at the level of the cell and the whole plant
• Describe the interplay between photosynthesis and respiration in a plant cell
• Outline the role of light in controlling germination, growth and flowering in higher plants
• Show familiarisation with up-to-date methodology for measuring photosynthesis in chloroplasts and intact leaves.

Recommended Reading List:

Assessment Details:
50% continuous assessment: 50% annual written examination.
**BO3170 Plant Molecular Biology**
(5 credits – Semester 2)

**Module Personnel:**
Dr Trevor Hodkinson

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

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

**Recommended Reading List:**

**Assessment Details:**
50% continuous assessment: 50% annual written examination.
**BO3121: Field Skills in Plant and Environmental Science (Canary Islands Field Trip) (5 credits - Semester 2)**

*Module personnel:*
Jane Stout (coordinator) and others

*Module content:*
There are four main aims of this module: 1. To introduce students to highly diverse subtropical island flora, with complex biogeographical composition; 2. To record the plant communities across a range of environments, differing in rainfall, altitude, degree of disturbance, etc. and to investigate the ecophysiology of the native flora over the range of habitats studied; 3. To assess the threat to biodiversity posed by human activities; and 4. To develop students’ knowledge of field-based plant and animal identification, and how to conduct field research. This module combines a lecture series with a residential field trip to the Canary Islands. The Canary Islands represent very different environments to Ireland: they have different ecology, different threats and pressures. They also contain highly variable landscapes and there are lots of different types of habitats in small area. In addition, they are home to many endemic species, particularly plants, which are not found anywhere else in the world, and face many man-made environmental challenges. The lecture series explores the geography, flora and fauna of the Canary Islands, as well as the history of the islands, and the impacts that humans have and continue to have on its ecosystems.

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

In-course Assessment

Most Comparative Biology 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.).

Assessment Protocol

1. The coordinating lecturer for the module will provide students with information about the nature of the assessment and the date by which it should be completed.
2. Completed work should be handed to the Executive Officer in the appropriate Discipline for that module (Botany, Zoology, Genetics) and the appropriate forms signed and countersigned.
3. The marks for the assessment can be obtained from the Executive Officer of the Discipline three weeks after the completion date.
4. Work handed in after completion date will have marks deducted at the rate of 10% per day unless good cause (e.g. medical certificate) can be provided. Assessments received one week or more later than the completion date will receive no mark.
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.

Junior Sophister Examinations

The grade for each student at the end of the Junior Sophister year is compiled from the results of the annual examination in the Trinity Term and on work assessed throughout the year.

The Junior Sophister examination in the Trinity Term will consist of a number of written papers based on the individual modules (timetable to be announced later). The number of questions per module and the marks allocated relate to its ECTS credit value. Past examination papers are available on the College web site.
Balance of Marks

The balance of marks awarded for written examinations (E) and in-course assessment (A) for each module is shown below. The final mark awarded for the year is the weighted average of the module marks.

<table>
<thead>
<tr>
<th>CORE MODULES</th>
<th>EX</th>
<th>CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>FB3010   Comparative Biology Seminars, Tutorials</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>GE3M09   Genetics for Comparative Biology</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>GE3M13   Eukaryotic Molecular Biology</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>GE3M13   Neurogenetics/Drosophila</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>BO3100   Plant Physiology</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>FB3030   Extended Essay: Comparative Biology &amp;</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>BO3107   Plant Molecular Biology</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>ZO3040   Comparative Physiology</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>ZO3050   Developmental Biology</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>ZO3070   Experimental Design and Analysis</td>
<td>50%</td>
<td>50%</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>ELECTIVE MODULE (one of the modules below)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BC------- Broad Curriculum</td>
<td>100%</td>
</tr>
<tr>
<td>BO3121   Field Skills in Plant and Environmental</td>
<td>100%</td>
</tr>
</tbody>
</table>

The Junior Sophister examinations (assessments and papers) form Part 1 of the examinations for the Moderatorship in Comparative Biology, 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, applies to all examinations in Comparative Biology. For further details, see the TR071 Science Course Junior Sophister Examination Regulations.
**Grading Guidelines**

The following guidelines are used when awarding grades for essays and examination answers in the Sophister years in the School of Natural Sciences.

<table>
<thead>
<tr>
<th>Class</th>
<th>Mark Range</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90-100</td>
<td><strong>EXCEPTIONAL ANSWER;</strong> 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.</td>
</tr>
<tr>
<td>I</td>
<td>80-89</td>
<td><strong>OUTSTANDING ANSWER;</strong> 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.</td>
</tr>
<tr>
<td></td>
<td>70-79</td>
<td><strong>INSIGHTFUL ANSWER;</strong> 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.</td>
</tr>
<tr>
<td>II-1</td>
<td>65-69</td>
<td><strong>VERY COMPREHENSIVE ANSWER;</strong> 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.</td>
</tr>
<tr>
<td></td>
<td>60-64</td>
<td><strong>LESS COMPREHENSIVE ANSWER;</strong> 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.</td>
</tr>
<tr>
<td>Level</td>
<td>Score Range</td>
<td>Grade Description</td>
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<tr>
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<tr>
<td>II-2</td>
<td>55-59</td>
<td><strong>SOUND BUT INCOMPLETE ANSWER;</strong> 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.</td>
</tr>
<tr>
<td></td>
<td>50-54</td>
<td><strong>INCOMPLETE ANSWER;</strong> 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.</td>
</tr>
<tr>
<td>III</td>
<td>45-49</td>
<td><strong>WEAK ANSWER;</strong> limited understanding and knowledge of subject. Serious omissions, errors and misunderstandings, so that answer is no more than adequate.</td>
</tr>
<tr>
<td></td>
<td>40-44</td>
<td><strong>VERY WEAK ANSWER;</strong> 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.</td>
</tr>
<tr>
<td>F-1</td>
<td>30-39</td>
<td><strong>MARGINAL FAIL;</strong> inadequate answer, with no substance or understanding, but with a vague knowledge relevant to the question.</td>
</tr>
<tr>
<td>F-2</td>
<td>0-29</td>
<td><strong>UTTER FAILURE;</strong> with little hint of knowledge. Errors serious and absurd. Could also be a trivial response to the misinterpretation of a question.</td>
</tr>
<tr>
<td>U.G</td>
<td></td>
<td>Ungraded</td>
</tr>
</tbody>
</table>

**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 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/](https://ems.tcd.ie/local/)

Most practical classes for Junior Sophister Comparative Biology are held in BIOLAB1, 2 or 3 in the Biology Teaching Centre of the new laboratories in the Anatomy Building. 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 and mechanical 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.

If you have any questions regarding Safety, Health or Welfare please contact the School Safety Officer, Ms Alison Boyce, at 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 Comparative Biology 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.
Relevant College Societies

A number of societies run by students, and affiliated to the Central Societies Committee, cover interests relevant to students in Comparative Biology. These include the Zoological Society, the Environmental Society, the Genetical Society and the Biochemical Society. The Comparative Biology Programme is relatively new, inaugurated in 2010-2011 (under the name Functional Biology), so no dedicated society exists. Students are encouraged to consider establishing a Comparative Biology Society.

Comparative Biology Student Representation

Nominations will be sought for a JS Comparative Biology student representative and Deputy to liaise with the Course Director to highlight and bring up any issues relating to the course and student concerns arising, academic or otherwise.

Seminars

There is an excellent series of seminars in Ecology and Evolution delivered by visiting speakers and hosted by Botany and Zoology disciplines within the School of Natural Sciences. In addition, research seminars are hosted by Genetics and Neuroscience. Seminars are announced on notice boards and through emails and you are encouraged to attend. Attendance at seminars is an excellent way to keep up-to-date with the latest research in the field of Comparative Biology.

Junior Sophister Timetable for 2016-2017

Students are advised to check the Timetables on my.tcd.ie.
Some Important Dates in 2016-17

Semester 1 (Michaelmas Term) begins .................................................. 26.09.16

Semester 1, Part 1
Lectures and Tutorials in Genetics (GE3M09) begin................................ 26.09.16
Lectures and Tutorials in Botany and Zoology begin................................. 03.10.16

Study Week - no lectures................................................................. 07.11.16 – 11.11.16

Semester 1, Part 2 ................................................................................ 14.11.16

Semester 1 (Michaelmas Term) ends .................................................... 16.12.16

2017

Semester 2 (Hilary Term) begins .......................................................... 16.01.17

Semester 2, Part 1
Lectures and Tutorials begin ............................................................... 16.01.17

Study Weeks - no lectures ................................................................. 27.02.17 – 03.03.17

Semester 2, Part 2 ................................................................................ 06.03.17

Submission of FB3030 – Comparative Biology and Society Essay  To be announced

Semester 2 (Hilary Term) ends ............................................................. 07.04.17

Revision Period ................................................................................. 10.04.17 – 28.04.17

JS Comparative Biology Written Examinations begin .......................... To be announced

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