



**Swansea University
Prifysgol Abertawe**

**FACULTY OF SCIENCE AND
ENGINEERING**

**UNDERGRADUATE STUDENT
HANDBOOK**

Year 2 (FHEQ LEVEL 5)

**MARINE BIOLOGY
DEGREE 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 students in 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 other resources:

<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/>

FIELD COURSES 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. Your 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 Bioscientists 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
Marine Biology
 BSc Marine Biology[C160,C160]
 BSc Marine Biology with a Year Abroad[C107]

Compulsory Modules

Semester 1 Modules	Semester 2 Modules
BIO237 Marine Invertebrates 15 Credits Dr EC Pope	BIO224 Ichthyology 15 Credits Dr EC Pope
BIO245 Boat Based Marine Biology 15 Credits Dr CD Lowe	BIO231 Year 2 Biological Sciences Literature Review 15 Credits Dr GR Thomas
BIO252 Ecological Data Analysis 15 Credits Prof L Borger/Dr N Franconi	BIO262 Oceanography 15 Credits Dr CD Lowe
BIO260 Marine Biology Field Course 15 Credits Dr EC Pope/Miss CM Bertelli/Dr CE Davies/Dr CD Lowe	
Total 120 Credits	

Optional Modules

Choose exactly 15 credits

75 credits possible in TB1

BIO235	Molecular Ecology	Prof S Consuegra Del Olmo	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

Year 2 (FHEQ Level 5) 2022/23
Marine Biology
 BSc Marine Biology with a Year in Industry[C424]

Compulsory Modules

Semester 1 Modules	Semester 2 Modules
BI-200 Professional Development and Careers Planning 0 Credits Miss VV Wislocka/Mr N Clarke	BIO224 Ichthyology 15 Credits Dr EC Pope
BIO237 Marine Invertebrates 15 Credits Dr EC Pope	BIO231 Year 2 Biological Sciences Literature Review 15 Credits Dr GR Thomas
BIO245 Boat Based Marine Biology 15 Credits Dr CD Lowe	BIO262 Oceanography 15 Credits Dr CD Lowe
BIO252 Ecological Data Analysis 15 Credits Prof L Borger/Dr N Franconi	
BIO260 Marine Biology Field Course 15 Credits Dr EC Pope/Miss CM Bertelli/Dr CE Davies/Dr CD Lowe	
Total 120 Credits	

Optional Modules

Choose exactly 15 credits

75 credits possible in TB1

BIO235	Molecular Ecology	Prof S Consuegra Del Olmo	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

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: lectures:

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%)

<p>Assessment Description: Exam (50% of grade): 30 online MCQ (35%); choice of one out of three essays (online; 65%).</p> <p>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%).</p>
<p>Moderation approach to main assessment: Second marking as sampling or moderation</p>
<p>Assessment Feedback: Practical reports and exam scripts will receive individual written feedback. Practical classes will also receive group level feedback.</p>
<p>Failure Redemption: Re-submission of continuous assessment and examination</p>
<p>Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.</p> <p>Syllabus as stated is subject to modification due to staff availability.</p> <p>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.</p>

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.

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 these 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%)

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.

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 modified 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. Practical 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). Practical 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 mycorrhizal 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.	

BIO245 Boat Based Marine Biology

Credits: 15 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules: BIO260

Lecturer(s): Dr CD Lowe

Format: 10 x lectures
6 x 4 hr boatwork
1 x 3 hr practical

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: The lectures in this module are a combination of a safety briefing as well as learning content. Since these briefings are mandatory to attend before the weekly fieldwork on the boat it is important to maximise attendance, I therefore propose that the first two lectures are timetabled as face to face, so that I can discuss general topics, determine boat groups and talk about the general structure of the field work, before moving to an online Zoom lecture for the remaining lectures. This will not drastically change the amount of face to face time that the students will receive as they will have half a day of face to face time with me on the boat each week.

Module Aims: In this boat-based, hands on module students will spend several sessions at sea using the University's Research Vessel, the Mary Anning. Although subject to weather conditions, students should expect to spend six, four hour sessions at sea. The Mary Anning is an 18m purpose built catamaran that was designed from the keel up as a survey and teaching vessel and as such is an ideal resource to give students hands on experience of working at sea with a variety of pieces of equipment. Students will assist with deployment of equipment, learn how to handle and identify organisms encountered, and return them to the sea so as to minimise harm to these organisms.

Students will be introduced to sampling techniques used in marine biological research and commercial surveys. They will be given theoretical information on different sampling gears and gear selection followed by practical use of these gears on the Mary Anning.

Assessment is 100% coursework based around survey operations and reporting common in both academic and commercial settings.

Module Content: Lectures and Practicals

Field demonstration practicals -

- 1) Marine biological sampling using grab sampler and beam trawl conducted in Swansea Bay
- 2) Marine biological sampling using pelagic and otter trawls conducted in Swansea Bay;
- 3) Oceanographic boatwork using a CTD, echosounder and side scan sonar equipment conducted in Swansea Bay;
- 4) Boat based marine mammal and bird surveys conducted in Swansea Bay or the Gower.
- 5) Plankton boat work (including phytoplankton and zooplankton sampling);
- 6) In depth beam trawl sample taxonomic identification

Note; due to the vagaries of the weather it may be necessary to alter the contents of this module The practicals and field work are simply shown as examples.

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

- LO1) Discuss and apply the different forms of marine biological sampling, with particular emphasis on boat based sampling techniques;
- LO2) Critically apply this knowledge in order to design their own sampling and experimental protocols.
- LO3) Have in depth and transferable boat based skills commonly used by academics, environmental consultancies and government agencies.
- LO4) Taxonomically identify local marine fauna.
- LO5) Statistically analyse both ecological and experimental data

Assessment: Coursework 1 (10%)
Coursework 2 (15%)
Coursework 3 (15%)
Coursework 4 (10%)
Coursework 5 (50%)

Assessment Description: Coursework 1 Grab sample sediment analysis

Coursework 2 Beam trawl habitat report

Coursework 3 Trawl type comparison

Coursework 4 Echo sounders - group project

Coursework 5 Habitat assessment

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

Assessment Feedback: Individual and group feedback on assignments.

Feedback lecture and question and answer session.

Kahoot online practice quiz.

Failure Redemption: Resubmission of coursework.

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

Students wishing to take this module must have passed the RYA Sea Survival Course in year 1. Available to single honours Marine Biology students only. Not available to any visiting and exchange students. Practical sessions may change due to staff availability and the weather.

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.

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.

BIO260 Marine Biology Field Course

Credits: 15 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr EC Pope, Miss CM Bertelli, Dr CE Davies, Dr CD Lowe

Format: 40 (5 days on site)

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

Fieldwork and lab sessions

Module Aims: This residential field course comprises practical work employing shore-based techniques to sample littoral and benthic marine habitats. Students will learn techniques for the identification of marine organisms and gain experience in the analysis and presentation of ecological data.

Module Content: This field based module comprises practical work employing shore-based techniques to sample littoral and benthic marine habitats. Students learn techniques for the identification of marine organisms and gain experience in the analysis and presentation of ecological data.

Taxonomic orientation: trawled species

Seine netting

Beach transect: infauna identification and distribution

Rocky shore (sheltered and exposed) transects

Final data collation

ID test

Group presentations on rocky shore projects

Practical work is subject to change depending on weather and staff availability.

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

LO1) Compare different marine sampling techniques and know their respective advantages and disadvantages (assessed during field course and via reports)

LO2) Correctly record ecological data and explain the importance of accurate record keeping

LO3) Analyse, display, interpret and present marine ecological data (assessed via reports and group presentation)

LO4) Identify common marine species, particularly invertebrates (assessed by an ID test)

LO5) Use dichotomous keys to identify any marine species (assessed via portfolio).

LO6) Produce detailed laboratory and field reports, including data analysis and use of other research to strengthen arguments (assessed via reports).

LO7) Present ecological data orally as a part of a group

Assessment: Coursework 1 (10%)

Coursework 2 (20%)

Coursework 3 (20%)

Coursework 4 (25%)

Coursework 5 (25%)

Assessment Description: 1. GW practical: professional behaviour (during entire course)

2. Class Test: Identification test (of samples collected during the fieldcourse)

3. Group presentation

4. Sandy shore report (CW1)

5. Taxonomy portfolio (CW2)

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

Assessment Feedback: Student feedback will be provided on reports and during a formal feedback lecture

Failure Redemption: Submission of alternative assessments

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 5 Biosciences module which is compulsory for marine biology students. The module is not available to visiting and exchange students.

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.

BIO262 Oceanography

Credits: 15 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr CD Lowe

Format: 18 x 1 hour Lectures
4 x 3 hour practical

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

Lectures and practical

Module Aims: To understand the life that lives in our oceans, we need to understand those oceans and the processes which take place in them.

This module will introduce students to the world's oceans, covering the physical, chemical and biological makeup of the open seas. Topics will consider the formation of the ocean basins, how water moves around these basins and the variations in the ocean's environment which dictate what life can live where. We will also consider long term changes in our environment and the impact that humans are having on this. Through four practical exercises, students will gain hands on experience with oceanographic instrumentation in the laboratory and at sea.

Module Content: Lectures:

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

A history of ocean science

The global ocean

Tides and currents

Oceanic water movement

Charts, navigation and shipping

Physical properties of seawater

Chemical properties of seawater

Measuring physical and chemical properties

Nutrients and biogeochemical cycling

Phytoplankton

The microbial loop

Zooplankton and nekton

Sampling and measuring plankton

Primary production in the oceans and seasonality

Remote sensing - Optical

Remote sensing - Acoustic

Natural climactic cycles

Anthropogenic impacts on the ocean

Practicals:

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

* Identification of water samples based on physical and chemical parameters.

* Design and construction and calibration of simple electronic instruments for measurements of basic oceanographic parameters

* Deployment of above instruments to sea, data collection and analysis.

* Use of navigation charts and the oceanographic features displayed on them.

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

LO1) Describe the variety of chemical and physical features that exists in the oceans and coastal seas (assessed during examination)

LO2) Describe the formation of ocean basins, tides and oceanic currents (assessed during examination)

LO3) Describe environmental factors which underpin the ecology of organisms living in open water (assessed during examination and practical)

LO4) Identify appropriate sample methods for different marine systems, physical and chemicals parameters and the requirements of study type (assessed during examination)

LO5) Understand the key concepts of how common oceanographic instrumentation measure in water parameters (assessed during examination and practical)

LO6) Describe how data created through in situ marine surveys can be used to make inferences over larger temporal and spatial scales. (from practical write-ups)

Assessment:

- Coursework 1 (15%)
- Coursework 2 (10%)
- Coursework 3 (15%)
- Coursework 4 (10%)
- Examination (35%)
- Exam - Multiple choice questions (15%)

Assessment Description: Theory exam

Continuous assessment; 3 practical assignments encompassing plankton seasonality, oceanographic instrumentation construction and calibration and in situ measurements.

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

Assessment Feedback: Individual written formal feedback on assignments.

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.