



**Swansea University  
Prifysgol Abertawe**

**FACULTY OF SCIENCE AND  
ENGINEERING**

**UNDERGRADUATE STUDENT  
HANDBOOK**

**YEAR 1 (FHEQ LEVEL 4)**

**BSC ENVIRONMENTAL SCIENCE AND THE CLIMATE  
EMERGENCY**

**UNDERGRADUATE PROGRAMMES**

**SUBJECT SPECIFIC  
PART TWO OF TWO  
MODULE AND COURSE STRUCTURE  
2023-2024**

## **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 23-24 academic year begins on 25 September 2023

Full term dates can be found [here](#)

### **DATES OF 23-24 TERMS**

25 September 2023 – 15 December 2023

8 January 2024 – 22 March 2024

15 April 2024 – 07 June 2024

### **SEMESTER 1**

25 September 2023 – 29 January 2024

### **SEMESTER 2**

29 January 2024 – 07 June 2024

### **SUMMER**

10 June 2024 – 20 September 2024

## **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.

## **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.

At Swansea University and in the Faculty of Science and 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, technical and administrative staff, administrators - I'm sure you will find many friendly helping hands ready to assist you. And make the most of living and working alongside your fellow students.

During your time with us, please learn, create, collaborate, and most of all – enjoy yourself!

**Professor David Smith**  
**Pro-Vice-Chancellor and Executive Dean**  
**Faculty of Science and Engineering**



<b>Faculty of Science and Engineering</b>	
Pro-Vice-Chancellor and Executive Dean	Professor David Smith
Head of Operations	Mrs Ruth Bunting
Associate Dean – Student Learning and Experience (SLE)	Dr Laura Roberts
<b>School of Biosciences, Geography and Physics</b>	
Head of School	Dr Kevin Rees
School Education Lead	Dr Wendy Harris and Dr Sarah Roberts
Head of Geography	TBC
Geography Programme Director	Dr Joanne Maddern
Year Coordinators	Year 0 – Dr Kath Ficken Year 1 – Dr Kath Ficken Year 2 – Dr Nick Felstead Year 3 – Dr Keith Halfacree PGT – Dr Iain Robertson

## 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 8.30am-4pm.

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

**Call:** +44 (0) 1792 295514 (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/>

## 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 23-24 handbooks to ensure that you have access to the most up-to-date versions.

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/](#)

**Year 1 (FHEQ Level 4) 2023/24**  
**Environmental Science and the Climate Emergency**  
 BSc Environmental Science and the Climate Emergency[F770]  
 BSc Environmental Science and the Climate Emergency with a Foundation Year[F771]  
 BSc Environmental Science and the Climate Emergency with a Year Abroad[F772]  
 BSc Environmental Science and the Climate Emergency with a Year in Industry[F773]

**Compulsory Modules**

Semester 1 Modules	Semester 2 Modules
<b>BIO109</b> Core Skills for Biological Sciences 20 Credits Dr SC Hocking	<b>BIO112</b> Life in the Oceans 20 Credits Dr MJ Perkins/Dr CD Lowe
<b>Total 120 Credits</b>	

**Optional Modules**

Choose exactly 20 credits

GEC133 is the welsh equivalent of GEG133

<b>GEC133</b>	Peryglon Naturiol a Chymdeithas	Dr RH Meara/Dr CJT Ladd/Dr KJ Preece/..	TB2	20
<b>GEG133</b>	Natural Hazards and Society	Dr RH Meara/Prof MA Doel/Prof SH Doerr/..	TB2	20

**And**

Choose exactly 20 credits

GEC135 is the welsh equivalent of GEG135

<b>GEC135</b>	Cynaliadwyedd a'r Argyfwng Hinsawdd	Dr RH Meara/Dr KR Evans/Dr CJT Ladd/..	TB1	20
<b>GEG135</b>	Sustainability and the Climate Emergency	Dr KH Halfacree/Dr KJ Ficken/Prof PRJ North/..	TB1	20

**And**

Choose exactly 20 credits

GEC140 is the welsh equivalent of GEG140

<b>GEC140</b>	Prosiect a Dulliau Ymchwil	Dr RH Meara	TB2	20
<b>GEG140P</b>	Project and Methods (Physical Geography)	Prof T Murray/Dr JAB Rosette/Dr RG Smith/..	TB2	20

**And**

Choose exactly 20 credits

<b>BIO111</b>	Botany and Ecology	Dr PJ Neyland/Dr JN Griffin/Dr MJ Perkins/..	TB1	20
<b>GEG132</b>	Introduction to Earth Systems	Dr E Urbanek/Dr NJ Felstead/Dr JR Jordan/..	TB1	20



# BIO109 Core Skills for Biological Sciences

**Credits: 20 Session: 2023/24 September-January**

**Pre-requisite Modules:**

**Co-requisite Modules:**

**Lecturer(s):** Dr SC Hocking

**Format:** 23 lectures, 6 workshops, 3 PC labs, 1 laboratory chemistry practical, 1 feedback lectures. 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 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. The module consists of lectures, ICT workshops, 1 lab practical and e-learning

**Module Aims:** This module is divided into three sections, scientific writing, data analysis and chemistry, which will equip students with the core skills needed throughout their degree program. The content of the module includes understanding the different types of data that can be measured and collected, the tools to formally present and analyse data and data analyses, and practical applications of spreadsheet software. There is a 'hands on' focus on dealing with data and developing basic mathematical and statistical analytical skills. Furthermore this module introduces first year undergraduates to the key skill of scientific writing, developing their ability to locate, understand, evaluate and communicate scientific information. Basic chemistry will be covered as a foundation to its importance to biological processes.

**Module Content:** The module will comprise of the following subjects:

- Using maths in Science
- Understanding data
- Types of data
- Units and measurement
- Using data bases
- Preparing figures, graphs and tables
- Sampling concepts
- Hypothesis testing
- Descriptive statistics
- Basic inferential statistics
  
- Basic rules to scientific writing
- Writing essays and practical reports
- Introduction to sources of scientific information and science in the public domain
- Essay writing
- Referencing
  
- Organic chemistry
- Stereochemistry
- Transition metal chemistry
- laws of kinetics
- chemical equilibria

#### Careers Development

- Resilience
- Developing Self Awareness
- Career options
- action planning
- CV's cover letters
- creating a LinkedIn page

The module is supported by both lectures and guided / self directed computer sessions and workshops which include:

- Introduction to Spreadsheets & Databases
- Plotting data in Spreadsheet Packages
- Displaying data visually
- Simple Statistics by Hand
- Basic rules to scientific writing
- Essays and practical reports
- Utilising internet sources and search engines
- Referencing

**Intended Learning Outcomes:** LO1) Classify the different type of data and describe how they are measured

LO2) Recognise and apply standard units of measurement.

LO3) Demonstrate how and when to present data in tables or different types of figures and graphs.

LO4) Demonstrate practical knowledge of the use of databases and spreadsheet applications.

LO5) Apply knowledge of the use of descriptive and inferential statistics, including parametric and non-parametric tests to evaluate statistically significant relationships and/or differences.

LO6) Differentiate between the different statistical analyses associated with different types of data.

LO7) Identify and evaluate different forms of scientific communications and their applications.

LO8) Locate and utilise internet sources of scientific information such as peer reviewed journal articles using appropriate search engines.

LO9) Communicate, structure and format scientific information in a number of different writing styles encompassing essay writing and practical reports.

LO10) Utilise, format and structure references in a scientific essay

LO11) Recognise the problems and risks associated with different forms of academic misconduct.

LO12) Explain why chemistry is important to biology

LO13) Describe the basic structure of atoms, molecules etc

LO14) Describe different types of chemical bond and have a basic understanding of chemical reactions.

LO15) Know how to make up molar solutions

LO16) Understand what pH is and how it is important in biological reactions

LO17) Explain the basic chemical structure of proteins, fats and carbohydrate

LO18) Describe the role of different metals in biology.

LO19) Understand the importance of self-reflection and career development skills

<b>Assessment:</b>	Coursework 1 (25%)
	Coursework 2 (25%)
	Coursework 3 (40%)
	Coursework 4 (10%)

**Assessment Description:** CW1: Essay

CW2: Chemistry assignment

CW3: Statistics report

CW4: Careers quizzes

**Moderation approach to main assessment:** Not applicable

**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

**Reading List:** Whitlock, Michael C.; Schluter, Dolph, Schluter, Dolph., The Analysis of Biological Data (International Edition), Macmillan Learning, 2020.ISBN: 9781319325350

Whitlock, Michael, author., Schluter, Dolph, author., The analysis of biological data, Macmillan Learning, 2020.ISBN: 9781319226237

Jones, A. M. (Allan M.), 1945- author., Reed, Rob (Robert H.), author.; Weyers, Jonathan D. B., author., Practical skills in biology, Pearson, 2022.ISBN: 9781292397078

Jones, A. M. (Allan M.), 1945- author., Reed, Rob (Robert H.), author.; Weyers, Jonathan D. B., author., Practical skills in biology, Pearson Education Limited, 2016 - 2016.ISBN: 1292094362

Stuart Johnson 1973- author., Jon Scott author., Study and communication skills for the biosciences / Stuart Johnson and Jon Scott., Oxford : Oxford University Press, 2019.ISBN: 9780198791461

Boyle, Jennifer, author., Ramsay, Scott, \$e author., Writing for science students, Palgrave in the UK is an imprint of Macmillan Publishers Limited, 2017 - 2017.ISBN: 9781137571526

Crowe, Jonathan (Science writer) author., Bradshaw, Tony (Tony K.), author., Chemistry for the biosciences : the essential concepts, Oxford University Press, 2021.ISBN: 9780198791041

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

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.

# BIO111 Botany and Ecology

**Credits: 20 Session: 2023/24 September-January**

**Pre-requisite Modules:**

**Co-requisite Modules:**

**Lecturer(s):** Dr PJ Neyland, Dr JN Griffin, Dr MJ Perkins

**Format:** 24 hours in person live lectures (or Zoom if necessary)  
12 hours laboratory practicals  
3 hours field practical  
Additional Zoom sessions for Q and A.  
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: Synchronous and asynchronous online lectures, laboratory and field practicals, eLearning, Canvas VLE used to disseminate information, short lectures, Zoom interactions and quizzes

**Module Aims:** Botany lectures cover the structure, life cycles and morphology of the major living Divisions of the Plant Kingdom. Floral structure, pollination, fruit dispersal and seed germination are discussed with particular reference to plant/animal interactions. This is followed by lectures that cover the basic anatomy of higher plants, from the cellular to the whole organism level. Lectures on plant physiology will emphasise flowering plants as whole organisms and concentrate particularly on plant-environment interactions. The topics covered are: photosynthesis; water relations; mineral nutrition; organic translocation; growth; developmental physiology. Aspects of plant ecology, plant-herbivore interactions and the importance of plants in medicine will also be covered. The lectures on plants are complemented by two laboratory practical sessions; Lower plant classification is studied by development of a dichotomous key; Basic anatomy and cell structure are studied microscopically; Physiological experiments illustrate aspects of plant water relations. Additionally, taxonomy and classification of species from the major divisions are studied by demonstrations displaying a wide range of specimens, along with examples of flower structure, pollination types and seed/fruit dispersal.

Ecology lectures cover the study of the interactions of organisms with their environment. The topic is divided into four key themes: the individual (conditions and resources, population distribution and abundance, population growth and regulation, population dynamics), species interactions (competition and predation), communities (patterns in space and time) and ecosystems (flux of energy and matter, food webs and patterns in species richness). A field practical looking at individuals (adaptation to ecological conditions and species area relationships) will develop skills in species identification, ecological sampling and ecological data analysis.

A lecture in plant ecology draws these two concepts together.

Note - lectures here refer to material that is presented on Canvas pages and delivered as live in-person lectures.

## **Module Content: Syllabus**

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

### **Botany**

- Classification, evolution and life cycles of non-vascular and vascular plants
- Pollination, fertilisation and dispersal in seed plants
- Plant biotechnology, genetic engineering
- Plant growth regulators (hormones)
- Plant growth and responses to light
- Water relations
- Mineral nutrition
- Mycorrhiza
- Photosynthesis, translocation
- Photosynthesis and global climate change
- Herbivory, plants, secondary metabolites and medicine

### **Ecology**

- Conditions, resources and the ecological niche
- Population distribution, abundance and life histories
- Population growth, regulation and dynamics
- Competition
- Predation and herbivory
- Communities; patterns in space and time
- Ecosystems; flux of energy and matter
- Food webs
- Patterns in species richness

### **Final lecture**

- Plant ecology; populations, habitats, ecosystems and biomes

### **Practicals**

Botany - Plant anatomy

Botany - Plant physiology experiment

Botany - Plant Kingdoms: taxonomy and classification, bryophytes, pteridophytes, gymnosperms and angiosperms

Ecology - Rocky shore ecology: individuals to communities

(Note order of practicals may change according to weather)

<p><b>Intended Learning Outcomes:</b> By the end of the module, the student should be able to:</p> <p>LO1) Describe the evolution, classification and morphology of plants and recognise typical specimens from the Divisions</p> <p>LO2) Compare and contrast the reproductive strategies and life cycles of plants from the major divisions (vascular and non-vascular plants).</p> <p>LO3) Describe and illustrate the physical structure of flowering plants from the cellular to the whole plant level.</p> <p>LO4) Summarise the physiological functioning of flowering plants, their interactions with the environment and their importance in the biosphere.</p> <p>LO5) Have knowledge of ecology and biological diversity, including structure, function, physiological constraints, evolution and adaptations to the environment</p> <p>LO5) Become proficient in microscopy and scientific illustration of cells</p> <p>LO6) Undertake, record, analyse and discuss some basic experiments in plant physiology</p> <p>LO7) Utilise taxonomic keys and guides to identify and classify organisms across a broad range of phyla during practical investigations</p> <p>LO8) Utilise field based ecological sampling techniques</p> <p>LO9) Work as a team and be able to utilise appropriate sampling and surveying techniques so that they can be employed in ecological research and monitoring</p> <p>LO10) 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</p> <p>LO11) Analyse and interpret data derived from experimental observations in terms of their significance and in the context of established knowledge utilising appropriate statistical techniques.</p> <p>LO12) Use relevant literature, information and programme resources to support the design, execution and analysis of practical investigations.</p>	
<b>Assessment:</b>	<p>Coursework 1 (10%)</p> <p>Coursework 2 (15%)</p> <p>Coursework 3 (25%)</p> <p>Exam - Multiple choice questions (50%)</p>
<b>Assessment Description:</b>	<p>Coursework 1: Anatomical drawings of plant cells (microscopy)</p> <p>Coursework 2: Ecology poster from field practical (adaptations and species-area relationships)</p> <p>Coursework 3: Laboratory practical report on plant physiology experiment (chemistry and water relations)</p> <p>Examination: (January) 100 Multiple Choice Questions based on all material taught in Botany and Ecology lectures</p>
<b>Moderation approach to main assessment:</b>	Not applicable
<b>Assessment Feedback:</b>	<p>Formal feedback in practical classes and lectures</p> <p>Individual comments on submitted coursework</p> <p>One to one discussion available in drop-in sessions upon request</p> <p>Electronic feedback on work submitted online</p> <p>Formative feedback on Canvas quizzes</p>
<b>Failure Redemption:</b>	<p>Resit of examination</p> <p>Re submission of coursework</p>
<b>Additional Notes:</b>	<p>Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.</p> <p>Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so students must ensure their availability. Field practical material may be subject to change depending on weather conditions.</p>

# BIO112 Life in the Oceans

**Credits: 20 Session: 2023/24 January-June**

**Pre-requisite Modules:**

**Co-requisite Modules:**

**Lecturer(s):** Dr MJ Perkins, Dr CD Lowe

**Format:** 25 h of lectures

6 h laboratory work

4 h of fieldwork

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, laboratory practicals, fieldwork, eLearning.

**Module Aims:** This module introduces students to the largest biome on the planet and the huge variety of life it contains; over 71% of the Earth's surface is covered by ocean and its health is intricately connected with our own. Lectures will consider the formation of ocean basins and key oceanographic processes within them before moving onto the chemical and physical properties of water. The module will introduce students to primary production in the ocean, the huge diversity of life within marine food chains, and key processes in nutrient cycling. Marine ecosystems will be discussed in detail, with focus on those found around the UK, before considering the interaction between humans and the oceans and the challenges faced by marine organisms in an ocean changing because of our activities.

**Module Content:** Lecture themes:

1. Introduction to the oceans
2. Waves, tides and currents
3. Chemical and physical properties of seawater
4. Plankton and productivity in marine ecosystems
5. Nutrient cycling
6. Microalgae definitions and taxonomy
7. Marine invertebrates
8. Marine fish
9. Marine reptiles, birds and mammals
10. Introduction to marine ecology
11. Estuarine and intertidal systems
12. Shallow seas
13. Deep sea
14. Tropical seas
15. Polar seas
16. UK marine habitats
17. Humans and the oceans
18. The changing oceans

**Intended Learning Outcomes:** LO1 Describe how oceans form and describe oceanic processes;

LO2 Safely undertake fieldwork in the intertidal habitat;

LO3 Comprehend the physiological functioning of micro- and macroalgae, their interactions with the environment and their importance both in aquatic ecosystems and to humans;

LO4 Explain the drivers of the diversity of marine animal life;

LO5 Describe the variety of marine ecosystems, with particular reference to UK habitats;

LO6 Define concepts underpinning the ecology and diversity of marine ecosystems;

LO7 Explain the interplay between society and the oceans;

LO8 Produce detailed laboratory reports, including data analysis and use of other research to strengthen arguments;

LO9 Discuss the importance of correctly citing academic work;

<b>Assessment:</b>	Examination (50%) Coursework 1 (10%) Coursework 2 (15%) Coursework 3 (25%)
<b>Assessment Description:</b>	Examination: 100 Multiple Choice Questions based on all material taught in lectures. Coursework 1: construction of standard curve; Coursework 2: mussel feeding; Coursework 3: rocky shore short exercises.
<b>Moderation approach to main assessment:</b>	Not applicable
<b>Assessment Feedback:</b>	Personal feedback provided on coursework submitted. Direct general feedback during lectures and practical sessions. Formal feedback session to discuss examination results.
<b>Failure Redemption:</b>	Resit of examination Re submission of coursework
<b>Reading List:</b>	Peter Castro author., Michael E. Huber author.; William C. Ober illustrator.; Claire E. Ober illustrator., Marine biology / Peter Castro, Ph.D., Michael E. Huber, Ph.D. ; original artwork by William C. Ober, M.D. and Claire E. Ober, B.A., R.N., New York, New York : McGraw-Hill Education, 2019.ISBN: 1260289249
<b>Additional Notes:</b>	Delivery of both teaching and assessments will be in-person 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. Lecture and practical material may be subject to change depending on staff availability and weather conditions.



# GEC133 Peryglon Naturiol a Chymdeithas

**Credits: 20 Session: 2023/24 January-June**

**Pre-requisite Modules:**

**Co-requisite Modules:**

**Lecturer(s):** Dr RH Meara, Dr CJT Ladd, Dr KJ Preece

**Format:** 20 darlith, 4 dosbarth ymarferol, 1 sesiwn 'diwrnod trychineb' diwrnod o hyd

1 hour lectures

2 x 2 practical classes

1 day long 'disaster day'

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

Ar y Campws

On Campus

**Module Aims:** .Bydd y modiwl hwn yn ymchwilio i agweddau peryglus amgylchedd y Ddaear a pherthynas y gymdeithas â nhw. Bydd egwyddorion cychwynnol yn cynnwys diffiniad o berygl naturiol, trychineb, risg a cholled ac ymagweddau at leihau risg a rheoli trychinebau. Mae'r prif fathau o berygl naturiol yn cael eu hastudio er mwyn deall sut maent yn gweithredu, ble, a pha mor aml maent yn debygol o ddigwydd. Caiff canlyniadau peryglus eu hystyried, yn ogystal â sut gall y gymdeithas ymateb i ddigwyddiadau peryglus. Mae agweddau allweddol yn cynnwys trafod peryglon cynradd ac eilradd, rhagweld a monitro peryglon, a deall sut y gellir lleihau eu heffeithiau niweidiol. Bydd y peryglon naturiol a fydd yn cael eu hystyried yn y modiwl hwn yn cynnwys ffrwydradau llosgfynyddoedd, daeargrynfeydd, tswnamiau, tanau gwyllt, tirlithriadau, digwyddiadau tywydd eithafol, llifogydd, cwmpfeydd eira a Phergion Mawr. Bydd y modiwl hefyd yn ystyried y cysyniad o "Bobl fel Peryglon". Bydd darlithoedd yn ymdrin ag egwyddorion cyffredinol ynghyd ag astudiaethau achos. Bydd dosbarthiadau ymarferol yn atgyfnerthu'r cysyniadau a drafodir mewn darlithoedd. Bydd agwedd ymarferol y gwaith hwn yn dod i uchafbwynt mewn diwrnod efelychu rheolaeth mewn trychineb.

This module investigates hazardous aspects of Earth's natural environment and how society relates to them. Introductory principles include the definition of natural hazard, disaster, risk and loss, and approaches to reducing risk and managing disasters. Major types of natural hazard are studied in order to understand how they operate, where, and how frequently they are likely to occur. Hazardous consequences are explored, as well as how society can respond to hazardous events. Key aspects include discussion of primary and secondary hazards, prediction, forecasting and monitoring of hazards, and understanding how their harmful effects can be minimised.

Natural hazards considered during this module include volcanic eruptions, earthquakes, tsunamis, wildfires, landslides, extreme weather events, flooding, avalanches and Mega Hazards. The module will also consider the concept of "Humans as Hazards". Lectures consider general principles as well as case studies. Practical classes reinforce concepts learned in lectures. The practical aspect of the work will culminate in a disaster management simulation day.

**Module Content:** Cyflwyniad i beryglon a thrychinebau

Peryglon naturiol – prosesau a chanlyniadau ffrwydradau llosgfynyddoedd, daeargrynfeydd, tswnamïau, tanau gwyllt, tirlithriadau, digwyddiadau tywydd eithafol, llifogydd, cwympfeydd eira a pheryglon mawr. Agweddau thematig - cofnod daearegol o ddigwyddiadau trychinebus fel dangosydd o'r tebygrwydd y byddant yn digwydd yn y dyfodol; monitro peryglon, newid byd-eang a pheryglon naturiol; byw gyda pheryglon naturiol.

Ymhlith y testunau y mae:

Cyflwyniad i beryglon a thrychinebau

Peryglon folcanig

Tanau gwyllt

Peryglon seismig

Peryglon sy'n gysylltiedig â goleddfau, Peryglon Mawr Peryglon Corwyntoedd

Arsylwi'r Ddaear o ran rheoli peryglon, newid a pheryglon amgylcheddol yn y dyfodol, llifogydd yn y dyfodol a pheryglon hydrolegol Tswnamïau

Risg i'r gymdeithas a chadernid

Introduction to hazards and disasters

Natural hazards - the processes and consequences of volcanic eruptions, earthquakes, tsunamis, wildfires, landslides, extreme weather events, flooding, avalanches and mega hazards

Thematic aspects - the geological record of catastrophic events as an indicator of their likely future occurrence;

monitoring hazards, global change and natural hazards; living with natural hazards.

Topics include:

Introduction to natural hazards and disasters

Volcanic hazards

Wildfires

Seismic hazards

Slope-related hazards

Megahazards

Hurricane hazards

Future environmental change & hazards

Flood hazards & hydrological hazards

Tsunamis

Risk society and resilience

**Intended Learning Outcomes:** Erbyn diwedd y modiwl hwn, dylai cyfranogwyr allu:

- diffinio peryglon naturiol, trychinebau, colledion a risg;
- esbonio sut y gall prosesau naturiol effeithio'n andwyol ar bobl, eu heiddo a'r amgylchedd;
- esbonio'r prosesau ffisegol sy'n achosi ffrwydradau llosgfynyddoedd, daeargrynfeydd, tswnamïau, tanau gwyllt, tirlithriadau, y tywydd, llifogydd, cwmpfeydd eira a pheryglon mawr.
- asesu'r dystiolaeth ar gyfer, a risg sy'n deillio o, ddigwyddiadau amllder isel ond o bwysigrwydd mawr
- disgrifiad o ddostraniad digwyddiadau naturiol catastroffig mewn gofod ac amser;
- dangos sut mae effeithiau digwyddiadau peryglus yn dibynnu ar gamau gweithredu'r gymdeithas cyn ac yn ystod digwyddiadau ac esbonio rolau camau lliniaru, monitro, rhagweld a rhybuddio wrth leihau'r risg o beryglon naturiol;

By the end of this module you should be able to:

- define natural hazards, disasters, losses and risk;
- explain how natural processes can adversely affect people, their property and the environment;
- explain the physical processes that cause volcanic eruptions, earthquakes, slope failures, tsunamis, avalanches, weather, flooding, megahazards and wildfires;
- assess the evidence for and risk from high-magnitude-low-frequency events;
- describe the distribution in space and time of catastrophic natural events;
- show how the effects of hazardous events depend on actions taken by society before and during the events and explain the roles of mitigation, monitoring, forecasting and warning in reducing the risk from natural hazards;

**Assessment:** Examination 1 (50%)  
Coursework 1 (10%)  
Coursework 2 (10%)  
Coursework 3 (30%)

**Resit Assessment:** Examination (Resit instrument) (100%)

**Assessment Description:** Gwaith Cwrs 1 – Gwaith Ymarferol Archifau (10%)  
Gwaith Cwrs 2 – Map peryglon folcanig (10%)  
Gwaith Cwrs 3 – Adroddiad sy'n seiliedig ar efelychiadau trychinebau (30%)  
Arholiad – Arholiad Aml-ddewis (50%)

Coursework 1 - Archive practical (10%)  
Coursework 2 - Volcanic hazard map (10%)  
Coursework 3 - Report based on disaster simulations (30%)  
Exam - Multiple Choice Exam (50%)

**Moderation approach to main assessment:** Moderation by sampling of the cohort

**Assessment Feedback:** Darperir adborth grwp ar gyfer adroddiadau'r diwrnod trychineb gan ddefnyddio ffurflenni adborth safonol yr adran.

Bydd sylwadau unigol ar gyfer atebion arholiad; Bydd myfyrwyr yn gallu gweld y rhain mewn cyfarfodydd tiwtorial

adrannol. Rhoddir adborth cyffredinol ar atebion arholiad drwy Blackboard.

Darpariaeth asesu ar gyfer myfyrwyr ag anableddau

Gwneir darpariaeth ar gyfer myfyrwyr ag anableddau yn unol â chyngor gan y Swyddfa Anableddau.

Rhowch fanylion am sut y byddai myfyrwyr yn gwneud yn iawn am fethiant yn y modiwl

Group feedback is provided for the disaster day reports using standard departmental feedback forms. Individual comments are written on examination answers; students will be able to view these in departmental tutorial meetings. General feedback on examination answers will be provided via Blackboard.

**Failure Redemption:**

Arholiad ail-leoli

Resit examination

**Reading List:** Rydgren, Knut ; Bondevik, Stein, Moss growth patterns and timing of human exposure to a Mesolithic tsunami in the North Atlantic, Geological Society of America (GSA), 2014-12-19.ISBN: 00917613  
Harbitz, Carl B ; Harbitz, Carl B ; Løvholt, Finn ; Løvholt, Finn ; Bungum, Hilmar ; Bungum, Hilmar, Plag, Hans-Peter ; Plag, Hans-Peter ; Marsh, Stuart ; Marsh, Stuart, Submarine landslide tsunamis: how extreme and how likely?, Springer Netherlands, 2014-07.ISBN: 0921030X  
PETER J. TALLING ; MICHAEL L CLARE ; MORELIA URLAUB ; ED POPE ; JAMES E. HUNT ; SEBASTIAN F.L. WATT, Large Submarine Landslides on Continental Slopes: Geohazards, Methane Release, and Climate Change, The Oceanography Society, 2014-06-01.ISBN: 10428275  
Carracedo, Juan Carlos, Growth, structure, instability and collapse of Canarian volcanoes and comparisons with Hawaiian volcanoes, Elsevier B.V, 1999.ISBN: 03770273  
Ward, Steven N ; Day, Simon, Cumbre Vieja Volcano—Potential collapse and tsunami at La Palma, Canary Islands, American Geophysical Union, 2001-09-01.ISBN: 00948276  
Self, Stephen ; Gertisser, Ralf, Tying down eruption risk, 2015-03-31.ISBN: 17520894  
Costa, Antonio ; Smith, Victoria C ; Macedonio, Giovanni ; Matthews, Naomi E, The magnitude and impact of the Youngest Toba Tuff super-eruption, Frontiers Media S.A, 2014-08-04.ISBN: 22966463  
Mason, Ben G ; Pyle, David M ; Oppenheimer, Clive, The size and frequency of the largest explosive eruptions on Earth, Springer-Verlag, 2004-12.ISBN: 02588900  
Self, Stephen, Volcanic Hazards, Risks, and Disasters, Elsevier Inc, 2015.ISBN: 9780123964533  
Voosen, Paul, Massive crater under Greenland's ice points to climate-altering impact in the time of humans, 2018-11-14.ISBN: 00368075  
Garde, Adam A ; Søndergaard, Anne Sofie ; Guvad, Carsten ; Dahl-Møller, Jette ; Nehrke, Gernot ; Sanei, Hamed ; Weikusat, Christian ; Funder, Svend ; Kjær, Kurt H ; Larsen, Nicolaj Krog, Pleistocene organic matter modified by the Hiawatha impact, northwest Greenland, 2020-09-01.ISBN: 00917613  
Harris, Alan, What Spaceguard did, Nature Publishing Group, 2008-06-26.ISBN: 00280836  
Poole, Graeme, Terror in the skies of Russia, Blackwell Publishing Ltd, 2013-09.ISBN: 02666979  
Kenny, Gavin G. ; Hyde, William R. ; Storey, Michael ; Garde, Adam A. ; Whitehouse, Martin J. ; Beck, Pierre ; Johansson, Leif ; Søndergaard, Anne Sofie ; Bjørk, Anders A. ; MacGregor, Joseph A. ; Khan, Shfaqat A. ; Mouginit, Jérémie ; Johnson, Brandon C. ; Silber, Elizabeth A. ; Wielandt, Daniel K.P. ; Kjær, Kurt H. ; Larsen, Nicolaj K., A Late Paleocene age for Greenland's Hiawatha impact structure, American Association for the Advancement of Science, 2022-03-11.ISBN: 23752548  
Prichard, Bob, The North Sea surge and east coast floods of 1953, John Wiley & Sons, Ltd, 2013-02.ISBN: 00431656  
Rufat, Samuel ; Tate, Eric ; Burton, Christopher G ; Maroof, Abu Sayeed, Social vulnerability to floods: Review of case studies and implications for measurement, Elsevier, 2015-12.ISBN: 22124209  
Ballesteros-Cánovas, J. A ; Stoffel, M ; St George, S ; Hirschboeck, K, A review of flood records from tree rings, SAGE Publications, 2015-12.ISBN: 03091333  
Archfield, S. A ; Hirsch, R. M ; Viglione, A ; Blöschl, G, Fragmented patterns of flood change across the United States, John Wiley and Sons Inc, 2016-10-16.ISBN: 00948276  
Schillereff, Daniel N ; Chiverrell, Richard C ; Macdonald, Neil ; Hooke, Janet M, Flood stratigraphies in lake sediments: A review, Elsevier B.V, 2014-08.ISBN: 00128252  
Dewan, Tanvir H, Societal impacts and vulnerability to floods in Bangladesh and Nepal, Elsevier B.V, 2015-03.ISBN: 22120947  
Gary John Brierley, Why we should release New Zealand's strangled rivers to lessen the impact of future floods.  
Mangini, Walter ; Viglione, Alberto ; Hall, Julia ; Hundecha, Yeshewatesfa ; Ceola, Serena ; Montanari, Alberto ; Rogger, Magdalena ; Salinas, José Luis ; Borzi, Iolanda ; Parajka, Juraj, Detection of trends in magnitude and frequency of flood peaks across Europe, Taylor & Francis, 2018-03-12.ISBN: 02626667  
Keith Smith 1938-, Environmental hazards : assessing risk and reducing disaster / Keith Smith., Routledge, 2013.ISBN: 9780415681063  
Guimarães Nobre, Gabriela ; Muis, Sanne ; Veldkamp, Ted I.E ; Ward, Philip J, Achieving the reduction of disaster risk by better predicting impacts of El Niño and La Niña, Elsevier, 2019-07.ISBN: 25900617  
John Abraham, Global warming is intensifying El Niño weather.  
Fasullo, J. T ; OttoBliesner, B. L ; Stevenson, S, ENSO's Changing Influence on Temperature, Precipitation, and Wildfire in a Warming Climate, American Geophysical Union (AGU), 2018-09-16.ISBN: 00948276  
Cattiaux, J ; Vautard, R ; Cassou, C ; Yiou, P ; Masson-Delmotte, V ; Codron, F, Winter 2010 in Europe: A cold extreme in a warming climate: COLD WINTER 2010 IN EUROPE, 2010-10.ISBN: 00948276  
Scaife, A. A ; Arribas, A ; Blockley, E ; Brookshaw, A ; Clark, R. T ; Dunstone, N ; Eade, R ; Fereday, D ; Folland, C. K ; Gordon, M ; Hermanson, L ; Knight, J. R ; Lea, D. J ; MacLachlan, C ; Maidens, A ; Martin,

M ; Peterson, A. K ; Smith, D ; Vellinga, M ; Wallace, E ; Waters, J ; Williams, A, Skillful longrange prediction of European and North American winters, 2014-04-16.ISBN: 00948276  
Met Office, North Atlantic Oscillation.

Caesar, L ; McCarthy, G. D ; Thornalley, D. J. R ; Cahill, N ; Rahmstorf, S, Current Atlantic Meridional Overturning Circulation weakest in last millennium, 2021-02-25.ISBN: 17520894

Stott, Peter A ; Christidis, Nikolaos ; Otto, Friederike E. L ; Sun, Ying ; Vanderlinden, JeanPaul ; van Oldenborgh, Geert Jan ; Vautard, Robert ; von Storch, Hans ; Walton, Peter ; Yiou, Pascal ; Zwiers, Francis W, Attribution of extreme weather and climaterelated events, John Wiley & Sons, Inc, 2016-01.ISBN: 17577780

IPCC, IPCC AR6 Climate Change 2022 Impacts Adaptation and Vulnerability.

IPCC, Global Warming of 1.5 deg C.

IPCC AR6 2021 Physical Science Basis.

Stimpson, Ian, Japan's Tohoku Earthquake and Tsunami, Blackwell Publishing Ltd, 2011-05.ISBN: 02666979

Lacassin, Robin ; Lavelle, Sylvain, The crisis of a paradigm. A methodological interpretation of Tohoku and Fukushima catastrophe, Elsevier B.V, 2016-04.ISBN: 00128252

Jose C. Borrero, Field Data and Satellite Imagery of Tsunami Effects in Banda Aceh, American Association for the Advancement of Science, 2005-06-10.ISBN: 00368075

Gaillard, Jean-Christophe ; Clavé, Elsa ; Vibert, Océane ; Azhari ; Dedi ; Denain, Jean-Charles ; Efendi, Yusuf ; Grancher, Delphine ; Liamzon, Catherine C ; Sari, Desy Rosnita ; Setiawan, Ryo, Ethnic groups' response to the 26 December 2004 earthquake and tsunami in Aceh, Indonesia, Springer Netherlands, 2008-10.ISBN: 0921030X

Lauterjung, J ; Münch, U ; Rudloff, A, The challenge of installing a tsunami early warning system in the vicinity of the Sunda Arc, Indonesia, Copernicus GmbH, 2010-04-06.ISBN: 16849981

Waltham, Tony, The Asian Tsunami disaster, December 2004, Blackwell Publishing Ltd, 2005-01.ISBN: 02666979

Bondevik, Stein, Earth science The sands of tsunami time, 2008-10-30.ISBN: 00280836

Chagué-Goff, Catherine ; Schneider, Jean-Luc ; Goff, James R ; Dominey-Howes, Dale ; Strotz, Luke, Expanding the proxy toolkit to help identify past events — Lessons from the 2004 Indian Ocean Tsunami and the 2009 South Pacific Tsunami, Elsevier B.V, 2011-07.ISBN: 00128252

Costa, Pedro J.M ; Dawson, Sue ; Ramalho, Ricardo S ; Engel, Max ; Dourado, Francisco ; Bosnic, Ivana ; Andrade, César, A review on onshore tsunami deposits along the Atlantic coasts, Elsevier B.V, 2021-01.ISBN: 00128252

Bondevik, Stein ; Løvholt, Finn ; Harbitz, Carl ; Mangerud, Jan ; Dawson, Alastair ; Inge Svendsen, John, The Storegga Slide tsunami—comparing field observations with numerical simulations, Elsevier Ltd, 2005.ISBN: 02648172

JANKAEW, Kruawun ; ATWATER, Brian F ; SAWAI, Yuki ; CHOOWONG, Montri ; CHAROENTITIRAT, Thasinee ; MARTIN, Maria E ; PRENDERGAST, Amy, Medieval forewarning of the 2004 Indian Ocean tsunami in Thailand, Nature Publishing Group, 2008.ISBN: 00280836

Dall'Osso, F ; Dominey-Howes, D, Public assessment of the usefulness of "draft" tsunami evacuation maps from Sydney, Australia – implications for the establishment of formal evacuation plans, Copernicus GmbH, 2010-08-25.ISBN: 16849981

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

Ar gael i fyfyrwyr gwadd a myfyrwyr cyfnewid.

Available to visiting and exchange students.

## GEC135 Cynaliadwyedd a'r Argyfwng Hinsawdd

**Credits:** 20 **Session:** 2023/24 September-January

**Pre-requisite Modules:**

**Co-requisite Modules:**

**Lecturer(s):** Dr RH Meara, Dr KR Evans, Dr CJT Ladd

**Format:** 36 o oriau cyswllt (32 awr o ddarlithoedd; 4 awr o weithdai)

36 contact hours (32 hours of lectures; 4 hours of 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

Ar y Campws

On Campus

**Module Aims:** Bydd y modiwl hwn yn gyflwyniad i newid amgylcheddol byd-eang a bydd yn ystyried agweddau ar gynaliadwyedd fel pwnc sy'n effeithio ar fywydau bob dydd. Mae her cynaliadwyedd yn sylweddol a bydd y darlithoedd yn eich darparu â'r wybodaeth a fydd ei hangen arnoch i ymwneud â Nodau Datblygu Cynaliadwy'r

This module is an introduction to global environmental change and explores aspects of the issue of sustainability as it affects everyday lives. The challenge of sustainability is significant and the lectures will provide you with the information needed to engage with the UN's Sustainable Development Goals.

**Module Content:** Wythnos

- 1-3 Cyflwyniad: Rhyngweithio dynol-ddaearyl
- Newid mewn poblogaethau ac effaith amgylcheddol
- Gwareiddiadau a'r hinsawdd
- System hinsoddol
- Newid yn yr hinsawdd
- Gwleidyddiaeth newid yn yr hinsawdd
- Her cynaliadwyedd
- Dirywiad amgylcheddol
- Y Nodau Datblygu Cynaliadwy
- 4-7 Defnydd tir a dirywiad
- 7-9 Materion trefol
- 9-11 Effeithiau newid yn yr hinsawdd
- 11 Casgliad: Tuag at brifysgol gynaliadwy?

## Week

- 1-3 Introduction: human-earth interaction
- Population change and environmental impact
- Civilizations and climate
- Climate System
- Climate change
- Politics of climate change
- The challenge of sustainability
- Environmental degradation
- The Sustainable Development Goals
- 4-7 Land use and degradation
- 7-9 Urban issues
- 9-11 Climate change impacts
- 11 Conclusion: towards the sustainable university?

**Intended Learning Outcomes:** Erbyn diwedd y modiwl hwn, dylai cyfranogwyr allu:

1. Deall cysyniadau allweddol newid amgylcheddol byd-eang.
2. Dadansoddi pwysigrwydd perthynol ffactorau dynol a ffisegol wrth achosi newid amgylcheddol.
3. Deall bod agweddau diwylliannol, economaidd, cymdeithasol, gwleidyddol a ffisegol ar 'cynaliadwyedd'.
4. Gwerthuso agweddau ar 'cynaliadwyedd' o fewn ystod o gyd-destunau daearyddol.
5. Disgrifio dulliau diweddar i fonitro a modelu newid amgylcheddol byd-eang.
6. Adolygu'n feirniadol dystiolaeth canlyniadau newid amgylcheddol byd-eang a'r her sy'n wynebu datblygiad cynaliadwy.

By the end of this module you should be able to:

1. Understand key concepts of global environmental change.
2. Analyse the relative importance of human and physical factors in causing environmental change.
3. Recognise that 'sustainability' has cultural, economic, social, political and physical dimensions.
4. Evaluate aspects of 'sustainability' within a range of geographical contexts.
5. Describe recent methods to monitor and model global environmental change.
6. Critically review the evidence of the consequences of global environmental change and the challenge facing sustainable development.

<b>Assessment:</b>	Coursework 1 (20%)
	Examination 1 (40%)
	Coursework 2 (40%)

**Assessment Description:** Arholiad Cwestiynau Aml-ddewis (lonawr);

C1 1 x blog 500 gair

C2 2 x blog 500 gair (cyfanswm 1,000 o eiriau)

Bydd hwn yn asesiad ffurfiannol fel rhan o'r cwrs hwn.

**Moderation approach to main assessment:** Partial moderation

**Assessment Feedback:** Bydd myfyrwyr yn derbyn adborth electronig ar yr adroddiad unigol. Bydd myfyrwyr yn derbyn adborth arholiad yn dilyn yr arholiadau

Students will receive electronic feedback on the individual report.

Students will receive examination feedback after exams.

**Failure Redemption:** Ailsefyll arholiad neu ailgyflwyno gwaith cwrs

Resit examination or resubmit coursework



**Reading List:** Paul J. Cloke editor.; Philip Crang editor.; Mark Goodwin editor., *Introducing human geographies* / edited by Paul Cloke, Philip Crang and Mark Goodwin., Milton Park, Abingdon, Oxon : Routledge, 2014.ISBN: 9781444135350

Goudie, Andrew, author., *The nature of the environment*, Blackwell Publishers Ltd, 2001 - 2001.ISBN: 9780631224631

Whitehead, Mark, 1975-, *Spaces of sustainability*, Routledge, 2006.ISBN: 1134246374

Potter, Robert B., author., *Geographies of development : an introduction to development studies*, Routledge, 2018 - 2018.ISBN: 9781138794290

Daniels, P. W., editor.; Bradshaw, Michael J. (Michael John), 1935- editor.; Shaw, Denis, editor.; Sidaway, James D., editor.; Hall, Tim, editor., *An introduction to human geography*, Pearson Education Limited, 2016.ISBN: 9781292082950

Peter Smithson author, Kenneth Addison author; K Atkinson (Kenneth), 1940- author, *Fundamentals of the physical environment* / Peter Smithson, Ken Addison and Ken Atkinson., Routledge, 2008.ISBN: 041539516X

Dobson, Andrew., *Fairness and futurity essays on environmental sustainability and social justice*, Oxford University Press, 1999.ISBN: 9780191522383

Paul J Cloke; Phil Crang 1964-; Mark Goodwin (Mark A.), *Introducing human geographies* / edited by Paul Cloke, Philip Crang and Mark Goodwin., Routledge, 2014.ISBN: 9780203529225

Cloke, Paul J.; Crang, Phil, 1964-; Goodwin, Mark (Mark A.), *Introducing human geographies*, Routledge, 2014.ISBN: 9780203529225

Ripple, William J ; Wolf, Christopher ; Newsome, Thomas M ; Barnard, Phoebe ; Moomaw, William R, *World Scientists' Warning of a Climate Emergency*, Oxford University Press, 2020-01-01.ISBN: 00063568

Hicks, David, *Why we still need a geography of hope*, Taylor & Francis Ltd, 2018-07-01.ISBN: 00167487

Steve Westlake, *Climate change: yes, your individual action does make a difference*, 2019.

Anderson, Karen, *Integrating multiple scales of remote sensing measurement – from satellites to kites*, SAGE Publications, 2016-04.ISBN: 03091333

Government of Canada, *Remote Sensing Tutorials*.

J. Neumann ; S. Lindgrén, *Great Historical Events That Were Significantly Affected by the Weather: 4, The Great Famines in Finland and Estonia, 1695—97*, American Meteorological Society, 1979-07-01.ISBN: 00030007

Thorvaldur Thordarson ; Stephen Self, *Atmospheric and environmental effects of the 1783–1784 Laki eruption: A review and reassessment*, American Geophysical Union, 2003-01-08.ISBN: 01480227

Benson, Larry V ; Berry, Michael S ; Jolie, Edward A ; Spangler, Jerry D ; Stahle, David W ; Hattori, Eugene M, *Possible impacts of early-11th-, middle-12th-, and late-13th-century droughts on western Native Americans and the Mississippian Cahokians*, Elsevier BV, 2007.ISBN: 02773791

David M. Meko ; Connie A. Woodhouse ; Christopher A. Baisan ; Troy Knight ; Jeffrey J. Lukas ; Malcolm K. Hughes ; Matthew W. Salzer, *Medieval drought in the upper Colorado River Basin*, American Geophysical Union, 2007-05-24.ISBN: 00948276

Castle, Stephanie L ; Thomas, Brian F ; Reager, John T ; Rodell, Matthew ; Swenson, Sean C ; Famiglietti, James S, *Groundwater depletion during drought threatens future water security of the Colorado River Basin*, Blackwell Publishing Ltd, 2014-08-28.ISBN: 00948276

Paul J Cloke; Phil Crang 1964-; Mark Goodwin (Mark A.), *Introducing human geographies* / edited by Paul Cloke, Philip Crang and Mark Goodwin., Routledge, 2014.ISBN: 9780203529225

Paul J Cloke; Phil Crang 1964-; Mark Goodwin (Mark A.), *Introducing human geographies* / edited by Paul Cloke, Philip Crang and Mark Goodwin., Routledge, 2014.ISBN: 9780203529225

Paul J Cloke; Phil Crang 1964-; Mark Goodwin (Mark A.), *Introducing human geographies* / edited by Paul Cloke, Philip Crang and Mark Goodwin., Routledge, 2014.ISBN: 9780203529225

Martinez-Alier, Joan, *The environmentalism of the poor*, Elsevier BV, 2014.ISBN: 00167185

Rocheleau, Dianne E, *Political ecology in the key of policy: From chains of explanation to webs of relation*, Elsevier BV, 2008.ISBN: 00167185

Blaikie, Piers, *Explanation and policy in land degradation and rehabilitation for developing countries*, John Wiley & Sons, Ltd, 1989.ISBN: 10853278

Paul Kingsnorth 1972-, *One no, many yeses : a journey to the heart of the global resistance movement* / Paul Kingsnorth., Free Press, 2003.ISBN: 0743220269

Leandro. Vergara-Camus, Vergara-Camus Contributor, *Land and Freedom The MST, the Zapatistas and Peasant Alternatives to Neoliberalism*, Zed Books, 2014.ISBN: 1322097968

Vergara-camus, Leano, *The MST and the EZLN Struggle for Land: New Forms of Peasant Rebellions*, Blackwell Publishing Ltd, 2009-07.ISBN: 14710358

Hoffmann, Ester ; Fox, Michael, *Food Sovereignty, One Occupation at a Time: An interview with Ester*

Hoffman of Brazil's Landless Workers' Movement (MST) on sustainability, agro-ecology, and the future of the hemisphere's largest social movement, Routledge, 2017-10-02.ISBN: 10714839

Wittman, Hannah, Reframing agrarian citizenship: Land, life and power in Brazil, Elsevier Ltd, 2009.ISBN: 07430167

Cloke, Paul J.; Crang, Phil, 1964-; Goodwin, Mark (Mark A.), Introducing human geographies, Routledge, 2014.ISBN: 9780203529225

Martinez-Alier, Joan, The environmentalism of the poor, Elsevier Ltd, 2014-07.ISBN: 00167185

Fiona, A ; Mackenzie, D, A working land: crofting communities, place and the politics of the possible in post-Land Reform Scotland, Blackwell Publishing, 2006-09.ISBN: 00202754

Castree, Noel, 'Out there'? 'In here'? Domesticating critical geography, Wiley, 1999-03.ISBN: 14754762

Cloke, Paul J.; Crang, Phil, 1964-; Goodwin, Mark (Mark A.), Introducing human geographies, Routledge, 2014.ISBN: 9780203529225

Lozano, Rodrigo ; Lukman, Rebeka ; Lozano, Francisco J ; Huisingsh, Donald ; Lambrechts, Wim, Declarations for sustainability in higher education: becoming better leaders, through addressing the university system, Elsevier BV, 2013-06.ISBN: 09596526

Potter, Robert B., author., Geographies of development : an introduction to development studies, Routledge, 2018 - 2018.ISBN: 9781138794290

Shi, Han ; Lai, Elizabeth, An alternative university sustainability rating framework with a structured criteria tree, Elsevier BV, 2013-12.ISBN: 09596526

Pacione, M, Models of Urban Land Use Structure in Cities of the Developed World, Geographical Association, 2001-04-01.ISBN: 00167487

Whitehead, Mark, 1975-, Spaces of sustainability, Routledge, 2006.ISBN: 1134246374

Drakakis-Smith, D. W., author., Drakakis-Smith, D. W., Third world cities, Routledge, 2000.ISBN: 1134639074

Cloke, Paul J.; Crang, Phil, 1964-; Goodwin, Mark (Mark A.), Introducing human geographies, Routledge, 2014.ISBN: 9780203529225

Pacione, M, Models of Urban Land Use Structure in Cities of the Developed World, Geographical Association, 2001-04-01.ISBN: 00167487

Drakakis-Smith, D. W., author., Drakakis-Smith, D. W., Third world cities, Routledge, 2000.ISBN: 1134639074

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

Ddim ar gael i fyfyrwyr ymweld neu fyfyrwyr cyfnewid. Nid oes rhagofynion na chydofynion ar gyfer y modiwl hwn.

Normally available to elective visiting or exchange students. There are no pre- or co-requisites for this module.

# GEC140 Prosiect a Dulliau Ymchwil

**Credits: 20 Session: 2023/24 January-June**

**Pre-requisite Modules:**

**Co-requisite Modules:**

**Lecturer(s):** Dr RH Meara

**Format:** 26 awr ar gyfer penwythnos preswyl ac 11 awr ar gyfer prosiect GIS

**Delivery Method:** Darlithoedd, Sesiynau Ymarferol (ar y campws) a penwythnos preswyl o waith maes ym Mangor/Abertawe a'i ranbarth/Aberystwyth (lleoliad yn newid yn flynyddol).

**Module Aims:** Mae'r modiwl hwn yn cynnwys hyfforddiant gwaith maes a sgiliau GIS i ddaearyddwyr dynol a ffisegol.

Rhan 1: Mae'r rhan yma yn cyflwyno egwyddorion a thechnegau allweddol a ddefnyddir mewn gwaith maes yn nisgyblaethau Daearyddiaeth, astudiaethau amgylcheddol ac astudiaethau defnyddio tir. Mae'n cynnig profiad o ddefnyddio amryw o ddulliau a thechnegau gwaith maes er mwyn casglu a dadansoddi gwybodaeth mewn perthynas â Daearyddiaeth, yr amgylchedd a defnyddio tir. Dysgir y modiwl ar y cyd â staff o Brifysgol Bangor a Phrifysgol Aberystwyth a dysgir y myfyrwyr o'r sefydliadau yma hefyd ar y modiwl. Dysgir rhan yma'r modiwl yn ystod penwythnos preswyl.

Rhan 2: Prosiect GIS. Bydd yr elfen hon o'r modiwl yn rhoi cyflwyniad i fyfyrwyr i sgiliau allweddol Mapio, Data Gofodol a GIS. Byddant yn ymchwilio i sut mae mapiau a dadansoddiad gofodol yn gallu ein helpu i ddeall a monitro ein byd. Bydd myfyrwyr yn ystyried y defnydd o fapio i ddadansoddi'r amgylchedd a rhannu'r canlyniadau yn y cyfryngau. Byddant yn archwilio i feddalwedd GIS Explore (arc Map, QGIS) a chymryd y camau cyntaf wrth arddangos data gofodol. Bydd myfyrwyr hefyd yn dysgu sut i gyfeirio lleoliad gofodol nodweddion amgylcheddol ar arwyneb y Ddaear, deall sut mae systemau cyfeirio'n berthnasol i leoliadau daearyddol ar fap gwastad a dysgu sut i weithio gyda data o amrywiaeth o systemau cyfeirio gofodol.

**Module Content:** Rhan 1: Penwythnos preswyl:

1. Cyflwyno a datblygu egwyddorion ac arferion technegau allweddol gwaith maes yn nisgyblaethau daearyddiaeth, astudiaethau amgylcheddol ac astudiaethau defnyddio tir;
  2. Cynnig profiad o ddefnyddio amryw ddulliau a thechnegau gwaith maes er mwyn casglu gwybodaeth mewn perthynas â daearyddiaeth, yr amgylchedd a defnyddio tir;
  3. Rhoi hyfforddiant wrth roi cyflwyniadau ar lafur ac ar bapur;
  4. Rhoi hwb i allu myfyrwr i ddehongli data maes;
  5. Cynnig profiad a hyfforddiant wrth roi cyflwyniadau ar lafur ac ar bapur.
- Trafodir cyfuniad o'r themau canlynol yn ystod y modiwl:  
Gwerthuso biomas coetiroedd; Daearyddiaeth eithrio yn Aberystwyth; gwerthuso defnydd tir yng ngogledd-orllewin Cymru; ffactorau ffisegol a dynol; cymunedau gwledig Cymru: parhad a newid; newidiadau amgylcheddol yn Ne Cymru.

Rhan 2: Prosiect GIS.

Mapio, Data Gofodol a GIS

Data gofodol a Systemau Gwybodaeth Ddaearyddol

Ymchwilio i sut gall mapiau a dadansoddiad gofodol ein helpu i ddeall a monitro ein byd. Ystyried y defnydd o fapiau i ddadansoddi'r amgylchedd a rhannu'r canlyniadau yn y cyfryngau. Ymchwilio i feddalwedd GIS (arc Map, QGIS) a chymryd y camau cynaf i arddangos data gofodol. Dysgu ac ymarfer gweithio gyda fformatiau gwahanol o ddata (ffector a rhastr).

Dysgu sut i greu mapiau a chynnwys elfennau allweddol ar fap (bar graddfa, allwedd, graticwl). Galluogi darllenwyr i ddehongli eich map a deall eich canlyniadau.

Mae astudiaethau achos yn cynnwys rhestr Fforest a mapio defnydd tir a phoblogaeth a dosraniad dinasoedd byd-eang

**Intended Learning Outcomes:** Wrth gwblhau'r modiwl hwn dylai myfyrwr fedru:

1. Trafod addasrwydd yr amryw ddulliau a thechnegau sy'n allweddol i waith maes Daearyddiaeth, yr amgylchedd a defnyddio tir;
2. Defnyddio technegau penodol er mwyn casglu gwybodaeth yn y maes;
3. Dadansoddi a chyflwyno canlyniadau gwaith maes;
4. Deall, dehongli a gwerthuso data maes;
5. Gywiro, defnyddio, dadansoddi a chyflwyno data daearyddol;
6. Dangos sgiliau allweddol wrth Fapio, Data Gofodol a GIS;
7. Trafod sut gall mapiau a dadansoddiad gofodol ein helpu i ddeall a monitro ein byd.

**Assessment:** Coursework 1 (50%)  
Exam - Multiple choice questions (50%)

**Assessment Description:** 1 x adroddiad gwaith maes neu dasg dogfennaeth ffotograffig / traethawd ffotograff (50%)

1 x arholiad cwis cyntaf (50%)

1 x fieldwork report or photo documentation task / photo essay (50%)

1 x canvas quiz exam (50%)

**Moderation approach to main assessment:** Moderation by sampling of the cohort

**Assessment Feedback:** Bydd myfyrwr yn derbyn adborth electronig ar eu gwaith cwrs ac adborth ysgrifenedig ar y cyflwyniad grwp, ac ar lafar gan eu tiwtor ar eu perfformiad.

**Failure Redemption:** Ailsefyll yr holl elfennau

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

Dysgir y modiwl yma drwy gyfrwng y Gymraeg. Not normally available to visiting or exchange students. Competence in written and spoken Welsh is essential for this module

# GEG132 Introduction to Earth Systems

**Credits: 20 Session: 2023/24 September-January**

**Pre-requisite Modules:**

**Co-requisite Modules:**

**Lecturer(s):** Dr E Urbanek, Dr NJ Felstead, Dr JR Jordan, Dr I Robertson

**Format:** Lectures

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:** This module forms an essential foundation for more advanced study of physical geography and environmental sciences. It introduces the four main Earth systems: the atmosphere, hydrosphere, biosphere and geosphere. It provides a sound understanding of the processes within each system, and the interactions between them.

The geosphere section introduces topics like the origin of Earth, plate tectonics and describes the distribution of different rock types and processes occurring in the geosphere. The biosphere section deals mainly with flows of energy and nutrients between Earth systems.

The atmosphere section deals with flows of energy and moisture and their role in controlling climate over both space and time. The hydrosphere section focuses on the concepts of the hydrological cycle and the main processes associated with the water fluxes.

In addition, the main properties and functions of soil, and the formation of different soil types worldwide are introduced. At the end of the module the changes in climate in the past, current and future, proxies of climate change are included.

**Module Content:** 1 Introduction - Interactions between Earth's systems

2 Atmosphere - Structure, energy budget

3 Atmosphere - GHG effect, clouds

4 Atmosphere - General circulation and world climate

5 Atmosphere - Weather, fronts, storms

6 Hydrosphere - Water cycle

7 Hydrosphere - Precipitation

8 Hydrosphere - Evapotranspiration

9 Hydrosphere - Hillslope runoff

10 Hydrosphere - Catchments and rivers

11 Hydrosphere - Groundwater

12 Pedosphere - Soil formation

13 Pedosphere - Soil function and services

14 Pedosphere - Soil & Climate change

15 Biosphere - Photosynthesis

16 Biosphere - Vegetation zones

17 Biosphere - C cycle

18 Biosphere - N cycle

19 Biosphere - Biogeochemical cycles

20 Biosphere - Biogeography

21 Geosphere - Earth origin

22 Geosphere - Rock formation

23 Geosphere - Weathering

24 Geosphere - Erosion

25 Geosphere - Karst

26 Geosphere - Glacial

27 Geosphere - Coastal Environments

28 Climate change in the past

29 Climate proxies

30 Climate change present and future

**Intended Learning Outcomes:** By the end of the module you should be able to:

1. Explain the origin of the Earth, including rock formation, and give examples of specific landforms produced by Earth's surface processes

2. Describe and explain variations in topography, weathering and erosion across the Earth's surface

3. Explain the relationship between atmospheric chemistry, atmospheric circulation and world climate; Describe the evolution of common weather events

4. Describe the main features of the hydrological cycle, main hydrological processes, their controls and variation across the Earth's surface; explain the dynamics of sea ice and permafrost on global ocean dynamics and sea level fluctuations.

5. Explain how energy and nutrients flow through Earth's ecosystems.

6. Describe the interactions between reservoirs and fluxes in the primary biogeochemical cycles

**Assessment:** Online Class Test (20%)  
Online Class Test (20%)  
Exam - Multiple choice questions (60%)

**Assessment Description:** Two online tests completed in students' own time (2x20%)  
Exam - online test with MCQ and short answer questions (60%).

**Moderation approach to main assessment:** Partial moderation

**Assessment Feedback:** Students will receive feedback on their online tests within 3 weeks after their submission.

**Failure Redemption:** Resit

Exam online test with MCQ and short answer questions

**Reading List:** Peter Smithson author, Kenneth Addison author; K Atkinson (Kenneth), 1940- author, Fundamentals of the physical environment / Peter Smithson, Ken Addison and Ken Atkinson., Routledge, 2008.ISBN: 041539516X  
Joseph Holden Prof, author., An introduction to physical geography and the environment / Joseph Holden., Harlow : Pearson Education Limited, 2017.ISBN: 9781292083612  
Joseph Holden 1975-, An introduction to physical geography and the environment / edited by Joseph Holden., Pearson, 2012.ISBN: 9780273740698

**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.



# GEG133 Natural Hazards and Society

**Credits: 20 Session: 2023/24 January-June**

**Pre-requisite Modules:**

**Co-requisite Modules:**

**Lecturer(s):** Dr RH Meara, Prof MA Doel, Prof SH Doerr, Dr NJ Felstead, Dr J Hiemstra, Dr JR Jordan, Dr KJ Preece

**Format:** Online lecture content  
10 x 2 hour synchronous sessions  
20 hours enquiry-based field course  
5 x 1 hour long disaster scenarios

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 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:** This module investigates hazardous aspects of Earth's natural environment and how society relates to them. Introductory principles include the definition of natural hazard, disaster, risk and loss, and approaches to reducing risk and managing disasters. Major types of natural hazard are studied in order to understand how they operate, where, and how frequently they are likely to occur. Hazardous consequences are explored, as well as how society can respond to hazardous events. Key aspects include discussion of primary and secondary hazards, prediction, forecasting and monitoring of hazards, and understanding how their harmful effects can be minimised.

Natural hazards considered during this module include volcanic eruptions, earthquakes, tsunamis, wildfires, landslides, extreme weather events, flooding, avalanches and Mega Hazards. Lecture material considers general principles as well as case studies. The module is compulsory for students taking BSc Environmental Geoscience.

**Module Content:** Introduction to hazards and disasters

Natural hazards - the processes and consequences of volcanic eruptions, earthquakes, tsunamis, wildfires, landslides, extreme weather events, flooding, avalanches and mega hazards

Thematic aspects - the geological record of catastrophic events as an indicator of their likely future occurrence;

monitoring hazards, global change and natural hazards; living with natural hazards.

Topics include:

Introduction to natural hazards and disasters

Volcanic hazards

Wildfires

Seismic hazards

Slope-related hazards

Megahazards

Hurricane hazards

Future environmental change & hazards

Flood hazards & hydrological hazards

Tsunamis

Risk society and resilience

<p><b>Intended Learning Outcomes:</b> By the end of this module you should be able to:</p> <ul style="list-style-type: none"> <li>• define natural hazards, disasters, losses and risk;</li> <li>• explain how natural processes can adversely affect people, their property and the environment;</li> <li>• explain the physical processes that cause volcanic eruptions, earthquakes, slope failures, tsunamis, avalanches, weather, flooding, megahazards and wildfires;</li> <li>• assess the evidence for and risk from high-magnitude-low-frequency events;</li> <li>• describe the distribution in space and time of catastrophic natural events;</li> <li>• show how the effects of hazardous events depend on actions taken by society before and during the events and explain the roles of mitigation, monitoring, forecasting and warning in reducing the risk from natural hazards;</li> </ul>	
<p><b>Assessment:</b></p>	<p>Examination 1 (50%)  Coursework 1 (10%)  Coursework 2 (10%)  Coursework 3 (30%)</p>
<p><b>Resit Assessment:</b></p>	<p>Examination (Resit instrument) (100%)</p>
<p><b>Assessment Description:</b> Coursework 1 - Archive practical (10%)  Coursework 2 - Volcanic hazard map (10%)  Coursework 3 - Report based on disaster simulations (30%)  Exam - Multiple Choice Exam (50%)</p>	
<p><b>Moderation approach to main assessment:</b> Moderation by sampling of the cohort</p>	
<p><b>Assessment Feedback:</b> Individual marks and feedback will be given for the archives exercise, hazard map exercise and write up of disaster scenario. Individual marks for examination answers.</p>	
<p><b>Failure Redemption:</b> Resit examination</p>	

**Reading List:** Fearnley, Carina J. editor.; Bird, Deanne K. editor.; Haynes, Katharine. editor.; McGuire, William J. editor.; Jolly, Gill. editor., *Observing the Volcano World Volcano Crisis Communication*, Springer International Publishing, 2018.ISBN: 3319440977

Smith, Keith, 1938-, *Environmental hazards : assessing risk and reducing disaster*, Routledge, 2013.ISBN: 9780415681063

Smith, Keith, 1938-, Petley, David N., *Environmental hazards : assessing risk and reducing disaster*, Routledge, 2009.ISBN: 9780415428651

Keith Smith 1938-, *Environmental hazards assessing risk and reducing disaster / Keith Smith.*, Routledge, 2013.ISBN: 0203805305

David Alexander (David E.), *Confronting catastrophe : new perspectives on natural disasters / David Alexander.*, Terra, 2000.ISBN: 9781903544013

Bill McGuire 1954-, Ian Mason (Ian M.); Christopher R. J Kilburn, *Natural hazards and environmental change / Bill McGuire, Ian Mason, Christopher Kilburn.*, Arnold, 2002.ISBN: 0340742208

Edward A. Keller 1942- author., Duane E DeVecchio (Duane Edward), 1970- author., *Natural hazards : earth's processes as hazards, disasters, and catastrophes / Edward A. Keller and Duane E. DeVecchio ; with assistance from Robert H. Blodgett.*, New York : Routledge, 2019.ISBN: 9781138058415

Haraldur Sigurdsson editor., *The encyclopedia of volcanoes / editor-in-Chief Haraldur Sigurdsson [and four others].*, London, England : Academic Press, 2015.ISBN: 0123859395

Fearnley et al (eds), *Observing the Volcano World*, Springer.

Guimarães Nobre, Gabriela ; Muis, Sanne ; Veldkamp, Ted I.E ; Ward, Philip J, *Achieving the reduction of disaster risk by better predicting impacts of El Niño and La Niña*, Elsevier, 2019-07.ISBN: 25900617

John Abraham, *Global warming is intensifying El Niño weather.*

Fasullo, J. T ; OttoBliesner, B. L ; Stevenson, S, *ENSO's Changing Influence on Temperature, Precipitation, and Wildfire in a Warming Climate*, American Geophysical Union (AGU), 2018-09-16.ISBN: 00948276

Cattiaux, J ; Vautard, R ; Cassou, C ; Yiou, P ; Masson-Delmotte, V ; Codron, F, *Winter 2010 in Europe: A cold extreme in a warming climate: COLD WINTER 2010 IN EUROPE*, 2010-10.ISBN: 00948276

Scaife, A. A ; Arribas, A ; Blockley, E ; Brookshaw, A ; Clark, R. T ; Dunstone, N ; Eade, R ; Fereday, D ; Folland, C. K ; Gordon, M ; Hermanson, L ; Knight, J. R ; Lea, D. J ; MacLachlan, C ; Maidens, A ; Martin, M ; Peterson, A. K ; Smith, D ; Vellinga, M ; Wallace, E ; Waters, J ; Williams, A, *Skillful longrange prediction of European and North American winters*, 2014-04-16.ISBN: 00948276

Met Office, *North Atlantic Oscillation.*

Caesar, L ; McCarthy, G. D ; Thornalley, D. J. R ; Cahill, N ; Rahmstorf, S, *Current Atlantic Meridional Overturning Circulation weakest in last millennium*, 2021-02-25.ISBN: 17520894

Stott, Peter A ; Christidis, Nikolaos ; Otto, Friederike E. L ; Sun, Ying ; Vanderlinden, JeanPaul ; van Oldenborgh, Geert Jan ; Vautard, Robert ; von Storch, Hans ; Walton, Peter ; Yiou, Pascal ; Zwiers, Francis W, *Attribution of extreme weather and climaterelated events*, John Wiley & Sons, Inc, 2016-01.ISBN: 17577780

IPCC, *Climate Change 2014 Impacts Adaptation and Vulnerability.*

IPCC, *Global Warming of 1.5 deg C.*

Stimpson, Ian, *Japan's Tohoku Earthquake and Tsunami*, Blackwell Publishing Ltd, 2011-05.ISBN: 02666979

Lacassin, Robin ; Lavelle, Sylvain, *The crisis of a paradigm. A methodological interpretation of Tohoku and Fukushima catastrophe*, Elsevier B.V, 2016-04.ISBN: 00128252

Jose C. Borrero, *Field Data and Satellite Imagery of Tsunami Effects in Banda Aceh*, American Association for the Advancement of Science, 2005-06-10.ISBN: 00368075

Gaillard, Jean-Christophe ; Clavé, Elsa ; Vibert, Océane ; Azhari ; Dedi ; Denain, Jean-Charles ; Efendi, Yusuf ; Grancher, Delphine ; Liamzon, Catherine C ; Sari, Desy Rosnita ; Setiawan, Ryo, *Ethnic groups' response to the 26 December 2004 earthquake and tsunami in Aceh, Indonesia*, Springer Netherlands, 2008-10.ISBN: 0921030X

Lauterjung, J ; Münch, U ; Rudloff, A, *The challenge of installing a tsunami early warning system in the vicinity of the Sunda Arc, Indonesia*, Copernicus GmbH, 2010-04-06.ISBN: 16849981

Waltham, Tony, *The Asian Tsunami disaster, December 2004*, Blackwell Publishing Ltd, 2005-01.ISBN: 02666979

Bondevik, Stein, *Earth science The sands of tsunami time*, 2008-10-30.ISBN: 00280836

Chagué-Goff, Catherine ; Schneider, Jean-Luc ; Goff, James R ; Dominey-Howes, Dale ; Strotz, Luke, *Expanding the proxy toolkit to help identify past events — Lessons from the 2004 Indian Ocean Tsunami and the 2009 South Pacific Tsunami*, Elsevier B.V, 2011-07.ISBN: 00128252

Costa, Pedro J.M ; Dawson, Sue ; Ramalho, Ricardo S ; Engel, Max ; Dourado, Francisco ; Bosnic, Ivana ;

Andrade, César, A review on onshore tsunami deposits along the Atlantic coasts, Elsevier B.V, 2021-01.ISBN: 00128252

Bondevik, Stein ; Løvholt, Finn ; Harbitz, Carl ; Mangerud, Jan ; Dawson, Alastair ; Inge Svendsen, John, The Storegga Slide tsunami—comparing field observations with numerical simulations, Elsevier Ltd, 2005.ISBN: 02648172

JANKAEW, Kruawun ; ATWATER, Brian F ; SAWAI, Yuki ; CHOOWONG, Montri ; CHAROENTITIRAT, Thasinee ; MARTIN, Maria E ; PRENDERGAST, Amy, Medieval forewarning of the 2004 Indian Ocean tsunami in Thailand, Nature Publishing Group, 2008.ISBN: 00280836

Dall'Osso, F ; Dominey-Howes, D, Public assessment of the usefulness of "draft" tsunami evacuation maps from Sydney, Australia – implications for the establishment of formal evacuation plans, Copernicus GmbH, 2010-08-25.ISBN: 16849981

**Additional Notes:** This module is compulsory for students enrolled for the BSc Environmental Geoscience degree scheme.

This module is not available to visiting or exchange students.

# GEG135 Sustainability and the Climate Emergency

**Credits: 20 Session: 2023/24 September-January**

**Pre-requisite Modules:**

**Co-requisite Modules:**

**Lecturer(s):** Dr KH Halfacree, Dr KJ Ficken, Prof PRJ North, Dr AM Singleton

**Format:** 36 contact hours - on-campus lectures.

**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:** This module is an introduction to global environmental change and explores aspects of the issue of sustainability as it affects everyday lives. The challenge of sustainability is significant and the lectures will provide you with the information needed to engage with the UN's Sustainable Development Goals.

**Module Content:** Introducing GEG135: Human-Earth Interaction  
Challenging Sustainability  
A Climate Emergency?  
Civilisations & Climate  
Introduction to Coursework 1  
Satellite Monitoring of Environmental Change  
Climate Change - Evidence from Recent Data  
Politics of Climate Change  
Climate Diplomacy, Sustainable Development & the UNSDGs  
Environmental Degradation  
Forests & Deforestation  
Tropical Deforestation & Impacts  
Forest Management & Sustainability  
Introduction & the Land Question in Scotland  
Land Rights in Brazil  
The Chiapas Rebellion & the Land Question in Mexico  
Introduction to Deserts & Drylands  
Theories & Evidence for Desertification  
Dryland Ecology, Management & Sustainability  
Challenges in the Urban Environment  
Poverty & Poor Development  
Housing Problems  
Urban Design for Sustainable Living  
Towards Urban Neighbourhood Communities  
Sustainably Transporting an Automobile Society  
An Introduction to the Cryosphere  
The Cryosphere: Snow, Permafrost & Sea Ice  
The Cryosphere: Glaciers, Ice Caps, Ice Sheets & Ice Shelves  
Sea Level Change  
Geomorphology in a Warmer World  
The Little Ice Age  
Towards the Sustainable University  
Conclusion & Exam Information'

<b>Intended Learning Outcomes:</b> By the end of this module you should be able to:	
<ol style="list-style-type: none"> <li>1. Understand key concepts of global environmental change.</li> <li>2. Analyse the relative importance of human and physical factors in causing environmental change.</li> <li>3. Recognise that 'sustainability' has cultural, economic, social, political and physical dimensions.</li> <li>4. Evaluate aspects of 'sustainability' within a range of geographical contexts.</li> <li>5. Describe recent methods to monitor and model global environmental change.</li> <li>6. Critically review the evidence of the consequences of global environmental change and the challenge facing sustainable development.</li> </ol>	
<b>Assessment:</b>	Coursework 1 (30%) Examination 1 (40%) Coursework 2 (30%)
<b>Assessment Description:</b>	Blog 500 words Multiple choice examination Critique of ChatGPT output
<b>Moderation approach to main assessment:</b>	Partial moderation
<b>Assessment Feedback:</b>	Students will receive individual and overall online feedback for coursework. Students will receive overall examination feedback
<b>Failure Redemption:</b>	Resit examination and/or resubmit coursework

**Reading List:** Introducing Human Geographies, Arnold, 2005.ISBN: 9780340882764

Daniels, P., Bradshaw, M., Shaw, D., Sidaway, J. & Hall, T (eds.), An Introduction to Human Geography, Pearson Education Limited, 2016.ISBN: 9781292082950

Frente Nacional Anti-Minero, We are of the Earth - a manifesto, Verso, 2022.

Goudie, Andrew., The nature of the environment, Blackwell Publishers, 2001.ISBN: 9781444312348

Malm, A., How to Blow Up a Pipeline: Learning to Fight in a World on Fire, Verso, 2021.ISBN: 1839760257

Potter, R., Geographies of Development: an Introduction to Development Studies, Routledge, 2018.ISBN: 9781138794290

Smithson, P., Addison, K. & Atkinson, K., Fundamentals of the Physical Environment, Routledge, 2008.ISBN: 041539516X

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Chatterton, Paul, 1972- author., Unlocking sustainable cities : a manifesto for real change, Pluto Press, 2019 - 2019.ISBN: 9781786803634

Introducing Human Geographies, Routledge, 2014.ISBN: 9780203529225

Hicks, D., Why we still need a geography of hope, Taylor & Francis Ltd, 2018.ISBN: 00167487

Ripple, W., Wolf, C., Newsome, T., Barnard, P. & Moomaw, W., World scientists' warning of a climate emergency, Oxford University Press, 2020.ISBN: 00063568

Westlake, S., Climate change: yes, your individual action does make a difference, April 11th, 2019.

Introducing Human Geographies, Routledge, 2014.ISBN: 9780203529225

Paul J Cloke; Phil Crang 1964-; Mark Goodwin (Mark A.), Introducing human geographies / edited by Paul Cloke, Philip Crang and Mark Goodwin., Routledge, 2014.ISBN: 9780203529225

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Rocheleau, Dianne E, Political ecology in the key of policy: From chains of explanation to webs of relation, Elsevier BV, 2008.ISBN: 00167185

Blaikie, Piers, Explanation and policy in land degradation and rehabilitation for developing countries, John Wiley & Sons, Ltd, 1989-07.ISBN: 10853278

Martinez-Alier, Joan, The environmentalism of the poor, Elsevier Ltd, 2014-07.ISBN: 00167185

Pigott, A., Imagining socioecological transformation: An analysis of the Welsh Government's policy innovations and orientations to the future, BioOne, 2018.ISBN: 23251026

Kristian S. Nielsen, Cameron Brick, Wilhelm Hofmann, Tina Joanes, Florian Lange & Wencke Gwozdz, The motivation–impact gap in pro-environmental clothing consumption.

Introducing Human Geographies, Routledge, 2014.ISBN: 9780203529225

Martinez-Alier, J., The environmentalism of the poor, Elsevier BV, 2014.ISBN: 00167185

Williams, J., The environmentalism of the poor, 2014.

Combe, M., Land reform in Scotland: what lies ahead, 2016.

Balfour, V., Accessing land for sustainable farming, 2016.

Community Land Scotland, Homepage.

Mackenzie, F., A working land: crofting communities, place and the politics of the possible in post-Land Reform Scotland, Blackwell Publishing, 2006.ISBN: 00202754

MST - Landless Movement of Rural Workers of Brazil, MST - Landless Movement of Rural Workers of Brazil.

Dolce, J., Popular Agrarian Reform and the Struggle for Land in Brazil, 2020.

Hammond, J. & Rossi, F., Landless Workers Movement (MST) Brazil.

Hoffmann, E. & Fox, M., Food Sovereignty, One Occupation at a Time, Taylor & Francis Ltd, 2017.ISBN: 10714839

Kingsnorth, P., One No, Many Yeses: a Journey to the Heart of the Global Resistance Movement, Free Press, 2003.ISBN: 0743220269

Vergara-Camus, L., The MST and the EZLN Struggle for Land: New Forms of Peasant Rebellions, Blackwell Publishing Ltd, 2009.ISBN: 14710358

Kingsnorth, P., One No, Many Yeses: a Journey to the Heart of the Global Resistance Movement, Free Press, 2003.ISBN: 0743220269

Kingsnorth, P., Opening a crack in history, The Resurgence Trust, 2003.ISBN: 02613131

Carlsen, L., Zapatistas at twenty, 2014.

Contreras, K., Pérez, R., Pickard, M., Rivera, A. & Zunino, M., Sustainable rural cities, dispossession and counterinsurgency in Chiapas, 2015.

Rosset, P. & Cunningham, S., Understanding the Chiapas revolt in Mexico.

Vidal, J., Mexico's Zapatista rebels, 24 years on and defiant in mountain strongholds, 2018.

Klein, H., A spark of hope: the ongoing lessons of the Zapatista Revolution 25 years on, NACLA January 18th 2019.

Cloke, Paul J.; Crang, Phil, 1964-; Goodwin, Mark (Mark A.), *Introducing human geographies*, Routledge, 2014. ISBN: 9780203529225

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**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. There are no pre- or co-requisites for this module.

# GEG140P Project and Methods (Physical Geography)

**Credits: 20 Session: 2023/24 January-June**

**Pre-requisite Modules:**

**Co-requisite Modules:**

**Lecturer(s):** Prof T Murray, Dr JAB Rosette, Dr RG Smith

**Format:** 23 hrs of either a human geography or physical geography project and 11 hrs environmental survey and modelling project work for all students

**Delivery Method:** Lectures, Practicals (on campus) and Fieldwork (local, Gower, Swansea City Centre)

**Module Aims:** This module involves training in fieldwork and GIS skills for both human and physical geographers. In part 1, students can choose from a physical or human geography project option:

## Part 1: Physical Geography

In the physical geography component we will look at sea-level change and its impacts on communities and ecosystems. During classroom sessions we will consider the causes of sea-level change and how it is measured. We use the technique of Stakeholder Analysis to look at the economic and social impacts of sea-level change in different regions. We will then undergo local visits to explore the potential impacts of sea level to our locality and on our coastal university. We'll look at both urban and rural environments and different mitigation policies that may be used.

## Part 1: Human Geography

The human geography project focusses on Cities and Photography. Students will investigate the use of photography through three Visual Methodologies: Photo-Documentation, Photo-Elicitation, and Photo-Essays. Students will take part in a photo documentation workshop and group photography fieldwork in Swansea City Centre. They will also complete a photo essay aided by group discussion to select concept, theme, whether analytical or evocative photographs (or both), and discussion of the links between practice and visual methodologies literature.

## Part 2: Field data collection and critical analysis skills.

During part 2 of this module, students will expand on the knowledge gained previously. This will combine investigations of our world in three dimensions, for which students will use photographs captured themselves to construct a 3D model. Students will learn about and apply other 3D analysis techniques to estimate environmental parameters that they will compare with their field data. They will also contribute to a citizen science initiative using a mobile app for coastal transition zones at risk from sea level change at our University campuses. Using these data collected and analysed during the semester, students will gain insight into sources of uncertainty among datasets, enabling them to critically examine the concept of ground 'truth'.

**Module Content:** 1) Physical Geography Project

Introduction lecture  
Gower Fieldtrips  
PC practical workshops

2) Human Geography Project

Lectures

Cities and Photography

Making Photographs as a part of a research project: Three Visual Methodologies: Photo-Documentation, Photo-Elicitation, and Photo-Essays

Photo Documentation Workshop 1

Photo Documentation of the Built Environment

Urban Decline, Decay, Ruins, Regeneration

Development of Swansea City Centre Shooting Script

Group Photography Fieldwork in Swansea City Centre

Photo Documentation Workshop 2

Group Discussion/Image Selection/Narrative Writing Ideas/Link to Literature

Photo Essay Workshop 1

Urban Photo Essay

Group Discussion to select concept, theme, whether analytical or evocative photographs (or both), etc.  
Understanding of links to literature.

3) Field data collection and critical data analysis

Field data collection

Lecture and PC practical: analysing the world in 3D

Lecture and PC Practical: data uncertainty

**Intended Learning Outcomes:** By the end of this module, students will have demonstrated the ability to:

- Collect, manipulate, analyse and present geographical data;
- Demonstrate competence in fundamental techniques that are used in the field for description, measurement and

inference in Quaternary studies OR visual analysis of photography in human geography;

- Show key skills in Mapping, Spatial Data and environmental surveys
- Discuss how maps and spatial analysis can help us to understand and monitor our world.

**Assessment:** Coursework 1 (50%)  
Exam - Multiple choice questions (50%)

**Assessment Description:** 1 x fieldwork report or photo documentation task / photo essay (50%)  
1 x canvas quiz exam (50%)

**Moderation approach to main assessment:** Moderation by sampling of the cohort

**Assessment Feedback:** Students will be able to view the results of their MCQ exam after the exam period, where the correct answer will be identified.

**Failure Redemption:** Resit all failed elements

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