Swansea University
Prifysgol Abertawe

FACULTY OF SCIENCE AND ENGINEERING

UNDERGRADUATE STUDENT HANDBOOK

Year 2 (FHEQ LEVEL 5)

ZOOLOGY

UNDERGRADUATE PROGRAMMES

SUBJECT SPECIFIC
PART TWO OF TWO
MODULE AND COURSE STRUCTURE
2022-23

DISCLAIMER

The Faculty of Science and Engineering has made all reasonable efforts to ensure that the information contained within this publication is accurate and up-to-date when published but can accept no responsibility for any errors or omissions.

The Faculty of Science and Engineering reserves the right to revise, alter or discontinue degree programmes or modules and to amend regulations and procedures at any time, but every effort will be made to notify interested parties.

It should be noted that not every module listed in this handbook may be available every year, and changes may be made to the details of the modules. You are advised to contact the Faculty of Science and Engineering directly if you require further information.

The 22-23 academic year begins on 19 September 2022

Full term dates can be found here

DATES OF 22-23 TERMS

19 September 2022 – 16 December 2022

9 January 2023 – 31 March 2023

24 April 2023 – 09 June 2023

SEMESTER 1

19 September 2022 – 27 January 2023

SEMESTER 2

30 January 2023 – 09 June 2023

SUMMER

12 June 2023 – 22 September 2023

IMPORTANT

Swansea University and the Faculty of Science of Engineering takes any form of **academic misconduct** very seriously. In order to maintain academic integrity and ensure that the quality of an Award from Swansea University is not diminished, it is important to ensure that all students are judged on their ability. No student should have an unfair advantage over another as a result of academic misconduct - whether this is in the form of **Plagiarism**, **Collusion** or **Commissioning**.

It is important that you are aware of the **guidelines** governing Academic Misconduct within the University/Faculty of Science and Engineering and the possible implications. The Faculty of Science and Engineering will not take intent into consideration and in relation to an allegation of academic misconduct - there can be no defence that the offence was committed unintentionally or accidentally.

Please ensure that you read the University webpages covering the topic – procedural guidance here and further information here. You should also read the Faculty Part One handbook fully, in particular the pages that concern Academic Misconduct/Academic Integrity. You should also refer to the Faculty of Science and Engineering proof-reading policy and this can be found on the Community HUB on Canvas, under Course Documents.

Welcome to the Faculty of Science and Engineering!

Whether you are a new or a returning student, we could not be happier to be on this journey with you.

This has been a challenging period for everyone. The COVID-19 pandemic has prompted a huge change in society as well as how we deliver our programmes at Swansea University and the way in which you study, research, learn and collaborate. We have been working hard to make sure you will have or continue to having an excellent experience with us.

We have further developed some exciting new approaches that I know you will enjoy, both on campus and online, and we cannot wait to share these with you.

At Swansea University and in the Faculty of Science & Engineering, we believe in working in partnership with students. We work hard to break down barriers and value the contribution of everyone. Our goal is an inclusive community where everyone is respected, and everyone's contributions are valued. Always feel free to talk to academic staff, administrators, and your fellow students - I'm sure you will find many friendly helping hands ready to assist you.

We all know this period of change will continue and we will need to adapt and innovate to continue to be supportive and successful. At Swansea we are committed to making sure our students are fully involved in and informed about our response to challenges.

In the meantime, learn, create, collaborate, and most of all – enjoy yourself!

Professor Johann (Hans) Sienz
Interim Pro-Vice Chancellor/Interim Executive Dean
Faculty of Science and Engineering

Faculty of Science and Engineering	
Interim Pro-Vice Chancellor/Interim Executive Dean	Professor Johann Sienz
Head of Operations	Mrs Ruth Bunting
Associate Dean – Student Learning and Experience (SLE)	Professor Paul Holland
School of Biosciences, Geography and Physics **Head of School: Siwan Davies**	
School Education Lead	Dr Laura Roberts
Head of Biosciences	Professor Geoff Profitt
Biosciences Programme Director	Dr Wendy Harris
Year Coordinators	Year 1 – Dr Chris Lowe Year 2 – Dr Kevin Arbuckle Year 3 – Dr Ed Pope MSc – Dr Aisling Devine

STUDENT SUPPORT

The Faculty of Science and Engineering has two **Reception** areas - Engineering Central (Bay Campus) and Wallace 223c (Singleton Park Campus).

Standard Reception opening hours are Monday-Friday 9am-5pm.

The **Student Support Team** provides dedicated and professional support to all studentsin the Faculty of Science and Engineering. Should you require assistance, have any questions, be unsure what to do or are experiencing difficulties with your studies or in your personal life, our team can offer direct help and advice, plus signpost you to further sources of support within the University. There are lots of ways to get information and contact the team:

Email: studentsupport-scienceengineering@swansea.ac.uk (Monday–Friday, 9am–5pm)

Call: +44 (0) 1792 295514 and 01792 6062522 (Monday-Friday, 10am–12pm, 2–4pm).

Zoom: By appointment. Students can email, and if appropriate we will share a link to our Zoom calendar for students to select a date/time to meet.

The current student **webpages** also contain useful information and links to otherresources:

https://myuni.swansea.ac.uk/fse/coe-student-info/

READING LISTS

Reading lists for each module are available on the course Canvas page and are also accessible via http://ifindreading.swan.ac.uk/. We've removed reading lists from the 22-23 handbooks to ensure that you have access to the most up-to-date versions. Access to print material in the library may be limited due to CV-19; your reading lists will link to on-line material whenever possible. We do not expect you to purchase textbooks, unless it is a specified key text for the course.

THE DIFFERENCE BETWEEN COMPULSORY AND CORE MODULES

Compulsory modules must be **pursued** by a student.

Core modules must not only be **pursued**, but also **passed** before a student can proceed to the next level of study or qualify for an award. Failures in core modules must be redeemed.

Further information can be found under "Modular Terminology" on the following link - https://myuni.swansea.ac.uk/academic-life/academic-regulations/taught-guidance/essential-info-taught-students/your-programme-explained/

FIELDCOURSES AND PRACTICALS

Year 2 Local Residential Field courses

After successful completion of Year 1, you will take a compulsory Year 2 local residential field course in your subject area usually in early September, before induction week. Information regarding finals dates is sent early in the second semester.

Practical Attendance

Modules have up to 3 weeks of practical work and, when a module is running, students taking that module will work in a laboratory for approximately 3 hour slots on **one** day (time of practical may vary between modules). The practicals for BIO – prefixed modules will take place in **Laboratory 115 or 118** in the Wallace Building or **Laboratory M100** in the Margam Building. There are also some computer-based practical classes, please refer to your timetable for the date and location of these. You lecturer will inform you of the correct session to attend. **You can only attend the session that you have been allocated.**

It is particularly important that students should attend at the start of each practical class as it is then that the work for the session is explained and late arrival may well jeopardise your chance of understanding the content of that class.

The lecturers delivering the practicals will inform students how practical work should be submitted for assessment. Sometimes you will be told that practical work for marking will be collected from you at the end of the laboratory class. For other practicals you will submit onto Turnitin through Canvas.

Attendance at practical classes is compulsory, and absence must be covered by Extenuating Circumstances or will result in a Zero for associated assessment.

For practical classes each student will require the following:-

(a) A **laboratory overall**; students are expected to wear an overall during practical classes and will **not** be admitted to a class unless they do so.

(b) **Safety glasses/goggles**; these must be brought to all practical classes and must be worn unless the lecturer in charge allows dispensation.

(c) **Your own paper** and **pencils** etc.

(d) **Dissection kit**: standard dissection kit containing forceps, seekers, scalpels, scissors and a hand lens.

If you do not already have them, laboratory coats, safety glasses and dissection kits should be purchased before the start of your practical.

USE OF ANIMALS IN TEACHING - POLICY STATEMENT

We ensure a responsible and ethical policy in the use of living or dead animals in teaching. We ensure a minimum number of animals will be used in any class that requires them and always seek alternatives to the use of animals where possible. The use of live animals for teaching is reconsidered at regular intervals and subject to strict ethical reviews. In addition to conformity to Home Office regulations, we endorse an approach which emphasises the importance of avoiding trivial exercises, minimising stress, choosing the right species, ensuring correct sample size and minimising durations of experiments.

There are clear moral and technical distinctions between vivisection (surgery on live animals) and dissection and these should be appreciated. In Swansea, **no** student practicals involve vivisection as the term is generally understood, however a small of practicals may involve the use of dead animals. Students and staff are expected to handle animal material respectfully and sparingly.

The use of animal material **is not** a necessary component in the training of Bioscientisits and we **do** use alternatives (videos, models and museum material) wherever possible. **Alternative assessments will be made available if you choose not to participate.**

Year 2 (FHEQ Level 5) 2022/23
Zoology
BSc Zoology[C300]
BSc Zoology with a Year Abroad[C301]

Compulsory Modules

Semester 1 Modules	Semester 2 Modules
BIO230 **Entomology - General Introduction** **15 Credits** **Dr WE Harris**	**BIO229** **Tetrapod Evolution** **15 Credits** **Dr WL Allen/Dr K Arbuckle/Dr C Pimiento/Dr KAR Rose**
BIO252 **Ecological Data Analysis** **15 Credits** **Prof L Borger/Dr N Franconi**	**BIO231** **Year 2 Biological Sciences Literature Review** **15 Credits** **Dr GR Thomas**
BIO253 **Introduction to field zoology** **15 Credits** **Dr WE Harris/Dr WL Allen/Dr K Arbuckle/Dr JC Bull/...**	
Total 120 Credits	

Optional Modules

Choose exactly 15 credits
from TB1

BIO228	Parasitology	Dr GR Thomas	TB1	15
BIO234	Animal behaviour in conservation and welfare	Dr HJ Nichols/Dr LJ Roberts	TB1	15
BIO235	Molecular Ecology	Prof S Consuegra Del Olmo	TB2	15
BIO237	Marine Invertebrates	Dr EC Pope	TB1	15

And

Choose exactly 15 credits
from TB2

BIO224	Ichthyology	Dr EC Pope	TB2	15
BIO232	Plant Ecology	Dr PJ Neyland/Dr AP Devine/Prof CA Froyd/..	TB2	15
BIO236	Cells and Immunity	Prof AF Rowley/Dr CE Davies	TB2	15
BIO239	Ecological Microbiology and the Cycles of Life	Dr SC Hocking	TB2	15
BIO258	Animal Physiology	Dr TM Uren Webster	TB2	15
BIO261	Population and Community Ecology	Dr MS Fowler/Dr M Lurgi Rivera	TB2	15

And

Choose exactly 15 credits
from either Teaching Block: the maximum credits permitted in a teaching block is 75

BIO224	Ichthyology	Dr EC Pope	TB2	15
BIO228	Parasitology	Dr GR Thomas	TB1	15
BIO232	Plant Ecology	Dr PJ Neyland/Dr AP Devine/Prof CA Froyd/..	TB2	15
BIO234	Animal behaviour in conservation and welfare	Dr HJ Nichols/Dr LJ Roberts	TB1	15
BIO235	Molecular Ecology	Prof S Consuegra Del Olmo	TB2	15
BIO236	Cells and Immunity	Prof AF Rowley/Dr CE Davies	TB2	15
BIO237	Marine Invertebrates	Dr EC Pope	TB1	15
BIO239	Ecological Microbiology and the Cycles of Life	Dr SC Hocking	TB2	15
BIO258	Animal Physiology	Dr TM Uren Webster	TB2	15
BIO261	Population and Community Ecology	Dr MS Fowler/Dr M Lurgi Rivera	TB2	15

Year 2 (FHEQ Level 5) 2022/23
Zoology
BSc Zoology with a Year in Industry[C384]

Compulsory Modules

Semester 1 Modules	Semester 2 Modules
BI-200 **Professional Development and Careers Planning** **0 Credits** **Miss VV Wislocka/Mr N Clarke**	**BIO229** **Tetrapod Evolution** **15 Credits** **Dr WL Allen/Dr K Arbuckle/Dr C Pimiento/Dr KAR Rose**
BIO230 **Entomology - General Introduction** **15 Credits** **Dr WE Harris**	**BIO231** **Year 2 Biological Sciences Literature Review** **15 Credits** **Dr GR Thomas**
BIO252 **Ecological Data Analysis** **15 Credits** **Prof L Borger/Dr N Franconi**	
BIO253 **Introduction to field zoology** **15 Credits** **Dr WE Harris/Dr WL Allen/Dr K Arbuckle/Dr JC Bull/...**	
Total 120 Credits	

Optional Modules

Choose exactly 15 credits
from TB1

BIO228	Parasitology	Dr GR Thomas	TB1	15
BIO234	Animal behaviour in conservation and welfare	Dr HJ Nichols/Dr LJ Roberts	TB1	15
BIO235	Molecular Ecology	Prof S Consuegra Del Olmo	TB2	15
BIO237	Marine Invertebrates	Dr EC Pope	TB1	15

And

Choose exactly 15 credits
from TB2

BIO224	Ichthyology	Dr EC Pope	TB2	15
BIO232	Plant Ecology	Dr PJ Neyland/Dr AP Devine/Prof CA Froyd/..	TB2	15
BIO236	Cells and Immunity	Prof AF Rowley/Dr CE Davies	TB2	15
BIO239	Ecological Microbiology and the Cycles of Life	Dr SC Hocking	TB2	15
BIO258	Animal Physiology	Dr TM Uren Webster	TB2	15
BIO261	Population and Community Ecology	Dr MS Fowler/Dr M Lurgi Rivera	TB2	15

And

Choose exactly 15 credits
from either Teaching Block: the maximum credits permitted in a teaching block is 75

BIO224	Ichthyology	Dr EC Pope	TB2	15
BIO228	Parasitology	Dr GR Thomas	TB1	15
BIO232	Plant Ecology	Dr PJ Neyland/Dr AP Devine/Prof CA Froyd/..	TB2	15
BIO234	Animal behaviour in conservation and welfare	Dr HJ Nichols/Dr LJ Roberts	TB1	15
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BIO236	Cells and Immunity	Prof AF Rowley/Dr CE Davies	TB2	15
BIO237	Marine Invertebrates	Dr EC Pope	TB1	15
BIO239	Ecological Microbiology and the Cycles of Life	Dr SC Hocking	TB2	15
BIO258	Animal Physiology	Dr TM Uren Webster	TB2	15
BIO261	Population and Community Ecology	Dr MS Fowler/Dr M Lurgi Rivera	TB2	15

BI-200 Professional Development and Careers Planning

Credits: 0 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Miss VV Wislocka, Mr N Clarke

Format: 6 hours consisting of a mix of podcasts, recorded lectures and Zoom sessions and optional 1-2-1 meetings and weekly drop-in sessions. Prior to the change it was 6 hours of face to face delivery via PC labs, and a 1-2-1 meeting where applicable / requested.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed activities each week.

These modules are delivered through online resources, scheduled Zoom sessions and 1-2-1 meetings. There is self-directed learning required using online resources provided.

Module Aims: This module is a mandatory module for all students who have enrolled (or transferred) onto the Science Industrial Placement Year but is also available to all other Bioscience students. The module focuses on the underpinning and fundamental requisites required to gain, enter and progress through a successful career. Learners will be introduced to (a) sourcing placements, CV writing, and application techniques; (b) Interview techniques, how to pitch yourself and be successful; (c) workplace fundamentals and IP awareness, behaviors and expectations; and, (d) Key employability skills; getting the most from your job or Industrial Placement.

Module Content: The module will focus on the key requirements to gain and be successful whilst on a placement. Directed and self -directed activity will address the following topics:

1) Science Industrial Placements - What they are, how to search and how to apply.

2) CV writing, cover letters and application processes.

3) Assessment centres, interview techniques and a mock interview.

4) Recognizing and developing employability skills.

5) reflecting and maximising your placement experience.

6) one to one meeting with careers and employability officers.

Intended Learning Outcomes: By the end of this module, students will be able to:

1) Be aware of and possess the essential skills needed to secure placement opportunities; alongside having the skills to apply for relevant placements.

2) Have a general understanding of an interview process and what tools and attributes make a good interview.

3) Discuss and share what is expected within the workplace including behavioral and professional conduct.

4) Identify personal employability skills and how these will be used in a workplace setting.

5) Understand the need to reflect and maximise the placement experience in future career decisions.

Assessment: Assignment 1 (100%)

Assessment Description: Students are required to attend all taught sessions and the one to one meeting (if required). The module has no credit attached. However to ensure engagement with the content a compulsory quiz will be added in session 5.Students who do not attend and have no valid reason will not be permitted to continue on a Science Industrial Placement Year programme of study.

Moderation approach to main assessment: Not applicable

Assessment Feedback: N/A

However feedback on progress and the progression through the module will be provided in the one to one meeting and MCQ quiz.

Failure Redemption: Successful completion of this module depends upon satisfactory attendance at, and engagement with, all sessions. Therefore there will normally be no opportunity to redeem failure. However, special provision will be made for students with extenuating or special circumstances.

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online.

Module code reserved by s.j.toomey on 10/02/2015 09:40:10

This module is being piloted in 2015. This module is only available for students enrolled on the Science Industrial Year, specifically:
CS-E00
BI-E00
GE-E00
MA-E00
PH-E00

BIO224 Ichthyology

Credits: 15 Session: 2022/23 January-June

Pre-requisite Modules: BIO105

Co-requisite Modules:

Lecturer(s): Dr EC Pope

Format: 15 lectures
3 h mackerel dissection
3 h computer-based practical
4 h aquarium visit
4 h mini-symposium

Delivery Method: Primarily online, with lab-based dissection.

Module Aims: This module follows on from BIO105 Animal Diversity to discuss the evolution, ecology, structure, functional physiology and exploitation by humans of the paraphyletic group of animals referred to as fish. A dissection will further investigate fish anatomy, emphasising the relationship between form and function, and a report using online data sources will demonstrate the wealth of data available to ichthyologists in the 21st century. Students will also give short group presentations at a virtual symposium.

Module Content: ectures:

The following distribution of lecture material is indicative; due to the interactive mode of teaching it is subject to modification.

Origins and evolution of fish
Body form and function
Colour, camouflage and bioluminescence
Sensory systems
Buoyancy
Trophic strategies
Respiration (gas exchange)
Osmoregulation
Reproduction and life history strategies
Intertidal fish as a case study
Fisheries

Practicals:

(These are shown as examples and are subject to change from one year to another)

Fish dissection
Use of online repository FishBase
Aquarium visit
Presentation at mini-symposium

Intended Learning Outcomes: At the end of the module the student will be able to:

LO1) Demonstrate a detailed knowledge of the evolution and taxonomic diversity of fish;
LO2) Explain the challenges of living in an aqueous environment;
LO3) Describe fish anatomy and physiology in detail, subtended by laboratory dissections;
LO4) Differentiate the reproductive strategies employed by fish;
LO5) Recognise the constraints placed upon fish by gills;
LO6) Compare teleost and elasmobranch anatomy, physiology, ecology and reproductive biology;
LO7) Access online data repositories, analyse and present downloaded data;
LO8) Discuss the basic concepts of fisheries and fishery science;
LO9) Present on an aspect of fish biology at a symposium;
L10) Conduct behavioural inventories of captive fish.

Assessment: Examination (50%)
Coursework 2 (20%)
Coursework 3 (10%)
Coursework 1 (20%)

Assessment Description: Exam (50% of grade): 30 online MCQ (35%); choice of one out of three essays (online; 65%). Continuous assessment (50% of grade); 2 practical assignments encompassing use of FishBase (20%) and fish anatomy (20%); 1 group presentation at a virtual symposium (10%).
Moderation approach to main assessment: Second marking as sampling or moderation
Assessment Feedback: Practical reports and exam scripts will receive individual written feedback. Practical classes will also receive group level feedback.
Failure Redemption: Re-submission of continuous assessment and examination
Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus. Syllabus as stated is subject to modification due to staff availability. Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.

BIO228 Parasitology

Credits: 15 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr GR Thomas

Format: 20 synchronous sessions
2 x 3 hour practicals
1 x coursework revision session
4 x exam feedback sessions
4 x drop in sessions
Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

Asynchronous lectures, practicals, synchronous revision sessions, exam feedback sessions, drop-in sessions and blended learning (Canvas).

Module Aims: Parasitism is a highly successful strategy employed by representatives from all animal and fungal phyla,
and from a large number of plants. Parasitism is a key driver of adaptation, and by extension evolution, yet is an often overlooked component in this process. This module explores the fascinating relationships between parasites and their hosts, with emphasis on parasites of medical and veterinary importance, and the importance of zoonotic diseases for human health.

Module Content: Lectures:
Introduction to parasitology
Protozoan and metazoan parasites
Ecto- and endoparasites
Public health and zoonoses
Control and management of parasitic diseases
Evolution of host-parasite systems, immune systems and evolutionary arms races

Practicals:
Comparative parasitology and quantitative analysis
Metazoan and Protozoan parasties: their identification and use of dichotomous keys.

Intended Learning Outcomes: By the end of this module, students will:
LO1) Explain the concepts of parasitism and be conversant with the appropriate terminology
LO2) Classify parasites using a taxonomic scheme, identify target parasites by scientific name (genus, species) and recognize given parasites by morphological features
LO3) Demonstrate familiarity with host spectra, and the importance of amplifier and reservoir hosts
LO4) Describe the main routes of parasite transmission and recognize the distribution of a parasite species
LO5) Describe routes of migration of a parasite in its target host to its principal site of infection and explain the public health significance of parasitic zoonoses
LO6) Produce two laboratory reports of professional standard, presenting data in graphical format
LO7) Analyse a standard biochemical assay for mitochondrial function

Assessment: Examination 1 (50%)
Coursework 1 (25%)
Coursework 2 (25%)

Assessment Description: CW 1.
Investigative Parasitology.
This report-based coursework will challenge students to construct a parasitological investigation into the distribution, sampling methodology, and ecology of one protozoan and one metazoan parasite of medical or veterinary importance in a geographical region.

CW 2 (Practical 1).
Comparative parasitology and quantitative analysis
A written report and analysis of data obtained from a comparative parasitological dissection.

Practical 2 is formative.

Exam
Multiple choice questions (35%)
A timed written essay, 1 topic from a choice of 3 (65%)

Moderation approach to main assessment: Second marking as sampling or moderation

Assessment Feedback: Formative feedback from formative practical; Feedback on summative assignments; Formal contact with tutor, general feedback via Canvas, drop in feedback sessions and feedback lecture, and comments on returned assignments.

Failure Redemption: Re-submission of coursework
Alternative coursework
Re-sit of exam

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.

BIO229 Tetrapod Evolution

Credits: 15 Session: 2022/23 January-June

Pre-requisite Modules: BIO105

Co-requisite Modules:

Lecturer(s): Dr WL Allen, Dr K Arbuckle, Dr C Pimiento, Dr KAR Rose

Format: 35 (consisting of 18 lectures plus 12 hrs practicals and 5 hours of drop in sessions)

Delivery Method: On campus

Module Aims: This module follows on from the introduction to vertebrates in the Level 4 Animal Diversity and Behaviour module, providing detail on form and function in vertebrates that spend all or part of their life cycle on land. Aspects of tetrapod behaviour, morphology and physiology will be considered in terms of adaptation and evolutionary constraint. Practicals will provide an introduction to the anatomy of birds and mammals by means of dissection, inference of the phylogenetic relationships between avian species, and an exploration of how beak morphology affects ecological niche in birds. Overall, students will gain an appreciation of the diversity of tetrapod types and an insight into the fundamental importance of metabolic rate in animals.

Module Content: Lectures:

METABOLIC RATE
The definition and measurement of different aspects of metabolic rate will be covered. The variation in metabolic rate according to the regulation of body temperature (i.e. homeothermy vs heterothermy) and body size, will be considered in detail.

BIRDS
Body plans; groups and lifestyle; ecology and behaviour of sea birds; flight mechanics

AMPHIBIANS & REPTILES
Taxonomy of amphibians; reproductive ecology of amphibians; taxonomy of terrestrial reptiles; turtles; evolution of reptile body plan and venom; biology of extinct reptiles (dinosaurs)

MAMMALS
Evolution and diversity of terrestrial mammals; human behavioural ecology

ACROSS TAXA
Mating systems; transitions between land and water; teeth and jaws; climate change and morphological evolution; brain evolution; sensory systems; armour

Practicals:

(These are shown as examples and are subject to change from one year to another)

Comparative anatomy of a bird and a mammal
Phylogeny of birds inferred through molecular data
Ecological drivers of bird beak shape evolution

Intended Learning Outcomes: Practicals:

By the end of the dissection practical students will be able to identify the main morphological differences between a bird and a mammal in terms of muscle mass distribution, limb morphology, feeding and digestive systems and respiratory systems.

The phylogeny practical has been designed to equip students with a working knowledge of how molecular data can be used to infer the evolutionary relationships between species. This will lead into the third beak practical which enables students to evaluate how an evolutionary perspective is necessary to understand functional morphology and species diversity.

At the end of the module the student should be able to:

LO1) Evaluate how different selective pressure have acted on vertebrate body size and morphology (assessed during assignment and examination)
LO2) Give examples of key transitions in vertebrate evolution (assessed during examination)
LO3) Describe the evolution and taxonomic diversity of vertebrate classes (assessed during examination)
LO4) Perform and critically evaluate a bird and mammal dissection (dissection assessment)
LO5) Assess the benefits and limitations of molecular data in phylogenetic inference (practical write-up)
LO6) Analyse the relationship between morphology and ecology (practical write-up)
LO7) Recognise, utilise and define key morphological terminology (assessed during assignment and examination)
LO8) Write in a clear and scientific style (all assessed work)

Assessment: Examination 1 (50%)
Coursework 1 (17%)
Coursework 2 (33%)

Assessment Description: The coursework components consist of individual practical reports.
Exam: 30 MCQ, (33.3%) Analytical Question (33.3%) and choice of one out of three essays (33.3%)

Moderation approach to main assessment: Second marking as sampling or moderation

Assessment Feedback: Practical reports and exam scripts will receive individual written feedback. Practical classes will also receive group-level feedback.

Failure Redemption: Repeat failed components

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.

BIO230 Entomology - General Introduction

Credits: 15 Session: 2022/23 September-January

Pre-requisite Modules: BIO105

Co-requisite Modules:

Lecturer(s): Dr WE Harris

Format: Synchronous sessions (20 hours)
Practicals (2 x 3 hours)
Exam feedback session (1 hour)
Drop-in sessions (5 hours)
Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

Blended learning (lectures, practicals and e-leaning)

Module Aims: Insects are arguably one of the most successful groups of organisms on the planet, and represent up to 90% of multicellular life. This course aims to encourage an understanding and appreciation for the adaptations and diversity of insect life, as well as emphasising the ecological and economic importance of this fascinating group. Lectures will aim to provide a broad understanding of the physiology and anatomy of insects, as well as aspects of their behaviour and ecology. Practical sessions will support the information provided in lectures, and provide opportunities to improve transferable skills. Topics covered are: Insects classification and taxonomy; insect anatomy, focussing on key adaptations of insects to life histories and features contributing to the success of this group; insect physiology, including the digestive, reproductive, nervous, circulatory and respiratory systems; insect senses and communication; the role of the cuticle and ecdysis; insect-plant interactions; insect defences, including the immune system; beneficial insects, including the role of insects as pollinators, in medicine, and in forensic science. Lectures are complemented by two practical sessions that include a demonstration of the insect orders to support lecture material, including examples of key groups and an introduction to identification; and further development of taxonomic skills to enhance field study..

Module Content: Direct teaching (approximate time allocation in brackets)

Introduction to insects (1 hour)
Anatomy - head, mouthparts and antennae (1 hour)
Anatomy - thorax, legs and wings (2 hour)
Anatomy - abdomen, reproductive, respiratory, circulatory and digestive systems (2 hours)
Senses and communication (2 hours)
Cuticle and ecdysis (2 hours)
Insect-plant interactions (1 hour)
Insect defences (2 hours)
Beneficial insects (1 hour)
Insect classification - the insect orders (2 hours)
Surveying and identifying insects in the field (2 hours)
Revision (1 hour)

Practicals

1. Demonstration practical supporting lecture on insects classification.
2. Insect survey techniques and taxonomy

E-learning

Additional resources provided on Canvas will include relevant articles, useful websites, and interactive quizzes to support revision and learning

Intended Learning Outcomes: At the end of this module students will:

LO1) Distinguish the structural and functional modifications which contribute to the success of insects
LO2) Classify and identify insects, using keys and guides, to order and family; recognise key order features
LO3) Compare insect anatomy and physiology, and consider functional roles of adaptations
LO4) Create teaching resources, in small groups, on a specific aspect of insect anatomy and physiology and demonstrate peer marking
LO5) Evaluate how insects perceive and interact with other organisms and their environment
LO6) Integrate the role of hormones in controlling metamorphosis and growth, and mechanisms for survival
LO7) Relate principles of visual and chemical defences to insect examples; connect immune function to knowledge of anatomy
LO8) Consider the role of insects and ecosystem service providers and their importance in maintaining ecosystem functioning
LO9) Design a hypothesis-based modelling experiment and present as a professional scientific poster

Assessment: Examination 1 (50%)
Coursework 1 (20%)
Coursework 2 (30%)

Assessment Description: Coursework 1:Insect system teaching resources - group work (20%)
Coursework 2:Insect modelling poster (30%)

Moderation approach to main assessment: Not applicable

Assessment Feedback: Group feedback provided via Canvas following discussions and presentations.

Personal feedback provided on coursework submitted, as well as general feedback provided via Canvas for each coursework component.

Direct general feedback during synchronous and practical sessions.

Formal feedback session to discuss examination results.

Failure Redemption: Re-submission of coursework
Alternative coursework
Re-sit of exam

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.

BIO231 Year 2 Biological Sciences Literature Review

Credits: 15 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr GR Thomas

Format: 2 Lectures
1 library workshop
2 workshop tutorials
1 Feedback tutorial

Delivery Method: Composite of asynchronous lectures, synchronus sessions, and tutorial workshops.
Independent study

Module Aims: This module is designed to develop the core literacy skills of undergraduate students at Level 2 in Biosciences. It
consists of the production of a detailed, 3000 word critical review of a recent topic of scientific interest that is relevant to the students degree scheme (biological, zoological or marine) and an accompanying scientific poster. Students are required to independently undertake a thorough literature search utilising an appropriate scientific search engine. They must then collate all of the relevant information into a comprehensive review summarising the key aspects of the topic whilst also validating the reliability of the sources of information. Furthermore, students will be required to prepare a poster summarising the key background information and findings of their review. All reviews and posters will be submitted electronically via TURNITIN to ensure compliance with the Universities policies on plagiarism.

Module Content: Lectures and tutorials will encompass:

Lecture 1- Writing a scientific review and utilising search engines
Lecture 2 - Poster preparation and presentation
Workshop 1 - databases and effective searching
Tutorial 1 - Group discussion of chosen topics and further guidance
Tutorial 2 - Feedback on first draft
Tutorial 3 - Feedback on submitted review and poster

Intended Learning Outcomes: Students will be able to:

LO1) Acquire and recall knowledge of species and biological diversity
LO2) Principles of biology and their applications encompassing the interactions and relationships of organisms with their environment, from single celled organisms to ecosystems and the methods used for their investigation.
LO3) Apply knowledge of the principles and concepts of biological sciences to problem solving in the real world and in artificial systems.
LO4) Design, plan and create an independent literature-based research project and analyse its results critically, interpreting them in the context of current biological knowledge
LO5) To critically assess, evaluate and synthesise information from published scientific sources and use it to construct reasoned arguments and testable hypotheses.
LO6) Draw links and identify themes between the range of scientific subject investigated within constructing meaning from oral, written, and numerical information through interpretation and summarising key component
LO7) Conduct an effective literature search by describing, summarising, evaluating and clarifying scientific information and identify and articulate the relationships between the literature
LO8) Format, reference and structure a scientific review
LO9) Summarise information through the production of a scientific poster
LO10) Design and manage a programme of work to investigate a given problem
LO11) Accept responsibility for and manage their own learning, making use of appropriate texts, journals, electronic resources and other learning resources.

Assessment: Report (75%)
Presentation (25%)

Assessment Description: 3000 word literature review
Poster presentation

Moderation approach to main assessment: Universal double-blind marking

Assessment Feedback: Individual written formative feedback on a draft
Written comments and oral feedback on final submission
Individual written feedback on poster from tutor and peer review

Failure Redemption: Re-submission of coursework

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.

BIO232 Plant Ecology

Credits: 15 Session: 2022/23 January-June

Pre-requisite Modules: BIO111

Co-requisite Modules:

Lecturer(s): Dr PJ Neyland, Dr AP Devine, Prof CA Froyd

Format: In person lectures (~16 hours), computer practicals (2 hours), field trips (8 hours) and drop-in sessions. Contact Hours will be delivered through a blend of live activities on-campus.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. In person lectures (~16 hours), computer practicals (2 hours), field trips (8 hours) and drop-in sessions. Contact Hours will be delivered through a blend of live activities on-campus. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

Composite, lectures and practicals

Module Aims: This module provides a holistic approach to plant ecology, including both classical ecological theory and practical surveying techniques. Students will become familiar with six major themes; plant formations and biomes, synecology, autecology, plant geography, paleoecology and modern plant ecology. Students will also be trained in plant taxonomy, field surveying techniques, data analysis and report writing that complement a future career in ecology, conservation or consultancy

Module Content:

This module will be taught holistically, adopting both a classical approach, which introduces students to plant ecological theory, together with a practical approach, which will impart students with transferable skills that are necessary for a career in ecology. The syllabus will be split into six major themes:

1. Plant formations and global vegetation patterns
 - Biomes, climate and plant distribution, productivity and reproduction, UK habitats
2. Synecological studies
 - Succession (sand dune and salt marsh), Clements and Gleason, plant communites and phytosociology, Braun Blanquet, National Vegetation Classification, Phase 2 community surveys, bryophyte communities
3. Autecological studies
 - Clapham and the Flora of the British Isles, comparative plant ecology; a functional approach (Grime), plant ecology data bases (e.g. Fitter), Ellenberg indicator values, Biological Flora of the British Isles, autecology of individual species
4. Plant Geography
 - Soils, distribution maps, distribution patterns (endemic versus disjunct), biogeographical elements
5. Palaeoecology
- Long-term vegetation dynamics of the continents, geologic timescales and ice ages, Holocene (last 11,000 years) history of the British flora, palaeoecological methodologies (palynology, chronology, sediments, proxies), tropical forest stability, human impact, natural disturbance, applications of long-term ecological information to conservation
6. Modern themes in plant ecology
- Invasive species, identification, legislation and mangement

Practicals

• Field sampling techniques and quantitative vegetation data collection
• Taxonomy and identification - excursion to National Botanic Garden Wales
• PC data analysis workshop

Intended Learning Outcomes: At the end of the module students will be able to:

LO1) Recognise plant formations and biomes
LO2) Classify important UK habitats
LO3) Compare and contrast synecology (plant communities) and autecology (single species)
LO4) Describe plant biogeography and distribution patterns
LO5) Describe history of the British flora and paleoecology
LO6) Undertake ecological surveys; interpret and analyse ecological data and produce a professional report
LO7) Outline modern plant ecology: identification, legislation and management of invasive species

Assessment:	Examination 1 (50%) Coursework 1 (20%) Coursework 2 (30%)

Assessment Description: 50% examination (1.5 hours; 30 MCQ plus one essay question)
50% coursework including:
CW1 Presentation/posters/scrapbook - plant identification, distribution and conservation (40% of coursework mark)
CW2 Woodland plant communities - ecological report, data analysis and interpretation data presentation (60% of coursework mark)

Moderation approach to main assessment: Second marking as sampling or moderation

Assessment Feedback: Formative written feedback on coursework.
Contact with lecturer as required.
Summative mark for exams.

Failure Redemption: Re-submission of coursework, re-sit of examination

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.

BIO234 Animal behaviour in conservation and welfare

Credits: 15 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr HJ Nichols, Dr LJ Roberts

Format: 18 hrs lectures, 2 hr workshops, 8 hrs in-person practicals, 3 x 1 hr drop in sessions, 30 hours on-line learning
Contact Hours will be delivered through a blend of live activities on-campus and some online learning

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

Lectures, on-line activities, field based practicals, seminars, workshops

Module Aims: This module assesses how animal behaviour is often the most significant cause of species declines and how understanding patterns of behaviour can assist in developing effective conservation and management strategies for species on the brink of extinction. Students will be introduced to the concept of conservation biology and the vast array of human-induced activities that currently threaten biological diversity on a global scale. There is a focus on the five main activities of conversational concern; fragmentation, habitat degradation, over-exploitation, invasive species and climate change. Examples will be provided from specific taxa affected. The shortfalls of in situ and ex situ conservation are introduced and examples are provided of how behavioural studies and knowledge of animal behaviour can, and have been used within conservation.

The role of understanding behaviour in domestic animal welfare is also introduced. Here students learn about the history and current UK policy on the use of farm and laboratory animals. Following that an insight is provided into how our domesticated animals perceive the captive environment and have developed behavioural mechanisms to cope with incarceration that can also be assessed to ensure sufficient welfare is provided.

Module Content: Lectures:

The following distribution of lecture material is indicative; due to the interactive mode of teaching it is subject to modification.

Revision on the proximate and ultimate mechanisms of animal behaviour
An introduction to Conservation biology
Habitat disturbance
Habitat fragmentation
In situ conservation
Ex situ conservation
Overexploitation
Climate change and behaviour
Invasive species
Introduction to animal welfare
Farm animal behaviour and welfare
Animals in scientific procedures
Welfare in lab animals
Species-specific needs in lab animals

Practicals;
Behaviour and welfare assessment in Folly Farm

Workshops:
Trends in Conservation Biology
Assessment 1: Presentation
Evaluating animal welfare in zoo environments

Intended Learning Outcomes: During this module students will:

LO1) Describe current topics in Conservation Biology including the current loss of biodiversity and contributory anthropogenic factors and how knowledge of animals behaviour in critical when conserving a species
LO2) Evaluate Animal Welfare practices in the UK with specific reference to farm and laboratory animals
LO3) Explain the legislation that governs conservation and welfare
LO4) Address the role of animal behaviour in driving Conservation Biology and Animal Welfare policy
LO5) Critically assess, analyse and interpret scientific information from a range of sources and in a range of formats including reports, posters and oral presentation
LO6) Assess the welfare and potential for reintroduction of animals in a zoological establishment

Assessment: Coursework 1 (20%)
Coursework 2 (30%)
Examination 1 (50%)

Assessment Description: Coursework 1: Five main threats 5 minute recorded presentation
Coursework 2: Evidence based husbandry report
Examination: MCQ 30 questions, choice of one essay question from three options

Moderation approach to main assessment: Second marking as sampling or moderation

Assessment Feedback: Written Individual annotated manuscripts for all coursework. Summary feedback on presentation

Failure Redemption: Re-submission of failed components

Additional Notes: Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.

BIO235 Molecular Ecology

Credits: 15 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof S Consuegra Del Olmo

Format: 17 - Lectures (including 1 revision and 1 feedback)
3 -1 x 3 hour lab practical
3 - 1 x 3 PC pracs
6- 2 x 3 hour workshop
6 -2 x 3 hour drop-in sessions

Delivery Method: Composite lectures, practicals, workshops and seminars

Module Aims: Molecular ecology is an emerging field that takes advantage of the latest advances in molecular genetics to answer
a varied range of theoretical and practical questions in ecology including conservation genetics, behavioural ecology, phylogeography, adaptation, hybridization and speciation. Through a combination of theoretical lectures, laboratory practicals and class discussions we will consider the application of a range of molecular and statistical tools to problems such as species conservation, biological invasions, wildlife forensics or fisheries. Lectures include a basic introduction to the field of Molecular Ecology and its connections to Conservation Biology and Population Genetics. This will be followed by lectures on population diversity focused on: molecular markers and genetic variation in natural populations, phylogeography and barcoding, population structuring and differentiation, mating systems, behavioural ecology and inbreeding. A more applied part of the programme will include lectures on microbial ecology, forensic science and conservation applications. Two practical lectures will cover the use of barcoding for species identification, including DNA extraction, amplification and sequencing (laboratory based) and the identification of there sequences using databases such as Genbank (computer based).

Module Content: Lectures will cover the following general topics:
•Overview of Molecular ecology: history and molecular applications for ecologists
•Basic molecular markers and techniques applied for ecological studies
•Basic population genetics
•Applications:
Behavioural ecology
Conservation genetics
Population ecology
Phylogeography and landscape genetics
Identification of species, individuals and sex

•MCQ quiz and review of past exam questions

Assignments
-Problem-solving exercise and/or MCQ quiz at final lecture and practical

Practicals
-Combined laboratory and computer based practical: use of molecular methods for species identification
Workshop
-Analysis of current literature on Mol Ecol to discuss methods, interpretation of results and writing up

Intended Learning Outcomes: At the end of the module students will have been introduced to molecular techniques used in ecological research.
The principles of population genetics will be introduced, and published case studies will be explored.

By the end of the module, the student is expected to be able to:

LO1) Appreciate the application of molecular tools in ecological and conservation studies
LO2) Recognise basic molecular techniques commonly used in such studies and their particular application
LO3) Demonstrate a knowledge of the basic principles of population genetics and how it is applied to ecological and conservation research
LO4) Locate ecological/conservation research papers (journal articles) reporting the use of molecular methods in inter- and intraspecific studies
LO5) Recognise the structure and language of a scientific paper and produce a basic paper with the results of their laboratory practical work
LO6) Calculate population genetic diversity and recognise the context for its application
LO7) Interpret the results from basic analyses of diversity and relate them to managing problems
LO8) Carry out basic molecular lab analyses for species identification using DNA barcoding

Assessment: Examination (50%)
Examination (50%)
Coursework 1 (25%)
Coursework 1 (25%)
Coursework 2 (25%)
Coursework 2 (25%)

Assessment Description: Examination: 30 MCQ, short essay and analytical question

Coursework 1: MCQ based on course topics and lab practical

Coursework 2: Analysis and writing of results of lab and computer practical in the form of a scientific report/paper

Moderation approach to main assessment: Second marking as sampling or moderation

Assessment Feedback: Written feedback for coursework and exams
Verbal feedback for coursework and for exams if needed

Failure Redemption: Re-submission of practical reports or exam

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.

BIO236 Cells and Immunity

Credits: 15 Session: 2022/23 January-June

Pre-requisite Modules: BIO104

Co-requisite Modules:

Lecturer(s): Prof AF Rowley, Dr CE Davies

Format: Lectures (20); Practicals (5x3 hr); revision (1); feedback (1)

Delivery Method: Composite, lectures and practicals

Module Aims: This module consists of the following lectures and practicals:

Lecture Topics:
1. Advances in microscopy (2)
2. Cell, tissue and organ culture - bioengineering and stem cells (3)
3. Immunology (15)

Practicals:
1. Poster presentation (1)
2. Lysoplate analysis of lysozyme (2)
3. Spectrophotometric analysis of changes in lysozyme (2)

Module Content: This module consists of the following lectures and practicals:

Lecture Topics:
1. Advances in microscopy (2)
2. Cell, tissue and organ culture - bioengineering and stem cells (3)
3. Immunology (15)

Practicals:
1. Poster presentation (1)
2. Lysoplate analysis of lysozyme (2)
3. Spectrophotometric analysis of changes in lysozyme (2)

Intended Learning Outcomes: At the end of the module, the student will be able to:

LO1) Discuss the recent developments in tissue and organ culture, with particular reference to biomedicine
LO2) Recognise the differences and importance of innate and adaptive immunity
LO3) Consider the variety of approaches to microscopy and the recent technological developments
LO4) Perform a standard cell count using haemocytometry, and an immuodiffusion assay, identifying the limitations of these approaches
LO5) Interpret and analyse data related to human haematology
LO6) Produce a detailed laboratory report to a professional standard, integrating examples from the existing literature
LO7) Write and give a group oral presentation on a specialist subject

Assessment: Coursework 1 (15%)
Coursework 2 (35%)
Examination 1 (50%)

Assessment Description: Examination (2 hr)

Continuous assessment (one report of ca. 2000 words showing evidence of data analysis, interpretation and use of primary literature)

Moderation approach to main assessment: Second marking as sampling or moderation

Assessment Feedback: Examination feedback session (1 group session)

Practical report feedback session (1 group session)

Failure Redemption: Re-submission of coursework, re-sit of examination

Additional Notes: Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.

BIO237 Marine Invertebrates

Credits: 15 Session: 2022/23 September-January

Pre-requisite Modules: BIO114

Co-requisite Modules:

Lecturer(s): Dr EC Pope

Format: 15 Lectures
2 Practicals
1 fieldtrip
Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

Delivery Method: All programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed activities each week.

Lectures will be delivered online;
Practicals will be conducted in laboratories;
Field trip will be conducted on site.

Module Aims: This module introduces students to the vast diversity of marine invertebrate and the fundamental roles they play in marine ecology. The module has been modifed to be delivered in a blended form for 2020/21 - students will receive 14 lectures and one laboratory practical covering the general themes of: marine invertebrate taxonomy and developmental biology; form, function and behaviour; comparative physiology; reproductive strategies and biogeography; and ecological roles. Students will be examined on their understanding of the lecture material, recommended reading and practical techniques.

Module Content: Lectures:

The following distribution of lecture material is indicative; due to the interactive mode of teaching it is subject to modification.

The challenges of living in a marine environment
The intertidal zone
Gelatinous marine animals
Polychaetes
Crustaceans
Molluscs
Echinoderms
Reproductive strategies
Larval dispersal and biogeography
Developmental biology
Nervous systems
Locomotory strategies
Benthic and pelagic ecology
Biofouling

Practicals:

(These are shown as examples and are subject to change from one year to another)

Larval generation
Comparative dissection
Field trip to demonstrate the abundance of marine invertebrates intertidally.

Intended Learning Outcomes: At the end of the module the student will be able to:

LO1) Demonstrate an understanding of the evolution and taxonomic diversity of marine invertebrates (assessed during examination)
LO2) Show a thorough knowledge of the biology and ecology of key groups of marine invertebrates (assessed during examination)
LO3) Appreciate the comparative anatomy and physiology of key marine invertebrate phyla (assessed during examination and practicals)
LO4) Discuss marine reproductive strategies and their importance for the biogeography of species (assessed during examination and practicals)
LO5) Perform standard aquaculture procedures involved in the production of invertebrate larvae (from practicals)
LO6) Discuss comparative mollusc anatomy, subtended by laboratory dissections (assessed during examination and practicals)
LO7) Produce detailed laboratory reports, including data analysis and use of other research to strengthen arguments (from practical report)

Assessment: Examination 1 (50%)
Coursework 1 (25%)
Coursework 2 (25%)

Assessment Description: Theory exam
Continuous assessment; 2 practical assignments encompassing comparative anatomy and reproduction and feeding.

Moderation approach to main assessment: Second marking as sampling or moderation

Assessment Feedback: Individual written formal feedback on assignments
Lecture giving overall class feedback on assignment

Failure Redemption: Re-submission of continuous assessment and examination

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

Syllabus as stated is subject to modification due to staff availability. Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.

BIO239 Ecological Microbiology and the Cycles of Life

Credits: 15 Session: 2022/23 January-June

Pre-requisite Modules: BIO104

Co-requisite Modules:

Lecturer(s): Dr SC Hocking

Format: 21x Lectures and 3x laboratory-based practicals

Delivery Method: Composite, lectures and practicals

Module Aims: This module provides an introduction into how microbes impact the world we see around us. Lectures and laboratory-based practicals will explore how microbes occupy almost every environment on the planet and drive the elemental cycles (carbon, nitrogen, phosphorous) on which all life relies. Lectures will cover microbial diversity and adaptations to extreme environments, elemental cycling in terrestrial and aquatic systems, and interactions with plants and animals. Practicals will develop this learning to investigate specific ecological examples of dynamic microbial communities.

Module Content: This module will use a combination of lectures (21 x 1 hour) and practicals (3 x 4 hours). Practicals will use specific examples highlighted in the lectures to put the theory-based learning into a real world context. The topics covered will explore diverse habitats and show how microbes have adapted to thrive and ultimately drive the existence of all organisms in the ecosystem.

The syllabus is split into four major themes:
1. Microbial diversity
- bacteria, Archaea and fungi; extremophiles,
2. Microbial nutrition and respiration
- heterotrophs and autotrophs; mechanisms of carbon assimilation; alternatives to oxygen respiration
3. Major biogeochemical cycles & how microbes influence them
- carbon, nitrogen, phosphorous, iron, sulphur and trace metals
4. Interactions with plants and animals
- symbionts and pathogens; endophytes, nitrogen fixation and mychorrhizal fungi, gut flora, common diseases of plants and animals.

Interdisciplinary skills in physics, chemistry and mathematics will be developed through:
i) Considering the energetics of chemical reactions which provide energy for growth and selection of nutritional modes based on underlying environmental conditions.
ii) How different elements are processed by cells and how microbes utilise the chemical properties of elements to generate energy.
iii) Quantify and critically assess microbial presence and diversity in habitats to determine their potential impact on habitats and interactions between different species.

Practical classes will investigate:
Microbial biodiversity in water column and in soil. How microbes alter the local chemistry to change the environment around the cell. Students will identify specialist nutritional modes and discuss how different microbes adapt to particular niches and interact with one another.

Specific skills employed include: aseptic technique and microbial culturing on selective media, light microscopy, isolation of crystals via basic chemistry techniques, generating and devising how to present data to allow critical analysis.

Intended Learning Outcomes: At the end of this module the students will be able to:

LO1) Describe and distinguish the major groups of microbes (bacteria, archaea, eukaryotic) and example habitats in which they are found,
LO2) Describe and form links between the broad morphological and biochemical variation within the microbial world,
LO3) Contrast and compare how the microbial communities in a particular environment affect the major biogeochemical cycles of life (carbon, nitrogen, phosphorous, iron, sulphur, and trace metals),
LO4) Demonstrate how microbe interactions are essential for the lifestyles of plants and animals, using specific examples.
LO5) Undertake practical skills needed to isolate and innumerate microbes from the environment, and be able to critically analyse and present such data sets to demonstrate diversity in the environment and discuss how small-scale microbial processes can have large scale ecological impacts.

Assessment:	Examination (50%) Coursework 1 (15%) Coursework 2 (35%)
Assessment Description: Examination (50% of total module mark: 2 hours examination; 30 MCQ (33% of examination mark) and one essay question (67% of examination mark) Coursework consisting of practical write up and data interpretation (50% of total module mark) Coursework 1: Experiment 1: Biogeochemistry, Experiment 2: Nutritional mode selection and microbial diversity (15%) Coursework 2: Experiment 3: Winogradsky column (35%)	
Moderation approach to main assessment: Second marking as sampling or moderation	
Assessment Feedback: Formative and summative feedback on coursework and examinations. Individual and group feedback sessions with lecturer as appropriate.	
Failure Redemption: Re-submission of coursework, re-sit of examination	
Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus. Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.	

BIO252 Ecological Data Analysis

Credits: 15 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof L Borger, Dr N Franconi

Format: 16 hours practical IT workshops.
10 hours taught lectures.
11 hours Stats Help sessions.
3 hours computer-based continuous assessments.

Delivery Method: 16 hours practical IT workshops
10 hours taught lectures & feedback sessions.
11 hours Stats exercise and feedback sessions.
3 computer-based continuous assessments.
Weekly assigned readings and computer-based exercises.
Final data analysis project.

Module Aims: This module introduces students to the basics of analyzing ecological data, using the R Software Environment for Statistical Computing. The topics covered will be also broad enough to be equally applicable to basic data analysis across biology and the skills acquired are widely transferrable for non-academic jobs. Students will receive 8 computer-based workshops/practicals of 2 hours each, complemented by 10 lectures and 11 Stats exercise and Feedback sessions before each workshop. The module will cover 5 broad key themes: 1). Data analysis and statistics, reproducibility and the R Software Environment; 2). Data management; 3). Data visualization; 4). Data analysis - The linear model; 5). Data analysis - Presentation of results and outline of more advanced methods. The module will be subject to continuous assessment consisting of 3 pieces of computer-based work (60% of final mark), which will require the students to carefully complete all course work assigned on a weekly basis ('independent learning'), in order to be able to complete the assignments. A further 40% of the final mark will consist in a data analysis report, to be completed after the end of the course. Weekly readings and non-assessed computer-based exercises will be assigned, too.

Module Content: Computer-based workshops & taught lectures:

1). Statistical methods, reproducibility and the R Software Environment;
2). Data management;
3). Data visualisation;
4). The Linear Model - linear regression;
5). Model criticism (model diagnostics);
6). The Linear Model - analysis of variance (ANOVA);
7) The Linear Model - analysis of co-variance (ANCOVA);
8). Presentation of statistical results & report writing and data management.

Intended Learning Outcomes: At the end of this module students will have been exposed to the basics of how to handle and analyze scientific data using R, for exploratory and confirmatory purposes, communicate the findings, and store both the data and the codes used, to allow full replicability. The student is expected to be able to:

1. Accurately input data for statistical analysis into R, visualize the data and, taking into account the specific question asked, choose and conduct basic statistical analysis using the linear model and hypothesis tests, or be able to identify if it is not applicable.
2. Critically interpret the data and analyses and produce basic informative tables and graphs to report the results of different types of basic statistical models.
3. Be able to provide all the data and computer codes for a full replicability of all analyses.
4. Format the results for a scientific publication.
5. Be able to learn new methods and packages in R independently.

These outcomes will crucially rely on essential independent learning by the students between each of the weekly workshops. As each workshop will build upon the material learned in the previous sessions, which will need to be assimilated and practiced independently, regular work by the students each week after each lecture and each workshop will be essential. Also, without essential independent learning, following the instructions provided during each workshop, student will not be able to satisfactorily complete the continuous assessments and obtain the grade. To aid this, weekly readings and non-assessed (computer-based and non) exercises will be provided.

Assessment:	In class test (Invigilated on campus) (20%) Class Test 2 - Held under exam conditions (20%) Class Test 3 - Held under exam conditions (20%) Coursework 1 (40%)

Assessment Description: CW1: Visualizing data and models in R for exploratory and confirmatory analyses.
CW2: The linear model: simple linear regression and ANOVA
CW3: The linear model: linear model with interactions up to ANCOVA
Coursework 1: Statistical Analysis Report

Moderation approach to main assessment: Second marking as sampling or moderation

Assessment Feedback: One-to-one feedback during the workshops by both lecturers and teaching assistants to students.
Taught lectures and exercise and feedback sessions.
Additional Stats Exercise and Help sessions to provide feedback and repetitions during the course.
Online help through Canvas.

Failure Redemption: Re submission of continuous assessment and/or final report.

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

Syllabus as stated is subject to modification due to staff availability. Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.

BIO253 Introduction to field zoology

Credits: 15 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr WE Harris, Dr WL Allen, Dr K Arbuckle, Dr JC Bull, Dr LJ Roberts

Format: Five day residential field based practicals

Delivery Method: Field based practicals, lectures, demonstrations, workshops, peer assessments

Module Aims: This residential field course comprises practical work employing techniques appropriate to sampling the zoological biodiversity of a range of terrestrial and freshwater habitats (coastland, woodland, grassland, freshwater systems). Students will learn techniques for the identification of species, practice recording accurate field notes, and gain experience in the analysis and presentation of zoological and ecological data. Furthermore students will be able to recognise and describe key groups of animals associated with a range of temperate habitats.

Module Content: Day 1:
- Arrive at Stackpole Outdoor Learning Centre, Pembrokeshire
- Orientation and introductory lectures on course aims and making reliable observations and recordings in a field setting.
- Lecture on British temperate habitats, animal groups, and experimental design

Days 2-4 include led exercises in groups, introducing key groups of species and their associated survey methods.

Day 2: Freshwater sampling; bat surveys

Day 3: Field photography; invertebrate sampling; small mammal surveys

Day 4: Amphibian and reptile surveys; capture, mark, release exercise; employability workshop

Day 5: Bioblitz competition; return to Swansea

Intended Learning Outcomes: At the end of the module the student will be able to:
LO1) Describe and explain characteristics of whole organisms: their diversity, classification, structure, function, physiological constraints, adaptations, ecology and behaviour within their natural environment
LO2) Apply the principles of zoology, encompassing the interactions and relationships of animals with their environment, from organisms to ecosystems and the methods used for their investigation within the field
LO3) Identify links between the behaviour of animals, their ecology, conservation and management
LO4) Utilise appropriate sampling and surveying techniques so that they can be employed in zoological research, monitoring, and for commercial purposes
LO5) Identify common UK habitats and use appropriate keys and guides to identify a range of associated taxonomic groups
LO6) Critically assess, evaluate, analyse and synthesise information from published scientific sources and use it to construct reasoned arguments and testable hypotheses.
LO7) Create scientific field reports and posters that effectively explain and interpret habitat and species data
LO8) Maintain accurate records of an experiment or investigation
LO9) Work individually or in teams to identify individual or collective targets within a project topic and develop strategies to achieve those targets

Assessment: Coursework 1 (30%)
Coursework 2 (30%)
Coursework 3 (40%)

Assessment Description: Coursework 1: Field notebook (1000 words)
Coursework 2: Scientific photograph and personal study (500 words)
Coursework 3: Invertebrate report and infographic (750 words)

Moderation approach to main assessment: Second marking as sampling or moderation

Assessment Feedback: Students will be provided with personal written feedback on submitted field reports, posters and note books
Class feedback will also be provided for students to gain an overall perception of how they performed. Summative marks will be given for multiple choice exams and pub quiz. Students will also receive formative feedback from peer assessments.

Failure Redemption: Resubmission of coursework or alternative assessment

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

This is a level 2 Biosciences module which is compulsory for zoology students and will be held from 6th to 10th September 2021.

Not available to Visiting - Exchange students.

BIO258 Animal Physiology

Credits: 15 Session: 2022/23 January-June

Pre-requisite Modules: BIO104

Co-requisite Modules:

Lecturer(s): Dr TM Uren Webster

Format: 14 lectures, 2 research-focused lectures, 3 x 3h practicals, 2 workshops on quantitative physiology, 1 revision lecture, 3 x 1h drop-in sessions.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

Blended learning with lectures and practicals.

Available to Visiting and Exchange students.

Module Aims: "Physiology is the study of normal function in animals, encompassing chemical and physical activities within cells, tissues and organs. Less formally, physiology is the study of ""how animals work"".
This module will explore integrative physiology, spanning genes to organ systems and will cover both vertebrate and invertebrate physiology, including terrestrial, aquatic and aerial examples. We will examine how animal physiology is fundamentally connected to the environment within an adaptive context, including examples of how animals are able to survive in harsh conditions and considering how they may respond to emerging environmental challenges."

Module Content: "Topics discussed during lectures:
~ Key principles in physiology
~ Energy metabolism and thermo-regulation
~ Respiratory and circulatory physiology
~ Osmoregulation, ion balance and excretory systems
~ Regulatory physiology: nervous and endocrine systems
~ Structural physiology
~ Digestive systems and the microbiome
~ Reproduction and endocrine disruption
~ Quantitative physiology

Laboratory practicals:
1) Temperature effects on zebrafish embryonic development
2) Osmoregulation in marine polychaetes
3) Molecular Physiology: Lactate Dehydrogenase Assay"

Intended Learning Outcomes: "At the end of the module, students will be able to:

LO1) Describe, explain and compare the structure and function of major physiological systems for multiple lineages of animals using appropriate terminology and an appropriate level of detail
LO2) Describe and explain foundational topics in physiology: homeostasis, systems integration, systems regulation, scaling, constraints and adaptive responses to environment
LO3) Demonstrate an ability to integrate and compare knowledge from multiple systems to understand animal performance in different environments
LO4) Understand how physiological experiments are designed, analysed and interpreted
LO5) Use quantitative methods (algebra, statistics, visualisations) to describe and understand the physical, chemical and biological basis of physiological phenomena
LO6) Demonstrate ability to apply abstractions of learned principles to novel topics and problems
LO7) Demonstrate professional values, behaviour, and ethos
LO8) Demonstrate effective and efficient communication
"

Assessment:
Examination (50%)
Coursework 1 (25%)
Coursework 2 (25%)

Assessment Description: Exam (30 MCQ, 1 essay) CW1: Laboratory practical report CW2: Laboratory practical report
Moderation approach to main assessment: Second marking as sampling or moderation
Assessment Feedback: Students will be assigned two pieces of coursework and one exam. Students will receive written feedback on all components and a model answer after the report has been marked. Students will also receive feedback in person on request after lectures, during drop-in sessions and during office hour sessions.
Failure Redemption: Re-sit failed elements in August
Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus. Module not available to visiting or exchange students with exception of those within the school's existing exchange programme.

BIO261 Population and Community Ecology

Credits: 15 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr MS Fowler, Dr M Lurgi Rivera

Format: 10 hours lectures
18 hours PC lab
2 hours workshop
Group Presentation session

Delivery Method: Lectures, ICT workshops, group presentation workshop and e-learning

Module Aims: This module will introduce students to concepts and basic analytical tools to understand and predict the growth or decline of animal, plant and other populations for: individual species; interacting, multispecies (e.g., predator-prey) communities; and spatial networks connected by dispersal.

Students will become familiar with 5 major themes related to ecological dynamics: population growth and density dependence, competition, consumer-resource interactions and spatial processes. Students will develop skills in conceptual thinking and data analysis, using and developing ecological models to predict how populations change over time and space, as well as report writing and presentation skills. Students will learn about how these tools are used in practical situations like conservation and invasive species management.

The course will be structured with lectures introducing background information and core concepts being followed by corresponding PC lab sessions where students will gain experience of putting those concepts into practice. An additional workshop session will prepare students for group presentations dealing with classical concepts in population ecology.

Module Content: The module aims to build on the basics of population ecology taught at level 1. A holistic approach will be adopted, teaching students both classical ecological theory and practical, transferable skills. It aims to:
1) introduce students to some fundamental concepts, by comparing and contrasting various hypotheses in population, community and spatial ecology
- Exponential population growth, density dependence, antagonistic (consumer-resource) species interactions, dispersal and metapopulations, age/stage structure, basic types of population dynamics (stable, cyclic, chaotic).
2) consider modern themes in population ecology
- stability of ecological communities, functional responses, network theory, environmental change
3) teach students how to develop and simulate simple ecological models appropriately
- Single-species (Logistic), multi-species (e.g., Lotka-Volterra), Metapopulation and structured population models
4) link these models to existing data sets from natural and lab populations
- Linking population time series to ecological models via statistical estimation
5) prepare reports and group presentations to a professional standard

Practicals:
• Ecological modelling PC workshops
• Network analysis PC workshop
• PC data analysis workshop
• Classical Concepts in Population Ecology workshop

Intended Learning Outcomes: At the end of the module students will be able to:

LO1) Recognise fundamental concepts and hypotheses in population, community and spatial ecology
LO2) Classify important features of basic population models
LO3) Recognise different stability states in population and community dynamics
LO4) Understand and analyse how functional responses arise and affect dynamics
LO5) Develop and use computer code to simulate simple single and multispecies ecological models
LO6) Apply simple statistical methods to estimate key demographic parameters from natural and lab populations
LO7) Recognise simple network metrics and applications
LO8) Understand how ecological models are applied to modern environmental and conservation challenges

Assessment: Examination (50%)
Coursework 1 (40%)
Group Work - Presentation (10%)

Assessment Description: Final Exam: MCQ, Analytical & Short Answer Questions Coursework 1: Personal Population Model Group Presentation: Classical concepts in population ecology
Moderation approach to main assessment: Second marking as sampling or moderation
Assessment Feedback: Feedback is given directly on submitted continuous assessment assignments through annotated scripts, feedback forms and via a feedback lecture session as appropriate.
Failure Redemption: Resit examination, resubmission of coursework of failed element
Additional Notes: Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.