Swansea University
Prifysgol Abertawe

FACULTY OF SCIENCE AND ENGINEERING

POSTGRADUATE STUDENT HANDBOOK

Year 4 (FHEQ LEVEL 7)

MSC ENVIRONMENTAL BIOLOGY: CONSERVATION & RESOURCE MANAGEMENT DEGREE PROGRAMME

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	Laura Roberts
Head of Biosciences	Geoff Profitt
Biosciences Programme Director	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/

MSc (FHEQ Level 7) 2022/23
Environmental Biology: Conservation and Resource Management
MSc Environmental Biology: Conservation and Resource Management

Compulsory Modules

Semester 1 Modules	Semester 2 Modules
BIOM25B **Science Skills and Research Methods** **20 Credits** **Dr MS Fowler/Dr AP Devine/Dr JN Griffin/Dr C Pimiento**	**BIOM22** **Advanced Techniques in Biodiversity Assessment and Management** **20 Credits** **Dr LJ Roberts/Dr PJ Neyland**
	BIOM32 **Ecosystems: Ecology, Conservation & Resource Management** **20 Credits** **Prof CA Froyd/Dr DW Forman/Dr WE Harris**
Dissertation	
BIOM34 **Research Project in Environmental Biology** **60 Credits** **Dr KAR Rose**	
Total 180 Credits	

Optional Modules

Choose exactly 40 credits

BIB700	Trends in Biosciences	Dr M Lurgi Rivera	TB1	20
BIOM12	Biodiversity and Health Ecology	Dr KL Wells	TB1	20
GEGM04	Environmental Modelling	Prof PRJ North/Prof B Kulessa	TB1	20
GEGM26	Climate Science and Policy	Prof T Murray	TB1	20

And

Choose exactly 20 credits

BIOM37B	Conservation of Aquatic Resources	Prof C Garcia De Leaniz/Prof S Consuegra Del Olmo/Dr PE Jones/..	TB2	20
GEGM10	Satellite Remote Sensing	Dr P Alton	TB2	20
GEGM22	Geographical Information Systems	Prof AJ Luckman/Dr RJ Fry/Dr Y Sun/..	TB2	20

BIB700 Trends in Biosciences

Credits: 20 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr M Lurgi Rivera

Format: 18 hours seminars
18 hours round table discussion
2 hours lectures

Delivery Method: "International Initiative for Theoretical Ecology seminar series, generally held every second Tuesday at 5pm, as well as a series of scientific journal clubs and practical workshops on quantitative methods for bioscientists, held on the Thursdays in between the biweekly seminars.

Recordings of seminars will be watched in-person in the classroom and will be followed by scientific discussions of the topic.
Journal clubs will involve personal learning through the reading of scientific papers and a marked component of attendance and in-class participation.

Quantitative Methods will be delivered in two workshops that will cover fundamentals of spatial ecology including metapopulation and metacommunity paradigms; and the analysis of complex networks structure and dynamics."

Module Aims: In this module you will discover what it takes to be a research scientist and discuss world-leading research with your module lecturer. You will watch the International Initiative for Theoretical Ecology seminar series, generally held every second Tuesday (or watch the recordings online), as well as a series of journal clubs and workshops on quantitative techniques for Bioscientists, held on the Thursdays in between the biweekly seminars. You will gain practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in Biosciences. For a selection of seminars, you will summarise the research highlights (3 to 5 bullet points, maximum 85 characters) and write an abstract on the research (max 300 words). You will also produce brief, webinar-style video-blogs and blogs for the remaining seminars. Lastly, you will write a short essay, with the accompanying computer code, discussing and implementing one of the quantitative approaches of your choice amongst those introduced during the workshop sessions. These tasks will allow you to fine-tune your communication skills and increase your depth of understanding of the latest research in Biosciences.

Module Content: - Introduction to the module, including specific details of assignments and timetable for the term (lecture) x1
- International Initiative for Theoretical Ecology seminar series (talks and round table) x5
- Series of journal clubs informal talks (talks and round table) x2
- Workshops on Quantitative Methods x2

Intended Learning Outcomes: 1) Gain a systematic understanding of knowledge, and a critical awareness of current problems and/or new insights at the forefront of Biosciences

2) Interpret, classify, and summarise new techniques and methodologies applicable to Biosciences

3) Reorganise and use established techniques of research and enquiry to create and interpret knowledge in Biosciences

4) Understand and apply quantitative analytical, statistical, and modelling methods in innovative ways to tackle scientific questions in the field of ecology and biology.

Assessment: Coursework 1 (20%)
Coursework 2 (20%)
Coursework 3 (20%)
Coursework 4 (20%)
Attendance (20%)

Assessment Description: Assignments 1 (20%) - Research highlights (3 to 5 bullet points, maximum 85 characters) and abstract on the research presented at the seminar attended on that week (max 300 words).

Assignment 2 (20%) - Webinar-style presentation (video blog) on the research presented at the seminar attended on that week

Assignment 3 (20%) - Written blog on the research presented at the seminar attended on that week

Assignment 4 (20%) – Mini research report (max 2,000 words) presenting one of the quantitative techniques using during the course to tackle a specific scientific question.

Attendance and Contribution (20%) - Attendance at seminars and workshops is mandatory and this assessment component will be split amongst all module's sessions. Failure to attend will result in marks being deducted.

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

Assessment Feedback: Oral feedback during scientific discussions and written feedback on assignments.

Failure Redemption: Assessments are not deferrable due to the requirement to attend the appropriate seminar. Students who fail the module overall (i.e. a final overall module mark of less than 50%) will be required to write a further essay that includes a quantitative modelling component on Trends in Biosciences.

Additional Notes: "Delivery of both teaching and assessment will be blended live and self-directed activities online (seminar videos) and on-campus.

Check out past seminars here: https://www.youtube.com/c/TheoreticalEcologySeminarSeries"

BIOM12 Biodiversity and Health Ecology

Credits: 20 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr KL Wells

Format: Lectures (15 hrs)
Practical (PC and Lab)
Tutorials/Workshops
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, workshops

Module Aims: Biodiversity & Health Ecology emerges as a new interdisciplinary research field at the intersection of humans, animals and ecosystems. It acknowledges that the spread of infectious diseases and pollutants in time of global changes strongly links health issues across organisms and ecosystems. Understanding and controlling Emerging Infectious Diseases (e.g. SARS, Ebola and Nipah virus) requires interdisciplinary and holistic concepts and approaches that account for human and animal interactions in all kind of natural and anthropogenic environments. This module addresses contemporary topics in the field of One Health from an ecological perspective and in context of changing biodiversity. It introduces background information and essential tools for environmental biologists, disease ecologists and resource managers to take part in tackling this global challenge. Through participation in this module you will develop the foundations to engage in research in this field.

Module Content: The growing awareness that health of humans, animals and ecosystems are tightly interwoven in times of global change requires interdisciplinary approaches in conservation and resource management. This module addresses contemporary topics in the field of One Health from an ecological perspective and in context of changing biodiversity due to human impacts. We will explore health at the human – domestic animal – wildlife interface with emphasis on interdisciplinary concepts and tools necessary to tackle global challenges in context of changing environments, agriculture, biodiversity and socioeconomic trends.
We will look at relevant tools and methods to explore interdisciplinary OneHealth as a topic of interest in basic and applied science and for informed decision making for governmental and non-governmental stakeholders.

This module will help you to develop the necessary ways of thinking and skills to link the manifold changes in our urban and natural environments to issues of human and wildlife health. We will highlight important ecological principles and topics that are at the backbone to understand the epidemiology and spread of infectious diseases, including human demography and habitat exploitation, biological invasions, population and community ecology, biotic interactions, functional biodiversity and, more generally, global change and climate change.
The course instructors look forward to sharing different skills and perspectives as we journey together through this interdisciplinary module!

Intended Learning Outcomes: On completion of this course, students will be able to:
L01 Develop and describe key concepts of EcoHealth and One Health and interdisciplinary approaches to tackle global challenges for conservation and resource management
L02 Understand system dynamics such as the spread of infectious diseases at the interface of humans, domestic and wild animals and ecosystems in context of changing environments, agriculture, biodiversity and socioeconomic trends
L03 Work independently and as a team to gather, synthesize and critically evaluate information pertaining to One Heath scenarios.
L04 Apply ecological key principles into ecosystem and animal health issues
L05 Be familiar with surveillance, risk assessment, and control measures to combat infectious disease spread at the human-wildlife interface

Assessment: Examination 1 (40%)
Coursework 1 (20%)
Coursework 2 (20%)
Coursework 3 (20%)

Resit Assessment: Examination 1 (100%)

Assessment Description: 3 hours exam
CW1 Poster
CW2 Essay
CW3 Report

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

Assessment Feedback: Annotated feedback on coursework and exams

Failure Redemption: August resit exam, resubmission of coursework

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

The growing awareness that health of humans, animals and ecosystems are tightly interwoven in times of global change requires interdisciplinary approaches in conservation and resource management. This module addresses contemporary topics in the field of One Health from an ecological perspective and in context of changing biodiversity due to human impacts. We will explore health at the human – domestic animal – wildlife interface with emphasis on interdisciplinary concepts and tools necessary to tackle global challenges in context of changing environments, agriculture, biodiversity and socioeconomic trends.
We will look at relevant tools and methods to explore interdisciplinary OneHealth as a topic of interest in basic and applied science and for informed decision making for governmental and non-governmental stakeholders.

This module will help you to develop the necessary ways of thinking and skills to link the manifold changes in our urban and natural environments to issues of human and wildlife health. We will highlight important ecological principles and topics that are at the backbone to understand the epidemiology and spread of infectious diseases, including human demography and habitat exploitation, biological invasions, population and community ecology, biotic interactions, functional biodiversity and, more generally, global change and climate change.
The course instructors look forward to sharing different skills and perspectives as we journey together through this interdisciplinary module!

BIOM22 Advanced Techniques in Biodiversity Assessment and Management

Credits: 20 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr LJ Roberts, Dr PJ Neyland

Format: Lectures: 15 hrs
Field Visit: 10 days (~60 hours)
Contact Hours will be delivered through a blend of field trips, online activities and workshops.

Delivery Method: This is predominantly a field-based module. Delivery will be blended and include workshops, online learning, briefing sessions and regular field work activities.

Module Aims: This module aims to introduce advanced professional techniques in biodiversity assessment and management.

In Part 1, students will learn how to use, interpret and evaluate appropriate metrics and methodologies to assess the impacts of new developments on biodiversity such as Preliminary Ecological Appraisal, Ecological Impact Assessment (EcIA) and biodiversity net gain (BNG). Student will also learn the evaluation of ecological and broader environmental features as part of an economic valuation of the environment e.g. for ecosystem services assessment, natural capital valuation and/or environmental net gain.

Part 2 of the module introduces students to a range of habitat management techniques, using the National Trust Gower as a case study system. Students will work with the National Trust to implement habitat and/or species management activities. Students will learn how to implementing (using appropriate techniques and biosecurity measures) schemes for habitat and/or species management, including mitigation, restoration and/ or habitat creation. This will include monitoring the effectiveness of habitat/species management to ensure that outcomes are achieved and where and how to implement remedial action if required while ensuring all legislative processes are adhered to.

This module provides students with highly employable skills within the environmental and conservation sector, aligning with the CIEEM's Competency Framework. While undertaking the module student will gain the experiences and develop a portfolio to allow them to apply for Qualifying Membership with the CIEEM.

Module Content: The syllabus and locations are indicative and subject to change based on weather and staff availability

Part 1: Biological Assessment Techniques
Week 1: Introduction to the course, self assessment and environmental legislation workshop
Week 2: Biodiversity for impact assessment and Introduction to Environmental Impact Assessment workshop
Week 3: Ecological Impact Assessment workshop
Phase 1 Habitat Mapping and UK Habitat Classification Systems fieldwork
Week 3: Ecological Impact Assessment scoping fieldwork
ArcGIS Workshop
Week 4: Biodiversity Net Gain workshop
Week 5: Ecosystem services assessment, natural capital valuation and environmental net gain workshop
Nature-based Solutions fieldwork

Part 2:
Week 6: Plant disease management: Ash woodland Management Bishopston Valley
Week 7: Rewilding project: The Vile, Gower
Week 10: Fire management on dwarf shrub heath: Gower Coast
Protected species management: Welshmoor Marshy grassland with Marsh Fritillaries
Restoration ecology and management of coastal habitats

Intended Learning Outcomes: Students will be able to:
1. Undertake, interpret and critically evaluate methods of biological assessment including Preliminary Ecological Appraisals, Environmental Impact Assessment and Biodiversity Net Gain using Phase 1 and UK Habitat Classification;
2. Critically appraise techniques for assessing ecological and broader environmental features as part of an economic valuation of the environment e.g. for ecosystem services assessment, natural capital valuation and/or environmental net gain.
3. Articulate, appraise, review and apply different strategies for managing habitats/species in accordance with environmental legislation and create habitat/species management plans, recovery or mitigation strategies.
4. Synthesise ecological information and analyse biological data to create professional reports and work effectivity as an individual or as part of a team to collect data

Assessment: Coursework 1 (40%)
Coursework 2 (40%)
Coursework 3 (20%)
Resit Assessment: Examination 1 (100%)

Assessment Description: Coursework 1: Ecological Impact Assessment
Coursework 2: National Trust Habitat Management Portfolio
Coursework 3: Application for Qualifying Membership of the CIEEM

Moderation approach to main assessment: Not applicable

Assessment Feedback: Written feedback directly on coursework. Discussion and questions will additionally be used. Feedback sessions and workshops.

Failure Redemption: August resit of failed components

Additional Notes: This module provides students with highly employable skills within the environmental and conservation sector, aligning with the CIEEM's Competency Framework. While undertaking the module student will gain the experiences and develop a portfolio to allow them to apply for Qualifying Membership with the CIEEM.

The module is available to exchange or visiting students.

BIOM25B Science Skills and Research Methods

Credits: 20 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr MS Fowler, Dr AP Devine, Dr JN Griffin, Dr C Pimiento

Format: Contact hours are divided into 20 hrs of lectures and 23 hrs of practicals/seminars/self-directed learning.

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.

The form of contact may vary depending on local requirements related to COVID-19.

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 campus
ICT Practicals on campus (PC Labs)
Group Symposium on Campus

Module Aims: This intensive lecture and practical based module covers science skills for students wishing to pursue postgraduate studies, including MSc, MRes, MPhil and PhD degrees. It will teach students how to make good use of library and internet resources (including Web of Science, Canvas and Dryad), to design and analyse their experiments, and to make presentations of their data during conferences and symposia.

It will provide PG students in the Department of Biosciences (and other Departments in the College of Science) with the research and analytical skills necessary to carry out their research projects. It will teach them how to formulate and test scientific hypotheses, and how to generate and analyse scientific results using a variety of research methods. Lecture topics include Reporting and Presentation skills, Numerical skills and Data Analysis and Scientific Writing. The lectures are taught during the first part of the Semester. The module is examined through a combination of Continuous Assessment (90%) and an online examination in the form of a MCQ test (10%).

Basic reading:

Whitlock, M. and Schluter, D. (2014) The Analysis of Biological Data (Roberts & Co.).
Crawley, M.J. (2005) Statistics: An Introduction Using R (Wiley).
Original research papers given in reading list and found through self-directed learning.

Module Content: Library and internet resources
Experimental design
Plagiarism and how to avoid it
Presentation skills (PowerPoint and graphics packages)
Scientific writing and literature reviews
Environmental data analysis and presentation using R

Intended Learning Outcomes: On completion of this course, students will be expected to:

Critically assess the merits of different experimental designs and the key concepts in methodology and philosophy of science
Understand safety requirements of their work
Make lucid and timely presentations of their data
Understand the problems and consequences of plagiarism in scientific research
Make efficient use of databases, library and internet resources for their postgraduate studies
Demonstrate knowledge of which statistical tests are appropriate for different data types
Write appropriate code to plot, explore and analyse data in the R programme environment
Interpret and evaluate the output of statistical models applied to data
Critically read, summarise and synthesise published scientific literature

Assessment:	Class Test 2 - Held under exam conditions (10%) Coursework 1 (40%) Coursework 2 (30%) Group Work - Presentation (20%)
Resit Assessment:	Examination 1 (100%)

Assessment Description: Class Test: 1 hour online MCQ assessing Data Analysis
Group Oral Presentation
CW1 - Literature Review
CW2 - Environmental Data Analysis using R (Report: Analysis of Provided (x2) and Own Data sets)

Moderation approach to main assessment: Not applicable

Assessment Feedback: Annotated scripts (using Turnitin/Grademark)
Feedback posted on Canvas
In-class questions, using clickers for instant feedback
Mock MCQ practice examination questions, using clickers for instant feedback
Model answers

Failure Redemption: Resit with MCQ Exam in August.
Module mark capped at 50%

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

Not available to exchange or visiting students

BIOM32 Ecosystems: Ecology, Conservation & Resource Management

Credits: 20 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof CA Froyd, Dr DW Forman, Dr WE Harris

Format: 19 hours of lectures / workshops
21 hours of field visits.
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

Combination of lectures/workshops and field site visits.

Module Aims: In this module, the students will learn to identify and understand the diversity and contrasting characteristics of terrestrial ecosystems with an emphasis on the origin and effects of various human-induced environmental impacts.

Module Content: In this module the students will learn to identify and understand the diversity and contrasting characteristics of terrestrial ecosystems with an emphasis on the origin and effects of various human-induced environmental impacts.

Due to the mode of teaching the syllabus outlined below is indicative of the material provided and is subject to modification.

*Terrestrial systems;
*Ecological monitoring for conservation;
*Biodiversity and biogeography;
*Long-term ecology;
*Conservation planning and resource management

Field visits will focus on woodland communities and include lowland and upland deciduous woodlands and upland coniferous woodlands in the locality

Intended Learning Outcomes: Upon completion of this module students will be able to acquire advanced, specialised knowledge on:

*Applied Conservation biology and Management;
*Implications of anthropogenically driven habitat changes and its possible relation to climate change.

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

Assessment Description: A 2 hour written examination and 3 assignments consisting of a 3000 word field course report, a 1,500 word briefing paper, and a group workshop discussion presentation.

CW1 (0%), Tree ID.
CW2 (25%) Peatland Briefing Paper.
CW3 (25%) Woodland Report.

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

Assessment Feedback: Written feedback given on submitted work and annotated examination scripts

Failure Redemption: Resit examination (capped at 50%).

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

Not available to exchange or visiting students.

BIOM34 Research Project in Environmental Biology

Credits: 60 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr KAR Rose

Format: Project supervision meetings. Initially more frequent to get project started, reducing during project phase, increasing as required.

Delivery Method: Project work. Varies according to topic of study. May be desk-based, lab-based, field-based.

Module Aims: In this module the students will learn how to:
* perform a literature search in order to establish what has already been published in the selected subject area
* appreciate the safety considerations of scientific research by completing appropriate audits of the materials and methods involved
* investigate a problem in environmental biology in which hypotheses can be generated and tested with the application of appropriate statistical analysis
* acquire a range of skills in the conduct of scientific research
* integrate material from the literature with the results obtained from the research carried out into an effective dissertation
* present their proposed methods and main results to peers

Module Content: In this module the students will learn how to:
* Perform a literature search in order to establish what has already been published in the selected subject area;
* Appreciate the safety considerations of scientific research by completing appropriate audits of the materials and methods involved;
* Investigate a problem in environmental biology in which hypotheses can be generated and tested with the application of appropriate statistical analysis;
* Acquire a range of skills in the conduct of scientific research;
* Integrate material from the literature with the results obtained from the research carried out into an effective dissertation.
* present their proposed methods and main results to peers

- The investigation will typically last for 15 weeks. The first two weeks will be spent undertaking a literature survey, a safety audit and in planning the research. Students will be expected to spend an average of at least 30 hours per week in the laboratory and/or field during the following 10 weeks. The last three weeks will be spent writing up and finalising the dissertation (of not more than 20,000 words). Two compulsory oral presentations on the project (worth 20% of the mark) will be given (i) approx. 1 month after commencing the project, giving an outline of the proposed question and methods (5%); (ii) shortly (typically 2 days) after submission of the dissertation, summarising the main findings of the project (15%).

Intended Learning Outcomes: Upon completion of this module students will be able to undertake the following at a level commensurate with MSc expectations:
*Survey the scientific literature, making appropriate use of electronic data base searcges where appropriate;
*Design meaningful experiments and/or surveys with adequate controls incorporating appropriate statistical procedures;
*Research and understand the implications of current health and safety regulations;
*Execute a careful and accurate research programme;
*Record data in a careful and accurate manner;
*Interpret data and plan appropriate subsequent research as indicated by earlier results;
*Perform statistical tests and present data using appropriate graphical, pictorial and tabular methods, making appropriate use of IT skills;
*Write a coherent scientific report.
*Present proposed methods and main results to an audience of peers

Assessment: Project (80%)
Presentation (5%)
Presentation 2 (15%)

Assessment Description: Coursework assessments:
(1) Project dissertation (80%).
(2) 5 min presentation of project background, aims & methods in class seminar (5%)
(2) 15 min presentation of project in class seminar (15%)

Moderation approach to main assessment: Universal non-blind double marking

Assessment Feedback: Written feedback given directly on submitted drafts and coursework.
Verbal & written feedback from presentations.

Failure Redemption: Resubmission of research dissertation within 3 months of relevant Exam Board meeting. One feedback session permitted with project supervisor prior to resubmission. Grade capped at 50%.

Additional Notes: The investigation will typically last for 12 to 15 weeks. The first two weeks will be spent undertaking a literature survey, a safety audit and in planning the research. Students will be expected to spend an average of at least 30 h per week in the laboratory and/or field during the following 10 weeks. The last three weeks will be spent completing the dissertation (of not more than 20,000 words). Two compulsory oral presentations on the project (worth 20% of the mark) will be given (i) approx. 1 month after commencing the project, giving an outline of the proposed question and methods (5%); (ii) shortly (typically 2 days) after submission of the dissertation, summarising the main findings of the project (15%). Not available to exchange or visiting students.

BIOM37B Conservation of Aquatic Resources

Credits: 20 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof C Garcia De Leaniz, Prof S Consuegra Del Olmo, Dr PE Jones, Dr GR Thomas, Dr RKF Unsworth

Format: Combination of lectures (16) and seminars (4)

Delivery Method: Combination of lectures and seminars.

Module Aims: The module will identify major issues in the conservation of aquatic organisms and develop the knowledge base of students in aquatic conservation, including those related to captive breeding programmes and the potential effects of climate change and other stressors. Some of the lectures/seminars are given by invited experts in the field. The module is assessed by a combination of continuous assessment (50%) and written examination (50%).

Module Content: Conservation practice globally
Specific issues of conservation to various taxa particularly those of key importance to aquatic resources
Role of captive breeding programmes in conservation of aquatic species
Climate change and its potential impact on the conservation of aquatic species

Intended Learning Outcomes: Students will acquire advanced, specialised knowledge on:
Conservation practice globally
Specific issues of conservation to various taxa particularly those of key importance to aquatic resources
Assessment of extinction risks
Role of captive breeding programmes in conservation of aquatic species
Climate change and its potential impact on the conservation of aquatic species

Assessment: Examination (50%)
Coursework 1 (15%)
Coursework 2 (30%)
Coursework 3 (5%)

Resit Assessment: Examination (100%)

Assessment Description: Written examination (50%)
Coursework 1 - Fisheries Management Solutions (15)
Coursework 2 - Darwin Grant Application (30%)
Coursework 3 - Poster for dissemination and advocacy of Darwin Grant Application (5%).

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

Assessment Feedback: Written feedback on coursework. Graded examination.

Failure Redemption: Resit exam capped at 50%.

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

Not available to exchange or visiting students.

GEGM04 Environmental Modelling

Credits: 20 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof PRJ North, Prof B Kulessa

Format: 21
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

On Campus

Module Aims: An understanding of the environment is increasingly important in many areas, e.g. industry, agriculture, conservation, health, science, and planning. This module introduces computational modelling in a geographical context. It aims to develop thinking about environmental issues within a modelling framework, and to develop practical skills in developing and using computational models, and in computer data analysis and visualisation. Examples are focused on solving practical scientific problems in environmental dynamics and climate change, focussing on modelling the terrestrial carbon and hydrological cycles.

Module Content: This module introduces computational modelling in the context of environmental dynamics and climatic Change. It aims to develop thinking about environmental issues within a modelling framework, and to develop practical skills in developing and using computational models, and in computer data analysis and visualisation. Examples are focussed on solving practical scientific problems which involve modelling the terrestrial carbon and hydrological cycles.

Outline of lecture topics:

-Role of modelling in environmental dynamics and climate change.
-Land surface carbon and hydrological cycles
-Models of plant photosynthesis and respiration
-Climate modelling and GCMs
-Modelling vegetation dynamics and succession
-Hydrological modelling - ground water and evapotranspiration
-Modelling surface water flow
-Example applications in climate change science and environmental planning

Example practical sessions

-Computer data analysis and visualisation
-Modelling the terrestrial carbon cycle using Biome BGC
-Introduction to modelling groundwater flow

Intended Learning Outcomes: -A broad understanding of the purpose and scope of computational modelling in environmental dynamics and climate change
-A critical awareness of the range of modern applications to which environmental modelling contributes
-An understanding of the environmental processes related to the water cycle and to biogeochemical cycles
-An ability to independently develop and execute simple computational models
-The ability to solve problems and write reports based on application of existing environmental models

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

Assessment Description: Examination
Coursework 1 - biogeochemical cycles
Coursework 2 - groundwater hydrology

Moderation approach to main assessment: Universal non-blind double marking

Assessment Feedback: Continual assessment feedback in writing on standard department feedback forms

Failure Redemption: resit examination or resubmit continual assessment whichever if applicable

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

Available for visiting students.

GEGM10 Satellite Remote Sensing

Credits: 20 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr P Alton

Format: 20
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

Primarily on campus

Module Aims: This module explains the use of remote sensing as a tool for gathering and analyzing information about human resources and the natural environment. It is appropriate for students who would find it valuable to understand how information about human activity and environmental change is retrieved from images of the Earth acquired by satelite or aircraft instruments. Emphasis is placed on the role of ongoing missions in providing operational information for science and society. Lecture material is supported by hands-on experience exploring satellite images in a computer environment.

Module Content: This module explains the use of remote sensing as a tool for gathering and analysing information about human resources and the natural environment. It is appropriate for students who would it valuable to understand how information about human activity and environmental change is retrieved from images of the Earth acquired by satellite or aircraft instruments. Emphasis is placed on the role of ongoing missions in providing operational information for science and society.
Elements of Geographic Information Systems (GIS) appropriate for dealing with spatially-explicit image data are examined. Lecture material is supported by hands on experience exploring satellite images in a computer environment.
Outline of lecture topics:
The role of remote sensing in providing information about human acitivity and environmental processes.
Principles behind the technology of satellites, imaging intruments and data analysis.
Applications of remote sensing: The following topics will be examined in terms of their requirement for infomation, the development of specific tools and techniques, and the results achieved:
a. Human resources: Forestry and agriculture
b. The human environment: The urban landscape
c. The natural environment: The atmosphere and oceans
d. Environmental change: The land surface and global vegetation
Environmental monitoring: Snow and ice
Example practical sessions:
Practical sessions will be carried out in a computer laboratory and written reoprts of the findings will form the continuous assessment assignments. These sessions will include:
Exploring spatial and spectral features in optical satellite images
Comparing data image data from different parts of the spectrum
Global satellite data and time-series analysis
Topographic analysis and visualisation of remotely-sensed data
Finding and acquiring remote-sesing sata using catalogues and archives.

Intended Learning Outcomes: Conceptual understanding of the purpose and scope of remote sensing.
Comprehensive understanding of how remote sensing techniques provide information about human resources and environmental processes.
Critical awareness of current remote sensing systems and ongoing research for monitoring human and natural environments.
Ability to explore, interpret and analyze satellite images in a computer environment.

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

Assessment Description: Exam (50%) - 2 hour exam
Coursework (50%) - 2500 word practical report

Moderation approach to main assessment: Universal non-blind double marking

Assessment Feedback: Students will receive examination feedback after exams if taken in January. Continual assessment feedback is given in writing on standard departmental feedback forms.

Failure Redemption: resit examination or resubmit continual assessment whichever if applicable
Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus. Available to visiting or exchange students with permission from scheme coordinator.

GEGM22 Geographical Information Systems

Credits: 20 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof AJ Luckman, Dr RJ Fry, Dr Y Sun

Format: 32
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: Online asynchronous mini-lectures and demonstrations, remote or in-person computer lab access for working through exercises at a time to suit the student, one hour per week timetabled in-person contact for help and advice, and 3 hours per week synchronous timetabled help session via zoom

Module Aims: This module will provide students from a range of disciplines including Geography and Bioscience with a comprehensive understanding of Geographic Information Systems, and key practical skills in the market-leading open-source GIS software tool Quantum GIS (QGIS). At the end of the module students will know how and where to acquire geospatial data, how to combine and analyse these data for specific objectives, and how to visualise primary and derived data in the form of maps.

Module Content: INTRODUCTION
This module will provide students from a range of disciplines including geography and bioscience, with a comprehensive understanding of Geographical Information Systems and key skills in using GIS within their research work and future careers. It will take a hands-on approach in a computer lab, combined with a series of lectures, to address the learning outcomes. Emphasis will be placed on equipping students with practical skills in the Quantum GIS (QGIS) software, and giving them the ability to import, combine, spatially analyse, and map a range of data from field survey, government agencies and census statistics.

INDICATIVE LECTURE TOPICS
- Introduction to GIS in Geography and Bioscience
- Sources and types of geospatial data relevant to Geography and Bioscience
- Aspects of visualizing and manipulating data from understanding the geographic reference frame through to spatial filters, spatial interpolation and map projections
- Approaches to querying data including combining attributes, selection of elements using spatial and attribute data, containment within regions and selection through proximity
- Elements of data analysis including spatial statistics, analysis of road and other communication networks, and surface elevation studies including line-of-sight visibility
- Basics of mapping and map design from cartographic principles, through symbolism and generalization, to human perception of space and essential reference data.

INDICATIVE COMPUTER PRACTICAL EXERCISES
- Importing and manipulating GIS layers
- Digitising and geocoding new data
- Querying, measurement and retrieval
- Raster and vector analysis
- Combining layers using containment and buffering
- Analysis of pathways within a transport network
- Topographic analysis, visualisation and viewsheds

Intended Learning Outcomes: At the end of this module, the student will:
1) Have a critical awareness of the purpose, scope and potential applications of Geographical Information Systems (GIS).
2) Understand the nature of geospatial data and be able to critically evaluate a range of geospatial data types.
3) Be able to synthesize a range of primary (e.g. GPS, remote sensing) and secondary (e.g. Ordnance Survey, UK census) sources of geospatial data.
4) Be familiar with the QGIS software package whilst having a critical awareness of the strengths and weaknesses of alternative commercial and freeware GIS software tools.
5) Have the skills to import, combine and synthesize geographic data from multiple map sources in QGIS.
6) Understand data standards and formats such as GeoTiff, Shape Files and KML, and be able to exchange geospatial data between software packages.
7) Be skilled in applying a range of GIS analysis tools from basic data editing to view-shed and network analysis.
8) Be able to critically evaluate evaluate maps using cartographic principles and results from advanced applications of GIS, based on case studies from epidemiology, demography, biological habitat mapping and geography.
9) Have the skills to develop a GIS project from basic data sourcing to spatial analysis and map visualization.

Assessment: Coursework 1 (10%)
Coursework 2 (20%)
Coursework 3 (10%)
Coursework 4 (60%)

Assessment Description: Coursework 1: Specimen Map. Individual formative assignment submitted through Turnitin and marked online
Coursework 2: Project proposal with map of indicative dataset. Individual Turnitin assignment submitted through Turnitin and marked online
Coursework 3: Multiple Choice Quiz. Individual randomized MCQ based on the course content and marked automatically online
Coursework 4: Project report. Individual summative assignment submitted through Turnitin and marked online

Moderation approach to main assessment: Universal second marking as check or audit

Assessment Feedback: Student will receive feedback within 3 weeks of submission on all assignments.
Feedback will include both individual formative comments and general group comments.

Failure Redemption: Resubmit failed component(s)

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

This module is available to all postgraduate students within the Colleges of Science, Medicine and Human and Health Sciences. Student should be familiar with basic computing and will benefit from numeracy skills.

GEGM26 Climate Science and Policy

Credits: 20 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof T Murray

Format:

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

Campus

Module Aims: This module will develop critical thinking about the role of science, especially climate science, in society. This role will be discussed in terms of what is desirable, what is practical and what is the present reality. We will focus on a few specific areas; what climate science tells us about what we should do as a society; what current policy is and what is needed; how science provides advice to policy-makers (especially through the activities of bodies such as the Intergovernmental Panel on Climate Change); and the symbotic/antagonistic relationship between science and the media. During the module you will be challenged to think about familiar topics in new ways - from the ownership of the information you consume to the role of housing, agriculture and business in a post-carbon society. We will also consider the communication of climate science topics to scientists, the general public and to policy makers.

Assuming there are no covid restrictions this module will be taught in a mixed format - there will be one or two face-to-face field trips, meetings and role playing sessions - but in order to allow visiting speakers from the widest range of sources - most sessions will be delivered online.

Module Content: Sample syllabus (details will change from year-to-year)

Climate Science and Policy, lectures, seminars and discussions

WEEK 1: Introduction / format of the module; The scientific method; Peer Review; Intro to the EN-ROADS simulator. Distribution of talk symposium topics.

WEEK 2: Visiting speaker; Science and the media; Assignment: critique of article.

WEEK 3: Visiting speaker; Science, risk and policy.

WEEK 4: NO SESSION

WEEK 5: Visiting speaker; Student talk symposium: [Topics: Extinction Rebellion; IPCC; Climate Change Committee; NRW; SPECIFIC, Institute for Government, IPCC topics].

WEEK 6: Citizen's assembly report https://www.climateassembly.uk/recommendations/index.html (Links to an external site.) Two visiting speakers.

WEEK 7: Visiting speaker; Feedback on critique. Science into stories… Getting science into the media, press releases; Assignment: writing a press release

WEEK 8: 2nd part of student talk symposium.

WEEK 9: Two visiting speakers.

WEEK 10: 23rd April World Climate Summit simulation https://www.climateinteractive.org/programs/world-climate/ 6 bloc simulation plus possibly Extinction Rebellion => teams of 3 or 4 people, 3 rounds negotiations, ~20 minutes ea

Typical visiting speaker topics:
Purpose, People, Play - we are the leaders we are waiting for
Calculating and reducing the carbon footprint of Swansea University
Solutions to fuel poverty and climate change in the built environment
What is farming for? Agriculture and Climate Change in the UK
Why net zero is not enough
Well-being of future generations (Wales) act, 2015, The Environment Act and the Climate Emergency
IPCC, how it works and is it fit for purpose?
Natural Resources Wales, Welsh environmental legislation and the climate emergency
Use of activism to provoke behaviour change - Extinction Rebellion

Intended Learning Outcomes: At the end of this module you will have developed understanding of:
- the role of an individual in the climate system and your own carbon footprint
- inputs into climate models and the changes that are needed in society to limit climate warming to below 1.5/2.0 degrees C as per the Paris agreement
- current UK policy on climate change, including net zero - and whether this is sufficiently ambitious
- the role of different aspects of the UK economy in climate change (business, agriculture etc)
- the international basis for tackling climate change and the role of and challenges for different countries
- the workings and findings of the IPCC and other climate related policy bodies
- the way that science and the media interact and the ownership and influences on the media we consume

Assessment:	Coursework 1 (10%) Coursework 1 (10%) Coursework 2 (15%) Coursework 2 (15%) Participation Exercise (5%) Participation Exercise (5%) Coursework 3 (30%) Coursework 3 (30%) Coursework 4 (40%) Coursework 4 (40%)
Assessment Description: Participation Exercise CW1 - Engagement CW2 - Press release on scientific paper CW3 - INDC document CW4 - COP26 essay	
Moderation approach to main assessment: Second marking as sampling or moderation	
Assessment Feedback: Via online marking and feedback in class sessions	
Failure Redemption: Resit coursework / alternative essay if coursework cannot be resat	
Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus. Available to visiting postgraduate students with permission of scheme coordinator.	