



**Swansea University
Prifysgol Abertawe**

**FACULTY OF SCIENCE AND
ENGINEERING**

**UNDERGRADUATE STUDENT
HANDBOOK**

YEAR 3 (FHEQ LEVEL 6)

**BSC ENVIRONMENTAL SCIENCE AND THE CLIMATE
EMERGENCY**

UNDERGRADUATE PROGRAMMES

**SUBJECT SPECIFIC
PART TWO OF TWO
MODULE AND COURSE STRUCTURE
2023-24**

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



Faculty of Science and Engineering	
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
School of Biosciences, Geography and Physics	
Head of School	TBC
School Education Lead	Dr Wendy Harris and Dr Sarah Roberts
Head of Geography	Dr Kevin Rees
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 (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 3 (FHEQ Level 6) 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
BIO331 Professional skills in conservation 20 Credits Dr PJ Neyland/Dr WE Harris/Dr SC Hocking/Prof LJ Roberts	
Total 120 Credits	

Optional Modules

Choose exactly 30 credits

GEC331 is the welsh equivalent of GEG331

GEC331	Traethawd Estynedig Daearyddiaeth	Prof NJ Loader/Dr OH Elias/Dr RH Meara/..	TB1+2	30
GEG331	Dissertation Report: Geography	Dr AL Pigott	TB1+2	30

And

Choose exactly 10 credits

GEC332 is the welsh equivalent of GEG332

GEC332	Cefnogaeth Traethawd Hir	Prof NJ Loader/Dr AL Pigott/Mr GR Whittaker/..	TB1+2	10
GEG332	Dissertation Support: Geography	Dr AL Pigott	TB1+2	10

And

Choose exactly 60 credits

Please note that BIO351 and BIO352 must be taken as co-requisites. They are not available as a singular module.

BIO329	Climate Change Biology	Prof KW Tang	TB1	10
BIO330	Tropical marine ecology and conservation	Dr CE Davies/Dr N Esteban/Dr PJ Neyland/..	TB1	10
BIO337	Biodiversity	Dr JN Griffin	TB1	10
BIO338	Polar Biology	Prof KW Tang	TB2	10
BIO341	Plant Conservation and Ecology	Dr AP Devine	TB1	10
BIO351	Science Communication	Dr WE Harris/Dr RH Meara/Dr SG Roberts/..	TB2	10
BIO352	Science Communication (BIO351) Placement	Dr RH Meara/Dr WE Harris/Dr SG Roberts/..	TB2	10
GEB301	Interdisciplinary Field Course to the Indian Himalayas (Sikkim)	Prof LJ Roberts/Dr KJ Ficken/Prof G Proffitt/..	TB1	20
GEG337	Wildfires	Prof SH Doerr	TB1	20
GEG341	Contemporary Rural Britain	Dr KH Halfacree	TB1	20
GEG344	The Cryosphere in a Changing Climate	Prof T Murray/Dr J Hiemstra/Prof B Kulesa/..	TB1	20
GEG346	Capital and Labour in the 21st century	Dr KG Rees/Dr CM Muellerleile	TB1	20
GEG348	Plate Tectonics and Global Geophysics	Prof B Kulesa	TB2	20
GEG358	Measuring Climate Change	Dr I Robertson/Prof MH Gagen	TB2	20

BIO329 Climate Change Biology

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof KW Tang

Format: Lectures = 13;
Paper discussions = 3;
Tutorial = 1;
Drop-in sessions = 2;
Review session = 1
Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

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

Lectures
Paper discussions
Tutorial
Drop-in meetings

Module Aims: The module examines the intricate connections between air, land and water in regulating the global climate system, and how that in turn affects planetary scale biology and ecology. Major past and present climate events and projected climate change, and their global ecological and environmental consequences will also be covered.

Module Content: Lectures:

1. Our planet's climate system - basic characteristics and driving forces; timescales, feedbacks and variations
2. Basic planetary physics in climate regulation - heat balance; ocean and atmospheric circulations; tropical cyclone formation
3. Basic planetary chemistry in climate regulation - sea-air gas exchange; oceanic control of carbon; rock cycle; transfer of particles and aerosols
4. Basic planetary biogeochemistry in climate regulation - climatically active bioproducts; biogeochemical cycles and climate
5. Climate history: glacial-interglacial cycle and global change - methods in palaeoclimatology; geological evolution of climate; Quaternary glaciations
6. Climate history: the last 12,000 years and its impacts on human history - Medieval Warm Period; Little Ice Age; effects on human history
7. ENSO: from climate to fish and beyond - tropospheric pressure systems; Southern Oscillation; El Nino and La Nina; teleconnections
8. Gulf Stream and NAO: linchpin of Europe's climate - discovery and significance of the Gulf Stream; NAO effects on North Atlantic climate and ecology
9. PDO: from fish to climate and beyond - discovery and significance of PDO; effects on Pacific climate and ecology; synergistic effects with ENSO; other climate indices
10. Our planet's future - CO₂ and global warming; natural variability vs. anthropogenic forcing; projected trends
11. Our planet's future - socioeconomic impacts; climate change in coastal zones
12. Our planet's future - ocean acidification
13. Our planet's future - mitigation and response; prospect of geoengineering

Paper discussions:

1. Kasting et al. (1988) How climate evolved on the terrestrial planets. *Scientific America* 256:90-97
2. Rahmstorf (2002) Ocean circulation and climate during the past 120,000 years. *Nature* 419:207-214
3. Zhang et al. (2007) Global climate change, war, and population decline in recent human history. *PNAS* 104:19214-19219

Tutorial:

Radiative budget model and simple box model for climate change predictions

Topics described are indicative and may be subject to change due to staff availability

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

LO1) Compare and contrast the evolution of different planetary climate systems (plate tectonics, carbonate cycle, atmospheric chemistry).

LO2) Explain how planetary physics (heat balance, mass transport, atmospheric and ocean circulations) affects the global climate.

LO3) Explain how planetary chemistry (trace gases, carbonate system, nutrient cycles) affects the global climate.

LO4) Describe and discuss the formation of major climate and weather phenomena and their effects on global ecology.

LO5) Interpret historical climate data and relate them to impacts on life on Earth.

LO6) Demonstrate knowledge of the ecological and socioeconomic impacts of recent rapid climate change.

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

Assessment Description: coursework 1 = 10% (short questions based on paper discussion; 300 words max.)

coursework 2 = 20% (short questions and quantitative skill questions based on paper discussion; 500 words max.)

coursework 3 = 10% (short questions based on paper discussion; 300 words max.)

coursework 4 = 60% (directed reading essay based on independent literature research; 1500 words max.)

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

Assessment Feedback: Written feedback on writing assignments and exam scripts. Individual formative verbal feedback during drop-in sessions.

Failure Redemption: Year 3 modules can be failed down to zero. August deferrals can be provided under extenuating circumstances.

Reading List: How climate evolved on the terrestrial planets, Munn & Co, 1988.ISBN: 00368733
Stefan Rahmstorf, Ocean circulation and climate during the past 120,000 years, Nature Publishing Group, 20020912.ISBN: 00280836
David D. Zhang ; Peter Brecke ; Harry F. Lee ; Yuan-Qing He ; Jane Zhang, Global climate change, war, and population decline in recent human history, National Acad Sciences, 20071204.ISBN: 00278424
Ruddiman, W. F., Earth's climate : past and future / William F. Ruddiman., W.H. Freeman and Company,, 2013.ISBN: 9781429255257
Vallis, Geoffrey K, Climate and the oceans, Princeton University Press, 2012.ISBN: 0691150281
Randall, David A. (David Allan), Atmosphere, clouds, and climate, Princeton University Press, 2012.ISBN: 0691143757
Bigg, Grant R, The oceans and climate, Cambridge University Press, 2003.ISBN: 0521016347
Burroughs, William James., Climate change : a multidisciplinary approach, Cambridge University Press, 2001.ISBN: 0521567718
Stenseth NC ; Ottersen G ; Hurrell JW ; Mysterud A ; Lima M ; Chan KS ; Yoccoz NG ; Adlandsvik B ;,
Review article. Studying climate effects on ecology through the use of climate indices: the North Atlantic Oscillation, El Niño Southern Oscillation and beyond., 20031022.ISBN: 09628452
Edward Bryant 1948-, Climate process & change / Edward Bryant., Cambridge University Press, 1997.ISBN: 9780521484404

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

All modules are subject to staff availability and may be restricted by student number. No pre-requisite required. Normally available to elective, visiting or exchange students. Please note that any failures are non-redeemable, there are no resits for Year 3 modules.

BIO330 Tropical marine ecology and conservation

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr CE Davies, Dr N Esteban, Dr PJ Neyland

Format: Lecture based contact hours (100%)

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

Lecture based

Module Aims: This module will provide a holistic overview of the ecology and conservation of important marine ecosystems, and will place this information within the context of ecosystem services, and their value to humanity.

This module will consist of up to 12 lectures/seminars on the following topics:

- Diversity and biology of coral reef communities
- Structure and function of seagrass meadows (temperate and tropical)
- Mangrove forest ecology
- Connectivity across the tropical marine seascape
- The ecosystem services of tropical marine systems
- Response of coral reef systems to climate change and ocean acidification
- Degradation of tropical marine systems
- Resilience thinking and the management of tropical marine systems

The module also contains a workshop session and additional direct contact with the module lead lecturer.

Module Content: - Diversity and biology of coral reef communities
- Structure and function of seagrass meadows (temperate and tropical)
- Mangrove forest ecology
- Connectivity across the tropical marine seascape
- The ecosystem services of tropical marine systems
- Response of coral reef systems to climate change and ocean acidification
- Degradation of tropical marine systems
- Resilience thinking and the management of tropical marine systems

Intended Learning Outcomes: LO1) Develop an up-to-date knowledge of the ecology and biology of tropical marine systems,

LO2) Be able to describe the major factors driving the diversity and productivity of tropical marine systems,

LO3) Demonstrate a synthesis of the ecosystem service value of tropical marine systems,

LO4) Articulate how local, regional and global scale anthropogenic processes are degrading tropical marine systems,

LO5) Have a knowledge base of how these complex ecosystems can be managed in a sustainable manner.

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

Assessment Description: Short Essay - Mangroves = 50%
Infographic and associated discussion session = 50%
[Infographic (75%) and discussion (25%)]

Moderation approach to main assessment: Not applicable

Assessment Feedback: Short Essay & Annotated essay scripts (Turnitin)

Infographic & Speedgrader annotations plus additional feedback from discussion

Both assessments will have an associated general feedback lecture.

Failure Redemption: Year 3 modules can be failed down to zero. August deferrals can be provided under extenuating circumstances.

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

All modules are subject to staff availability and may be restricted by student number or prerequisites. This module also provides compulsory preparation for students undertaking the Tropical marine field module (BIO327)

Normally available to elective, visiting or exchange students. Please note that any failures are non-redeemable, there are no resits for Year 3 modules.

BIO331 Professional skills in conservation

Credits: 20 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr PJ Neyland, Dr WE Harris, Dr SC Hocking, Prof LJ Roberts

Format: 40 hrs field trips
8 hrs lectures/workshops
6 hours drop-in sessions
1 hr feedback
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 including: Field excursions, ICT workshops, independent study, lectures

Module Aims: This field based module will introduce students to the professional techniques utilised to monitor and study animals and plants in a variety of terrestrial habitat types and in relation to conservation management and biodiversity monitoring in the United Kingdom. The course places a strong emphasis on ecological census techniques and basic classification and taxonomy. Students will develop key techniques relevant to the environmental sector including Protected Species (specifically birds, amphibians, mammals, reptiles and plants), River and Phase 1 habitat surveys and Environmental Impact Assessment. Students will also learn about the biotic and abiotic factors that define different UK habitats and be introduced to the natural history of Wales. A focus is on developing key transferable skills that enhance employability such as problem solving, data analysis, report writing, evaluation, communication and teamwork. This module is therefore suitable for students wishing to pursue a career in ecological consultancy or conservation.

Module Content: This module is a five day field course that runs in June. Daily activities will be undertaken in local habitats in and around south Wales and the Gower Area of Outstanding Natural Beauty. Due to the mode of teaching, the material below is indicative of that covered and is subject to change depending on staff availability and weather conditions. Lectures and a will take place on campus on the morning of each day trip. There will be additional workshops in Semester 1.

Day 1
Introduction lecture
Legislation lecture
Protected Species lecture
Phase I lecture
Phase I mapping fieldwork

Day 2
Common Standards Monitoring (CSM) lecture
CSM fieldwork sand dunes Gower

Day 3
Rivers lecture
Rivers fieldwork Gower

Day 4
Preliminary Ecological Appraisal (PEA) lecture
PEA fieldwork Crymlyn Burrows

Day 5
Calcareous grasslands lecture
Grasslands fieldwork Gower

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

LO1). Describe and utilise primary professional ecological census techniques to survey and monitor plant and animal populations and habitats

LO2). Recognise and discuss the important features and designations of local UK habitats and communities of conservation importance

LO3). Identify important animal and plant species, particularly indicator and priority species of conservation importance

LO4). Critically evaluate UK and European conservation protocols particularly in terms of local and national Acts and Directives and create effective management strategies to maintain and enhance conservation

LO5). Analyse, present and interpret ecological data and synthesise ecological reports to a professional standard. This includes a Preliminary Ecological Appraisal report and associated budget for surveying and post-development monitoring.

LO6). Work professionally within a group and evaluate environmental risks

Assessment:

Coursework 1 (20%)
Coursework 2 (30%)
Coursework 3 (50%)

Assessment Description: CW1 Interpretation Board
CW2 Report – choice of freshwater (River Habitat Survey and BMWP water quality assessment) or common standards monitoring of sand dunes
CW3 Preliminary Ecological Appraisal Report (PEAR) (2000 words).

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

Assessment Feedback: Class feedback
Individually annotated reports
Drop-in sessions

Failure Redemption: As this is a Year 3 module there is no opportunity to redeem failure, though if there are extenuating circumstances students would be offered a non-field based alternative module BIL300. Due to the nature of the field-based activities, if more than 50% of the assessment is missed students will be required to default onto the alternative module.

Reading List: Elizabeth A. C. Price (Elizabeth Anne Clewett), Lowland grassland and heathland habitats / Elizabeth A.C. Price ; illustrations by Jo Wright., Routledge, 2003.ISBN: 9780415187633
Giller, Paul S., Malmqvist, Bjorn., The biology of streams and rivers / Paul S. Giller and Bjorn Malmqvist., Oxford University Press., 1998.ISBN: 0198549776
Wheater, C. Philip, 1956- author., Cook, Penny A., 1971- author.; Bell, James R. (James Robert), 1969- author., Practical field ecology, John Wiley & Sons, Inc., 2020 - 2020.ISBN: 9781119413226
C. Philip Wheater 1956-, James R Bell (James Robert), 1969-; Penny A. Cook 1971-; ebrary, Inc., Practical field ecology : a project guide / C. Philip Wheater, James R. Bell and Penny A. Cook., Wiley, 2011.ISBN: 9780470694299
JNCC and Defra, Handbook for Phase 1 habitat survey. A technique for environmental audit, 2010.
Paul Waring 1957-, Martin Townsend; Mark Tunmore; Richard Lewington, Field guide to the moths of Great Britain and Ireland / Paul Waring, Martin Townsend ; Mark Tunmore (assistance with immigrant moth accounts) ; illustrated by Richard Lewington., British Wildlife Pub., 2009.ISBN: 9780953139989
Chinery, Michael., Collins guide to the insects of Britain and Western Europe / Michael Chinery., Collins., 1986.ISBN: 0002191377
Lars Svensson 1941-, Killian Mullarney; Dan Zetterström; P. J Grant (Peter James), Collins bird guide., HarperCollins, 2009.
Rose, Francis O'Reilly, Clare, The wild flower key : how to identify wild flowers, trees and shrubs in Britain and Ireland / Francis Rose., Frederick Warne, 2006.ISBN: 0723251754
Hubbard, C. E. (Charles Edward)Hubbard, J. C. E., Grasses : a guide to their structure, identification, uses, and distribution in the British Isles / by C.E. Hubbard; revised by J.C.E. Hubbard; with illustrations mainly by Joan Sampson., Penguin, 1992.
Fryxell, John M., 1954- author., Sinclair, A. R. E. (Anthony Ronald Entrican), author.; Caughley, Graeme, author., Wildlife ecology, conservation, and management, John Wiley & Sons, Ltd, 2014 - 2014.ISBN: 9781118291078

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

All modules are subject to staff availability and may be restricted by student number or prerequisites
Not available to visiting or exchange students

BIO337 Biodiversity

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr JN Griffin

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

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

Lectures

Module Aims: Biodiversity (or biological diversity) is the 'variety of life' at all levels of organisation -- from genes to ecosystems. This module will explore the foundational and very latest research exploring spatial and temporal patterns of biodiversity, how biodiversity is related to the functioning of ecosystems, the growing extinction threat, and global strategies to conserve biodiversity.

Module Content: This module will be largely lecture-based, with a directed reading component. The module will provide a detailed consideration of the complexity of the issue of biodiversity, its consequences for a functioning ecosystem and the wider implications for society and global systems. The major themes covered will include:

The complex concept of Biodiversity will be carefully defined, and its various elements (from genes to ecosystems) discussed. Specific attention will be paid to the most commonly used measure of biodiversity - the species unit.

Spatial patterns in Biodiversity, from local to the global scale. Focus will be on describing and explaining the macro-scale patterns in biodiversity, including variation with latitude, altitude (terrestrial) and depth (marine).

Changes in Biodiversity over deep geological time, from the origin of life to the present day. The causes and evolutionary consequences of the 'big five' past mass extinctions will be discussed.

Human caused extinctions, including pre-historic extinctions, recent extinctions and projected species extinctions. These events will be placed in the context of the 'big five' to ask whether we are facing the '6th mass extinction'.

Cutting-edge research addressing the possible consequences of extinctions for the structure and functioning of ecosystems. The links between various aspects of biodiversity (species, functional, phylogenetic) and various ecosystem functions (including stability) will be discussed. Furthermore, the possibility that primary species extinctions could cause cascades of secondary extinctions will be evaluated.

Consideration of whether biodiversity is linked to ecosystem services. Although the link between whole ecological communities and valuable ecosystem services is well-established, whether biodiversity per se influences services remains a research frontier.

Discussion on the various strategies being used to maintain (e.g. in situ and ex situ conservation) and store (e.g., seed banks) biodiversity and the controversial topic of de-extinction (bringing species back through synthetic biology).

<p>Intended Learning Outcomes: By the end of the module students will be able to:</p> <p>LO1) Define 'biodiversity' and explain its various dimensions.</p> <p>LO2) Describe and explain the main spatial and temporal patterns in biodiversity.</p> <p>LO3) Discuss the main drivers of modern biodiversity loss, and discuss why certain habitats and species are more vulnerable than others.</p> <p>LO4) Describe and explain the role of biodiversity in the functioning of ecosystems and provisioning of ecosystem services to humans.</p> <p>LO5) Discuss and critically evaluate strategies of conserving biodiversity, from genes to ecosystems.</p>	
<p>Assessment:</p>	<p>Coursework 1 (50%)</p> <p>Coursework 2 (50%)</p>
<p>Assessment Description: Coursework 1. Understanding biodiversity and the drivers of its loss. Three-part essay question, with each answer a maximum of 500 words (with references additional). The questions will cover: a) what is biodiversity and its various components and ways of measurement; and how is biodiversity distributed globally and across taxa; b) what are the main drivers of biodiversity loss, with examples; c) what are the patterns of biodiversity loss across taxonomic groups and according to species' traits?</p> <p>Coursework 2. Effects of biodiversity on ecosystems and consequences for people.</p> <p>Part 1: Analysis of a biodiversity experiment. 500 word report, including statistical analysis and figures. Skills: data handling, data analysis, data presentation, interpretation, critical analysis/thinking to place in broader context</p> <p>Part 2. Understanding biodiversity and ecosystem functioning in the real world and its connections to people Three-part essay question. Biodiversity – stability relationships; b) biodiversity – functioning across heterogeneous real world ecosystems; c) biodiversity, services, human wellbeing. 200 words for each part.</p>	
<p>Moderation approach to main assessment: Moderation by sampling of the cohort</p>	
<p>Assessment Feedback: Final year exams will not have formal feedback provided.</p>	
<p>Failure Redemption: As a level 3 module all marks are recorded in final year examination, there are no resits. Year 3 modules can be failed down to zero. August deferrals can be provided under extenuating circumstances.</p>	
<p>Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.</p> <p>All modules are subject to staff availability and may be restricted by student number or prerequisites. Normally available to elective, visiting or exchange students. Please note that any failures are non-redeemable, there are no resits for Year 3 modules</p>	

BIO338 Polar Biology	
Credits: 10 Session: 2023/24 January-June	
Pre-requisite Modules:	
Co-requisite Modules:	
Lecturer(s): Prof KW Tang	
Format:	Lectures = 13 hours; Paper discussions = 4 hours; Drop-in sessions = 2 hours; Review session = 1 hour Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.
Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus	
Lectures, paper discussions, drop-in meetings	
Module Aims: This module considers the ecology of the polar region. Topics are organised into six themes: 1) History of polar exploration; 2) Characteristics of the environments; 3) Major wildlife; 4) Adaptation strategies; 5) Ecosystem dynamics; 6) Changes and threats. Lectures will be complemented by paper discussions.	
Module Content: The module is organised around six main themes:	
<ol style="list-style-type: none"> 1. The history: Heroic age of polar exploration; Modern-day polar exploration and research 2. The environment: Geological formation of the polar oceans; Environmental conditions; Sea ice and deep water formation; Dry Valleys, subglacial lakes, fjords, tundra 3. The wildlife: Polar vertebrates and their evolutionary history; Krill and zooplankton migration; Vegetation; Biodiversity pattern 4. Adaptations: The challenges of living in the polar regions; Concept of Q10 and the basics of thermal biology; Different ways to deal with cold temperature; Adaptations by vegetation 5. The ecosystem: Phytoplankton and primary production; Iron limitation and ocean fertilisation; Biological pump; Sea ice dynamics and biological production; The importance of krill; Antarctic vs. Arctic marine food web 6. Changes and threats: Ozone depletion & UV exposure; Fishing and hunting pressure; Pollution; Climate change; Other disturbances 	
Lectures will be complemented by paper discussions. Extensive extra directed reading is expected.	
Intended Learning Outcomes: At the end of this module the students will:	
LO1) Demonstrate an appreciation of the extreme environmental conditions in the polar region LO2) Be able to compare and contrast wildlife in polar regions and those in lower latitudes LO3) Be able to describe strategies used by organisms to adapt to the polar environment LO4) Demonstrate detailed understanding of food web structure and dynamics in the polar oceans LO5) Be able to describe recent changes and threats to the polar ecosystems	
Assessment:	Examination (40%) Coursework 1 (5%) Coursework 2 (10%) Coursework 3 (5%) Coursework 4 (40%)

Assessment Description: EXAM: Essay question (40%)

FINAL COURSWORK: Directed reading question (40%)

CONTINUOUS COURSEWORK (20%)

5% assignment 1

10% assignment 2

5% assignment 3

Moderation approach to main assessment: Universal Non-Blind Double Marking of the whole cohort

Assessment Feedback: Individual formative verbal feedback during drop-in sessions; written feedback on writing assignments and exam scripts.

Failure Redemption: As a Level 3 module, there are no re-sits or alternative course works. Year 3 modules can be failed down to zero. August deferrals can be provided under extenuating circumstances.

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

All modules are subject to staff availability and may be restricted by student number or prerequisites

Normally available to elective, visiting or exchange students. Please note that any failures are non-redeemable, there are no resits for Year 3 modules

BIO341 Plant Conservation and Ecology

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules: BIO103

Co-requisite Modules:

Lecturer(s): Dr AP Devine

Format: 12 Lectures (12 hrs), 2 Practicals (8 hrs), 2 help sessions (2 hr). Contact Hours will be delivered through a blend of 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

A mixture of lectures, practicals and interactive discussions

Module Aims: "Without plants, there is no life. The functioning of the planet, and our survival, depends on plants." (Global Plant Conservation strategy 2012). This module gives an overview of the importance of plant communities to conservation goals and the threats to plant habitats. We will explore core concepts of conservation biology, examining both in-situ and ex-situ conservation and discuss global conservation policies and conventions. Students will also have the opportunity to conduct their own plant conservation assessments in line with the IUCN framework.

Module Content: This module will be taught with a mixture of lectures, practicals and interactive discussions, the syllabus will be split into four major themes:

- 1) Threats to plants and the need for conservation
 - Threats to ecosystems, plant species and habitats
 - The importance of plants an ecosystem services approach
 - Conservation conventions, polices and bodies
- 2) Practical conservation assessment
 - IUCN conservation assessment
 - Plant conservation in practice
 - Concepts in population biology
- 3) Concepts in conservation biology for in-situ plant conservation
 - Population biology
 - Reserve design
 - Habitat fragmentation
 - Edge effect
 - Allee effect
 - Future challenges in plant conservation
- 4) Concepts in conservation biology for ex-situ plant conservation
 - Genetic diversity
 - Seedbanks
 - Propagation
 - Micropropagation
 - Botanical gardens

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

LO1) Describe the threats facing ecosystems and plant communities and current conservation policies and conventions.

LO2) Discuss and critically evaluate biological and ecological concepts related to plant conservation, including both in-situ and ex-situ conservation applications

LO3) Conduct a conservation assessment for an individual plant species (computer based practical), deciding the conservation status of a species and critically evaluating the reliability of the assessment outcome.

LO4) Critically analyse conservation strategies in regards to long-term success, applying biological concepts from gene to ecosystem.

LO5) Discuss and evaluate the future challenges that plant species and communities face and how conservation can be used to mitigate these future impacts.

Assessment: Coursework 1 (30%)
Coursework 2 (70%)

Assessment Description: Coursework 1 - Assignment (30%)

- IUCN practical assessment

Coursework 2 - Assignment (70%)

- Plant conservation report

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

Assessment Feedback: Written feedback on assignment and verbal where appropriate.

Failure Redemption: As a Year 3 module all marks are recorded in final year examination, there are usually no re-sits options. However when appropriate a supplementary re-sit exam will be made available.

Reading List: Pullin, Andrew S, Conservation biology / Andrew S. Pullin., Cambridge University Press, 2002. ISBN: 0521644828

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

All modules are subject to staff availability and may be restricted by student number or prerequisites

It is strongly recommended that students who are interested in taking this module have also completed the BIO232 Plant ecology module, however it is not a formal pre-requisite.

Normally available to elective, visiting or exchange students. Please note that any failures are non-redeemable, there are no resits for Year 3 modules.

BIO351 Science Communication

Credits: 10 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr WE Harris, Dr RH Meara, Dr SG Roberts

Format: 10 weeks of 2 hour workshops (20 hours)

Delivery Method: In person lectures and workshops, including input from guest lecturers with special expertise.

Module Aims: Science communication is a key skill for scientists. Developing these skills allows students to really digest complicated, often abstract theories ideas and find ways to successfully presenting them to non experts. This improves student's own understanding as well as equipping them for the much wider world of science and business. Students will learn how to communicate complex science concepts to different audiences using a variety of techniques. Each session of the course will focus onto different modes of communication and will include theoretical and practical components.

Module Content: Week 1: Introduction

Week 2: Why is science communication important?

Written Communication

Week 3: Science papers, posters and press releases

Week 4: Communicating data

Spoken Communication

Week 5: Oral presentation and teaching

Week 6: Radio presentation and podcasts

Week 7: TV and social media

Week 8: Miscommunication

Week 9: Accessible communication

Week 10: Presentations

Intended Learning Outcomes: LO1. Identify the different ways that science can be communicated to a range of audiences

LO2. Define science communication theory and the rationale for using different communication methods

LO3. Communicate complex ideas via printed, audible and visual media

LO4. Communicate complex concepts to a wide range of audiences

LO5. Design and create engaging resources to disseminate information on a given topic

LO6. Evaluate and select appropriate methods for communicating data

LO7. Consider the sources and impacts of miscommunication

LO8. Evaluate and improve communication to increase accessibility

Assessment: Coursework 1 (30%)

Coursework 2 (30%)

Coursework 3 (40%)

Assessment Description: Assessment:

Coursework 1. Create an oral presentation or interactive teaching material on a topic of your choice.

Coursework 2. Create a blog and summarise relevant data as an infographic.

Coursework 3. Create a podcast or radio show as a group.

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

Assessment Feedback: Students will receive individual written summative feedback on all coursework components and will receive regular formative feedback on work completed during workshops

Failure Redemption: Alternative coursework in line with module outcomes would be provided

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.

BIO352 Science Communication (BIO351) Placement

Credits: 10 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules: BIO351

Lecturer(s): Dr RH Meara, Dr WE Harris, Dr SG Roberts

Format: 20 hours
3 x 1 hour lecture

Delivery Method: Introductory in-person lecture providing background information, assessment details and module overview.

Self-directed work placement to be arranged with lecturing team. Students will be supported in finding and securing a suitable placement.

An interim in-person workshop will evaluate progress and address any issues that may arise during the placement. This two-hour workshop will include a student presentation on their placement progress, skills gained, contributions made and any challenges encountered.

A final lecture will cap the placement module, allowing students to share their experience and introducing the final assessment report.

This module is also available in Welsh.

Module Aims: Partnered with BIO351 Science Communication module, this placement-based module allows students to undertake a communications-based placement to gain real-world experience of scientific communication.

Module Content: Introductory module briefing

Minimum of 2 x 30-minute supervision meetings with your academic and/or work-placement supervisor at mutually convenient times during the teaching block.

Oral presentation of placement progress (March)

The Work Placement project is initiated and designed by the student in collaboration with an outside organization and an academic supervisor. It is the student's responsibility to negotiate and secure an appropriate work placement and a work-placement supervisor. Academic staff will provide guidance, and, wherever possible, contacts.

The placement should complement the degree scheme being studied, and the programme of work must seek to enhance the set of subject-specific and transferable skills that the student has already acquired.

Students must inform the module coordinator of the precise details of their work placement (including the name and contact details of an appropriate work-placement supervisor) by the end of teaching week 2 in TB2. It is encouraged that placements are planned during TB1. Zoom meetings will be arranged to support this. By the end of week 2 in TB2, any diversions from this rule will be dealt with on a case by case basis.

Intended Learning Outcomes: During this module, students will:

LO1) Demonstrate an appreciation of the working environment in the context of their chosen field of study.

LO2) Apply their subject-specific knowledge to specific industrial activities or projects, individually and/or in teams.

LO3) Improve communication skills through a range of activities and variety of audiences

LO4) Develop an appreciation of ethical consideration, equality and diversity, representation, language, and health and safety in the workplace

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

Assessment Description: Coursework 1 - Placement update oral presentation

Coursework 2 - Final report - placement overview, location background, skills practiced and attained, timeline and executive summary.

Moderation approach to main assessment: Moderation by sampling of the cohort
Assessment Feedback: Written personal summative feedback via Canvas In person formative oral feedback
Failure Redemption: Arrangement of placement ensure continuous feedback and monitoring of progress, however, where required resubmission of assessments is possible and continuation of placement may be available in summer if needed.
Additional Notes: This module must be taken in conjunction with BIO351 Science Communication and is compulsory for Geography students taking BIO351

GEB301 Interdisciplinary Field Course to the Indian Himalayas (Sikkim)

Credits: 20 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof LJ Roberts, Dr KJ Ficken, Prof G Proffitt, Prof SV Shubin

Format: 92 hours contact in the field, 8 hours lectures/group meetings in advance of field trip and whilst in Sikkim

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.

Field course and preparatory lectures and group meetings.

Module Aims: This residential field course module explores the relationship between environment and society in the Himalayan state of Sikkim in NE India on the borders with China, Nepal, Tibet and West Bengal. The course is inter-disciplinary in approach and policy-oriented. Students work with members of University Staff in mixed groups of biologists, human geographers, physical geographers and zoologists. Through intensive inter-disciplinary group working, students utilise (and pass on) their specialist skills in the group exercises and projects that are undertaken.

Module Content: Teaching and learning will be centred on the two-week field-course to Sikkim, and supplemented by lectures and further study in Swansea before and after the field-course. Much of the learning will be undertaken in groups but, apart from where stated, the assessment will be your individual work.

Preparatory lectures will be delivered in Swansea before the field course:

The climate and Geography of Sikkim

The Biodiversity of Sikkim

Sikkim's Society

Biogeography of Sikkim

Agrobiodiversity / Organic Farming in Sikkim

Hydroelectricity

Religious identity in Sikkim

Workshops:

Developing your research questions

Planning your research

Assessment overview

Field trips when in Sikkim

Temi Tea Plantation

Old and New Rumtek Monastery

Tsomgo lake

Fambong Lah hike

Hydroelectric Dams and Power Stations

Agricultural developments

Lal Bazaar

Dzongu region

Intended Learning Outcomes: On completion of the module, students should be able to do most of the following:

- Explain anthropogenic effects on the environment, the complex interplay of physical factors (e.g. mountains, rivers and lakes), social factors (e.g. politics, migration, religion, education and commerce) and biological factors (e.g. agriculture and plant/animal interactions) in many of the issues applicable to the region and be capable of looking at complex issues in diverse ways
- Evaluate, where appropriate, the relevance of environmental concepts and theories to local case studies
- Identify the key issues facing developing countries such as Sikkim, assess the effectiveness of policy responses, and be able engage with political and policy debates about the future of the region (and other regions experiencing similar environmental, physical, social and economic challenges) particularly in relation to the growth of eco-tourism as a strategy for future development and conservation of resources
- Use varied field techniques for studying the designated field area and the relationship between the environment and society in Sikkim
- Understand and apply the benefits of inter-disciplinarity for better understanding the complex relationships between human/social, physical and biological features of any given location.

Assessment: Coursework 1 (20%)
Coursework 2 (30%)
Coursework 3 (30%)
Coursework 4 (20%)

Assessment Description: 1 [20%] Presentations

2 [30%] Fieldwork notebook

3 [30%] Individual project report 3,000 words

4 [20%] Interdisciplinary Government POSTNote policy bulletin on group project (4000 words)

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

Assessment Feedback: Continual assessment feedback is given in writing on standard departmental feedback forms and electronically via Canvas. Students will receive formative feedback on their field note books and presentations during the field course

Failure Redemption: Resubmit failed continual assessment.

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

A maximum of 20 students are able to participate in this module. The students will be selected for the module on the basis of academic achievements at Level 1 and additional criteria including motivation, commitment to group-work and inter-disciplinary working and applied research. A student's participation on this field course is contingent upon successfully obtaining necessary documentation for travel to Sikkim, India. This module is NOT available to visiting and exchange students.

The module runs in September before the start of term. Students are expected to be available during this time.

GEC331 Traethawd Estynedig Daearyddiaeth

Credits: 30 Session: 2023/24 September-June

Pre-requisite Modules: GEC277; GEC278; GEG277; GEG278

Co-requisite Modules:

Lecturer(s): Prof NJ Loader, Dr OH Elias, Dr RH Meara

Format: Cymorth unigol gan staff gan gynnwys allbwn ar adroddiadau paratoadol. Sesiwnau cefnogi (ar lein)

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

Newid y ffordd y cyflwynir modiwlau i gyflwyno cydamserol ar-lein. Gall y dewis pwnc ar gyfer Traethawd Estynedig gael ei gyfyngu oherwydd cyfyngiadau pandemig Covid-19 (h.y. dewis cyfyngedig o ran pwnc/dull, defnyddio data eilaidd ayyb.). Cyflwynir y traethawd estynedig cyfan yn electronig

Change in delivery of module to on-line synchronous. Choice of Dissertation topic may be limited by covid-19 restrictions (i.e. restricted choice of topic/method, use of secondary data etc.). Complete dissertation to be submitted electronically.

Module Aims: Mae'r traethawd estynedig yn adroddiad 10,000 o eiriau (mwyafswm) ar brosiect ymchwil gwreiddiol, sylweddol ac annibynol ar agwedd o Ddaearyddiaeth. Mae fel arfer yn seiliedig ar o amgylch 20-25 diwrnod o waith ymchwil sylfaenol (primary research) a sawl wythnos o waith analeiddio ac ysgrifennu. Mae'r traethawd estynedig yn cynnig y cyfle i chi i ddilyn eich diddordebau personol ac i arddangos eich galluoedd fel Daearyddwr. Yn ystod hynt y traethawd estynedig fe'ch cefnogir gan grwp cefnogaeth/trafodaeth sy'n cael ei arwain gan fyfyrwr, a byd ganddoch hefyd aelod o staff fel arolygydd. Byddwch yn cynnig beirniadaeth adeiladol i gyd-fyfyrwr sy'n ymgymryd a phrosiectau ymchwil cysylltiedig, gan ddysgu o'u profiadau, problemau a'u datrysiadau hwy. Mae'r gefnogaeth ac arolygaeth yma yn cael ei ddarparu drwy fodiwl "Dissertation Support" (GEG332) sydd yn fodiwl cyd-afnyddig.

Module Content: Mae'r traethawd estynedig yn adroddiad 10,000 o eiriau (mwyafswm) ar brosiect ymchwil gwreiddiol, sylweddol ac annibynol ar agwedd o Ddaearyddiaeth. Mae fel arfer yn seiliedig ar o amgylch 20-25 diwrnod o waith ymchwil sylfaenol (primary research) a sawl wythnos o waith analeiddio ac ysgrifennu. Mae'r traethawd estynedig yn cynnig y cyfle i chi i ddilyn eich diddordebau personol ac i arddangos eich galluoedd fel Daearyddwr. Yn ystod hynt y traethawd estynedig fe'ch cefnogir gan grwp cefnogaeth/trafodaeth sy'n cael ei arwain gan fyfyrwr, a byd ganddoch hefyd aelod o staff fel arolygydd. Byddwch yn cynnig beirniadaeth adeiladol i gyd-fyfyrwr sy'n ymgymryd a phrosiectau ymchwil cysylltiedig, gan ddysgu o'u profiadau, problemau a'u datrysiadau hwy. Mae'r gefnogaeth ac arolygaeth yma yn cael ei ddarparu drwy fodiwl "Dissertation Support" (GEG332) sydd yn fodiwl cyd-afnyddig.

Intended Learning Outcomes: Ar ddiwedd y modiwl yma, fe ddylai'r myfyriwr allu:

- Arolygu'r lenyddiaeth wyddonol, gan wneud defnydd o gonfeydd data electroneg lle'n berthnasol;
- Ymchwilio a deall oblygiadau rheolau priodol lechyd a Diogelwch;
- Cyflawni rhaglen ymchwil priodol yn ofalus;
- Cadw cofnodion ymchwil yn ystod gwaith maes, archifol, cyfrifiadurol, neu labordy;
- Integreiddio deunydd o'r llenyddiaeth gyda canlyniadau a'u crewyd drwy ymchwil;
- Gweithio yn annibynol i gwblhau adroddiad ymchwil sylweddol.

Assessment: Project (100%)

Assessment Description: Traethawd estynedig 10,000 o eiriau.

Moderation approach to main assessment: Universal Double Blind Marking of the whole cohort

Assessment Feedback: Rhoddir adborth ar elfennau paratoadol y traethawd estynedig, gan gynnwys adroddiad interim sylweddol a'i gyflwynir ar ddechrau mis Rhagfyr.

Failure Redemption: Ail-gyflwyno traethawd estynedig - naill ai ar y testun gwreiddiol neu un newydd - yn y cyfnod ail-eistedd.

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 cyfnewid a rhai ar ymweliad. Competence in written and spoken Welsh is essential for this module.

GEC332 Cefnogaeth Traethawd Hir

Credits: 10 Session: 2023/24 September-June

Pre-requisite Modules: GEC277; GEC278; GEG277; GEG278

Co-requisite Modules: gec331

Lecturer(s): Prof NJ Loader, Dr AL Pigott, Mr GR Whittaker

Format: Tiwtorialau grwp ac unigol

Group tutorials and one-to-one meetings. (Online delivery due to covid-19 restrictions). 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 campws/ar lein

On campus/online

Module Aims: Mae'r modiwl yma yn cynnig strwythur, trwy gefnogaeth grwp-cyfoedion dan arweiniad myfyrwyr a goruchwyllo gan staff academiaidd, i fyfyrwyr sy'n dilyn y modiwl 30 credid 'Traethawd Estynedig Daearyddiaeth'. Caiff y broses cefnogaeth a goruchwyllo yma ei hasesu trwy gyflwyniad crynodeb fideo yn (CD1), a chyflwyniad Amlinelliad y Traethawd hir (Dissertation Outline) yn CD2. Trwy weithio o fewn grwp-cyfoedion dan arweiniad, cewch gyfle i gynnig beirniadaeth gefnogol i fyfyrwyr eraill sy'n ymgymryd mewn prosiectau ymchwil perthnasol, a dysgu o'u profiadau ymchwil a strategaethau datrys nhw. Mae'r modiwl yma yn cyd-fynd a'r 'Traethawd Estynedig Daearyddiaeth' a rhaid cymryd y ddau fodiwl ar y cyd.

(This module provides structured, student-led peer-group support and academic staff group supervision for students undertaking the 30-credit 'Dissertation Report: Geography' module. This support and supervision is assessed through the submission of a Video abstract in TB1 and the submission in TB2 of a Dissertation Outline. Working within a supervised Student Peer Group, you will also have the opportunity to provide constructive criticism to fellow students undertaking related research projects, learning from their research problems and subsequent solutions. This module complements the 'Dissertation Report: Geography' module, which is a co-requisite.)

Module Content: Amlinelliad awgrymiadol o strwythur y gefnogaeth:

Wythnos 1: Sesiwn cyfarwyddol a chyflwyniad i'r modiwl
Wythnos 2: Cyfarfod Grp Cyfoedion Traethawd estynedig
Wythnos 3: Cyfarfod grp gyda goruchwyliwr
Wythnos 5: Cyfarfod Grp Cyfoedion Traethawd estynedig
Wythnos 6: Cyfarfod grp gyda goruchwyliwr
Wythnos 8: Cyfarfod Grp Cyfoedion Traethawd estynedig
Wythnos 9: Cyfarfod grp gyda goruchwyliwr, a derbyn adborth ar y poster.
Wythnos 10 - cyflwyno amlinelliad o'r traethawd estynedig
Wythnos 11: Cyfarfod unigol gyda goruchwyliwr
Wythnos 12: Cyfarfod Grp Cyfoedion Traethawd estynedig
Wythnos 13: Cyfarfod grp gyda goruchwyliwr
Wythnos 15: Cyfarfod Grp Cyfoedion Traethawd estynedig
Wythnos 16: Cyfarfod unigol gyda goruchwyliwr (trafod copi drafft o'r traethawd estynedig)
Wythnos 18: Cyflwyno munudau a nodiadau'r cyfarfodydd cyfoedion a goruchwyliwr.
Wythnos 21: Cyflwyniad poster PowerPoint

DISGRIFIAD:

Mae'r modiwl yma yn cynnig strwythur trwy gefnogaeth grwp-cyfoedion dan arweiniad myfyrwyr a goruchwyllo gan staff academiaidd, i fyfyrwyr sy'n dilyn y modiwl 30 credid 'Traethawd Estynedig Daearyddiaeth'. Caiff y broses cefnogaeth a goruchwyllo yma ei hasesu trwy gyflwyniad: CD1; Poster PowerPoint/Abstract-Fideo. CD2; Amlinelliad manwl o'r traethawd hir.

Trwy weithio o fewn grwp-cyfoedion dan arweiniad, cewch gyfle i gynnig beirniadaeth gefnogol i fyfyrwyr eraill sy'n ymgymryd mewn prosiectau ymchwil perthnasol, a dysgu o'u profiadau ymchwil a strategaethau datrys nhw. Mae'r modiwl yma yn cyd-fynd a'r 'Traethawd Estynedig Daearyddiaeth' a rhaid cymryd y ddau fodiwl ar y cyd.

(Indicative structure of support:

Week 1: Briefing
Week 2: Dissertation Peer Group Meeting
Week 3: Group meeting with supervisor
Week 5: Dissertation Peer Group Meeting
Group meeting with supervisor
Week 7: PowerPoint poster submission
Week 8: Dissertation Peer Group Meeting
Week 9: Group meeting with supervisor, with feedback on posters
Week 12: Dissertation Peer Group Meeting
Week 13: Group meeting with supervisor
Week 15: Dissertation Peer Group Meeting
Week 18: Dissertation and peer and supervisor meeting minutes submission

DESCRIPTION

This module provides structured, student-led peer-group support and academic staff group supervision for students undertaking the 30-credit 'Dissertation Report: Geography' module. This support and supervision is assessed through the submission of:
a Powerpoint Poster/Video abstract in TB1; Dissertation Outline in TB2.

The 'Dissertation Report: Geography' and 'Dissertation Support - Geography' modules are co-requisites.)

Intended Learning Outcomes: Erbyn diwedd y modiwl yma bydd y myfyriwr yn medru:

- Adolygu'r llenyddiaeth wyddonol, gan wneud defnydd o gronfeydd data digidol lle'n briodol.
- Ymchwilio a deall goblygiadau mesurau a deddfwriaeth iechyd a diogelwch addas
- Gweithredu rhaglen ymchwil ystyrlon
- Cyfuno deunydd o'r llenyddiaeth gyda chanlyniadau sy'n deillio o ymchwil
- Gweithio fel rhan o dîm sy'n cynnig cyngor beirniadol a chefnogol i fyfyrwyr eraill.

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

- * Survey the scientific literature, making use of electronic databases where appropriate
- * Research and understand the implications of appropriate health and safety legislation
- * Execute a careful research program
- * Keep research records during field, computer or lab work
- * Integrate material from the literature with results obtained from research
- * Work in a team providing critical and supporting advice to other students)

Assessment: Assignment 1 (50%)
Assignment 2 (50%)

Assessment Description: Cyflwynir tiwtorialau yn unol â'r amserlen, y tiwtor fydd yn penderfynu ar y dull cyflwyno.

Asesiad Semester 1. Cyflwyniad 5 munud ar ymchwil dylunio a dulliau trwy fideo/a recordiwyd

Asesiad Semester 2: Asesiad Ysgrifenedig – Amlinelliad o'r Traethawd Estynedig

Dylai amlinelliad y traethawd estynedig fod ar ffurf rhestr gynnwys sy'n cynnwys teitlau penodau ac is-benawdau penodau ynghyd â disgrifiad o'r hyn y bydd y traethawd estynedig yn ei gynnwys o dan bob is-adran. Dylid anelu at gynnwys canlyniadau a chasgliadau cychwynol.

Assessment Semester 1. 5 min. Video/recorded presentation on research design and methods

Assessment Semester 2: Written assessment – Dissertation Outline

The dissertation outline should take the form of a contents list comprising of chapter titles and chapter sub-headings with description of what the dissertation will include within each sub-section. It should aim to include at least preliminary results and conclusions.

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

Assessment Feedback: Feedback through online tutorial system and in written form via University feedback sheets.

Failure Redemption: Nid oes modd achub methiant ar Lefel 3. Failure is non redeemable at Level 3.

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

Dim ar gael i fyfyrwyr dethol o bynciau arall, myfyrwyr sy'n ymweld, na myfyrwyr ar gynllun cyfnewid.
Not available to elective, visiting or exchange students

GEG331 Dissertation Report: Geography

Credits: 30 Session: 2023/24 September-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr AL Pigott

Format: Dissertation support - Geography
Delivery subject to covid-19 restrictions).
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

Synchronous online delivery / on campus - delivery mode subject to covid-19 restrictions.

Module Aims: The dissertation is an original, substantive and independent research project in an aspect of Geography. It is typically based on approximately 20 - 25 days of primary research and several weeks of analysis and write-up. The end result must be less than 7,500 words of text. The dissertation offers you the chance to follow your personal interests and to demonstrate your capabilities as a Geographer. During the course of your dissertation you will be supported by a student-led discussion group and a staff supervisor, and you will also provide constructive criticism to fellow students undertaking related research projects, learning from their research problems and subsequent solutions. This support and supervision is delivered through the 'Dissertation Support' module, which is a co-requisite.

Module Content: The dissertation is an original, substantive, and independent research project focused on an aspect of Geography that is supervised by one or more appropriate members of academic staff. The dissertation is presented as a 10,000 word (maximum) report and supported through peer and supervisor meetings provided through the 'Dissertation Support' module. These two modules are co-requisites.

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

- Survey the scientific literature, making use of electronic databases where appropriate
- Research and understand the implications of appropriate health and safety legislation
- Execute a careful research program
- Keep research records during field, computer or lab work
- Integrate material from the literature with results obtained from research
- Work independently producing substantial research report

Assessment: Project (100%)

Assessment Description: Submission of original dissertation, 10,000 words (max).

Moderation approach to main assessment: Universal Double Blind Marking of the whole cohort

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

Failure Redemption: Failure is non-redeemable in level 3

Additional Notes: Not normally available to visiting and exchange students

GEG332 Dissertation Support: Geography

Credits: 10 Session: 2023/24 September-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr AL Pigott

Format: 7 (online delivery subject to covid-19 restrictions)

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

Tutorials delivered as per timetable, method of delivery remains the choice of the tutor.

Module Aims: This module provides structured, student-led peer-group support and academic staff group supervision for students undertaking the 30-credit 'Dissertation Report: Geography' module. This support and supervision is assessed through the submission of a PowerPoint Poster in TB1 and the submission outline in TB2. Working within a supervised Student Peer Group, you will also have the opportunity to provide constructive criticism to fellow students undertaking related research projects, learning from their research problems and subsequent solutions. This module complements the 'Dissertation Report: Geography' module, which is a co-requisite.

Module Content: Indicative structure of support:

Week 1: Briefing

Week 2: Dissertation Peer Group Meeting

Week 3: Group meeting with supervisor

Week 5: Dissertation Peer Group Meeting

Group meeting with supervisor

Week 7: PowerPoint poster submission

Week 8: Dissertation Peer Group Meeting

Week 9: Group meeting with supervisor, with feedback on posters

Week 12: Dissertation Peer Group Meeting

Week 13: Group meeting with supervisor

Week 15: Dissertation Peer Group Meeting

Week 18: Dissertation and peer and supervisor meeting minutes submission

Attendance at all group meetings is compulsory.

DESCRIPTION

This module provides structured, student-led peer-group support and academic staff group supervision for students undertaking the 30-credit 'Dissertation Report: Geography' module. This support and supervision is assessed through the submission of a PowerPoint Poster in TB1, and the submission in TB2 of a dissertation outline. The 'Dissertation Report: Geography' and 'Dissertation Support - Geography' modules are co-requisites.

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

- * Survey the scientific literature, making use of electronic databases where appropriate
- * Research and understand the implications of appropriate health and safety legislation
- * Execute a careful research program
- * Keep research records during field, computer or lab work
- * Integrate material from the literature with results obtained from research
- * Work in a team providing critical and supporting advice to other students

Assessment: Assignment 1 (50%)
Assignment 2 (50%)

Assessment Description: Coursework comprises of two elements:

Assessment Semester 1. 5 min. Video/recorded presentation on research design and methods

Assessment Semester 2: Written assessment – Dissertation Outline

The dissertation outline should take the form of a contents list comprising of chapter titles and chapter sub-headings with description of what the dissertation will include within each sub-section. It should aim to include at least preliminary results and conclusions.

Moderation approach to main assessment: Universal Double Blind Marking of the whole cohort

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

Failure Redemption: Failure is non-redeemable in level 3

Additional Notes: Not available to elective, visiting or exchange students.

GEG337 Wildfires

Credits: 20 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof SH Doerr

Format: As lectures, seminars and Q&A sessions (face to face or online, as appropriate) with the potential of a half-day field trip (subject to any future CV-19 restrictions)

Delivery Method: The module will be delivered through a blend of activities, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions (face to face or online, as appropriate) with the potential of a half day field trip (subject to any future CV-19 restrictions)

Module Aims: Wildfires are a natural phenomenon in the Earth System that has shaped the landscapes and ecology of a wide range of Earth's biomes for many millions of years. They currently burn 3–5 million km² of the Earth's surface annually (around 12-20 x the size of the UK). Wildfires (i.e. uncontrolled fires) and managed vegetation fires emit around 8 billion tonnes of CO₂ to the atmosphere on average each year, with some of these emissions contributing to climate change, but most of them being sequestered again during vegetation recovery. Many fires are an essential driver of maintaining ecosystems whether ignited naturally by lightning or humans as land management tool, and do not present an immediate risk to society or the environment. However, some fires lead to loss of life or infrastructures and can also threaten ecosystems that are not adapted to fire or in which fire regimes are altered by human influence. Fire impacts on society extend beyond direct destruction, such as accelerated soil erosion and water contamination, or exposure to smoke contributing to over 300,000 premature deaths per year. Major fire outbreaks in recent years have received extensive media attention and fuelled concern that climate change is increasing fire activity, threatening human livelihood, destroying ecosystems and accelerating climate change. These conflicting roles of fire pose a huge challenge: how do we balance the natural role of vegetation fires on Earth with the need to protect life and infrastructure?

This module will provide an multifaceted overview of vegetation fires and its role in maintaining ecosystems, how fire is ignited, how climate change, land management, weather and fuel types interact to determine the nature and behaviour of fire, how fire directly and indirectly impacts the natural environment and societies, how the media and societies perceive fire, and how we can manage and co-exist with fire in our changing world.

Given the multidisciplinary nature of fire science, ranging from physical principles to ecology and socio-economic and political dimensions, no textbook exists that covers all these comprehensively. The module thus will use a few textbooks, but also requires engaging critically with the latest scientific literature. It particularly suited to students who focus on physical geography, but it also offers insights and skills relevant to cultural, social and economic geography, and other disciplines.

Module Content: • Fire principles (combustion and fire behaviour)

- Fire as a factor shaping ecosystems through the Earth's history
- Fire in the tropics
- Fire in temperate and Mediterranean regions
- Fire in boreal and arctic regions
- Fire in the UK
- Direct environmental and social impacts of fire
- Indirect environmental and social impacts of fire
- Fire feedbacks with global climate change
- Temporal and regional trends in fire activities and their drivers
- Social 'fire': perceptions versus realities and the role of media
- Fire management, insurance, and policies
- Coexisting with fire: rethinking resilience to wildfire

The reading list field below does not work, hence reading list added here:

Fire on Earth – An Introduction, Andrew Scott et al. Wiley & Sons, 2014

Fire – A Very Short Introduction, Andrew Scott Oxford University Press, 2020

Most reading will be based on journal articles

<p>Intended Learning Outcomes: 1. Understanding the principles of fire, its ignition and behavior 2. Understanding the co-evolution of fire with ecosystems and their adaption to fire (pyromes). 3. Knowledge of the causes, temporal trends and impacts of fires in the Earth's major biomes. 4. Understanding the complex interactions between climate, land use and societies in fire occurrence and behavior 5. Skills in mapping and assessing the impacts of fires using commonly used modelling tools 6. Understanding of the tools and associated benefits and drawbacks of modern fire suppression approaches 7. Insights into the complexities of managing fire for conflicting purposes and in deriving fire policies 8. Understanding of how science, media, policy and major industries affect perceptions and management of fire in the UK and a selection of major fire affected countries across the world</p>	
Assessment:	Class Test 1 - Coursework (15%) Assignment 1 (25%) Briefing Paper (60%)
Assessment Description:	Assessment 1 (online problem-based test) 15% Seminar presentation on modelling exercise 25% End of module report (policy briefing document) 60%
Moderation approach to main assessment:	Moderation by sampling of the cohort
Assessment Feedback:	Students will receive feedback immediately after the online tests and individual written comments on coursework within 3 weeks of the submission deadline
Failure Redemption:	Failure is non-redeemable in level 3
Reading List:	Scott, Andrew C., Bowman, D. M. J. S.; Bond, William J., 1948-; Pyne, Stephen J., 1949-; Alexander, Martin E., Fire on earth : an introduction, Wiley Blackwell, 2014.ISBN: 9781119953562 Belcher, Claire M., editor of compilation., Fire phenomena and the Earth system : an interdisciplinary guide to fire science, Wiley-Blackwell, 2013.ISBN: 9780470657485
Additional Notes:	Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.
<p>Normally available to elective, visiting or exchange students. Please note that any failures are redeemed during the August resit period, so you must ensure your availability.</p>	

GEG341 Contemporary Rural Britain	
Credits: 20 Session: 2023/24 September-January	
Pre-requisite Modules:	
Co-requisite Modules:	
Lecturer(s): Dr KH Halfacree	
Format: 32 (30 lectures, 2 films)	
Delivery Method: Lectures and film material; on campus	
<p>Module Aims: This module provides a comprehensive account of the human geography of present-day rural Britain. Substantive issues covered include: the rural economy, both agricultural and non-agricultural; population change in the countryside, especially migration; the development and impact of the town and country planning system in rural areas; the more specific issues of rural housing, accessibility and services, and their link to deprivation; the activities and effects of rural pressure groups; the variety of different groups and experiences found in the countryside, especially focusing on neglected groups; political debates over land use and control; the political structure of rural areas; and the idea that rural Britain is moving from 'productivism' to 'post-productivism'. The module is exclusively focused on Britain during the post-1945 period. It demonstrates that contemporary rural Britain does not conform to the timeless rustic idyll of Laura Ashley designs and chocolate box cottages but is an arena of dynamic change, conflict and compromise.</p>	
<p>Module Content: Topics included in 2022-23 session:</p> <p>Defining rural in 2023: imagination & more Agricultural change since 1945: a revolution Agriculture & the environment: unhappy bedfellows Making a living on the farm: ever a challenge Non-agricultural employment: a neglected majority Coursework 1 introduction Migration & changing rural populations: realising the idyll Poverty, village services & housing: outside the idyll Neglected rural geographies: beyond the idyll Contested rural leisure: discipline, walking & hunting The evolution of rural planning: focus on land use Towards grass-roots rural planning: 'ordinary' voices? & Coursework 2 introduction The politics of farming: corporatism undermined Radical ruralities: low impact alternative settlement Conclusion: towards a 'post-productivist countryside'</p>	
<p>Intended Learning Outcomes: At the end of this module the student should be able to:</p> <ul style="list-style-type: none"> - Outline a comprehensive knowledge and understanding of the socio-economic, political and cultural composition of rural Britain since 1945. - Understand the importance of contrasting theoretical concepts and ideas for explaining these patterns and processes. - Present an informed, contextualised and detailed account of the human geography of rural Britain today. - Summarise both descriptive and more conceptual material concerning contemporary rural Britain in essay form. 	
Assessment:	Examination 1 (50%) Coursework 1 (25%) Group Work - Project (25%)
<p>Assessment Description: CW 1- Individual critical essay on rural representations CW2 - Group project on dealing with a specific rural problem in a specific real-life location</p>	
Examination - 2 questions from choice of 6	
Moderation approach to main assessment: Moderation by sampling of the cohort	
Assessment Feedback: Continual assessment feedback in writing on standard department feedback forms	
Failure Redemption: Failure is non-redeemable in level 3	

Reading List: Bosworth, G. & Somerville, P. (eds.), *Interpreting Rurality: Multidisciplinary Approaches*, Routledge, 2014. ISBN: 1138687154

Cloke, P., Marsden, T. and Mooney, P. (eds.), *Handbook of Rural Studies*, Sage, 2006. ISBN: 9780761973324

Gallent, N., Juntti, M., Kidd, S. & Shaw, D., *Introduction to Rural Planning*, Routledge, 2015. ISBN: 1315749289

Howkins, A., *The Death of Rural England: a Social History of the Countryside since 1900*, Routledge, 2003. ISBN: 9780415138857

Milbourne, P. (ed.), *Rural Wales in the Twenty-First Century*, University of Wales, 2011. ISBN: 9780708324349

Woods, M., *Rural Geography*, Sage, 2005. ISBN: 9780761947615

Woods, M., *Rural*, Routledge, 2011. ISBN: 9780415442404

Shucksmith, M. & Brown, D. (eds.), *Routledge International Handbook of Rural Studies*, Routledge, 2016. ISBN: 9781138804371

Barcus, H. & Halfacree, K., *An Introduction to Population Geographies: Lives across Space*, Routledge, 2017. ISBN: 9780203855843

Burchardt, J., *Paradise Lost: Rural Idyll & Social Change in England since 1800*, I.B. Tauris, 2002. ISBN: 9781860645143

Cloke, P. (ed.), *Country Visions*, Pearson/Prentice Hall, 2003. ISBN: 9780130896018

Holloway, L. & Kneafsey, M. (eds.), *Geographies of Rural Cultures & Societies*, Ashgate, 2004. ISBN: 0754635716

Murdoch, J., Lowe, P., Ward, N. & Marsden, T., *The Differentiated Countryside*, Routledge, 2003. ISBN: 1135358141

Scott, M., Gallent, N. & Gkartzios, M. (eds.), *The Routledge Companion to Rural Planning*, Routledge, 2019. ISBN: 9781138104051

Woods, M., Heley, J., Howells, H. & Goodwin-Hawkins, B., *A Rural Vision for Wales*, Aberystwyth University, 2021.

Yarwood, R. & Halfacree, K., *Rural Change*, Hodder Education, 2008. ISBN: 9780860033691

Introducing Human Geographies, Routledge, 2014. ISBN: 9780203529225

Studying cultural landscapes, Arnold, 2003. ISBN: 0340762683

Jenny Pickerill author., *Eco-homes : people, place and politics / Jenny Pickerill.*, London : Zed Books, 2016. ISBN: 1780325320

Kneafsey, Moya, author., Maye, Damian, author.; Holloway, Lewis, author.; Goodman, Michael K., 1969-author., *Geographies of food : an introduction*, Bloomsbury Academic, 2021 - 2021. ISBN: 9780857854575

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

Available to elective, visiting or exchange students. Although clearly a social science Human Geography module, it is accessible to those from other backgrounds.

GEG344 The Cryosphere in a Changing Climate	
Credits: 20 Session: 2023/24 September-January	
Pre-requisite Modules:	
Co-requisite Modules:	
Lecturer(s): Prof T Murray, Dr J Hiemstra, Prof B Kulesa, Prof AJ Luckman	
Format:	32 (25 lecture + 7 presentation & discussion) 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: Delivery of teaching will be blended - most will be face-face on campus but seminars are online.	
Module Aims: This module will provide you with the scientific basis to understand the physical behaviour of glacier ice in our changing climate. We will look at spatial scales ranging from individual ice crystals to continental-scale glaciation. The module core topics will include glacier mass balance, transformation of snow to ice, glacier hydrology, glacier dynamics, ice crystal structure and deformation, glacier sliding, deformation of glacial sediments, glacier flow instabilities and glacier surging. We will introduce example topics of current research interest. The module is assessed through examination, as well as group presentation on a seminar and a short individual report.	
Module Content: 1) Fundamentals of Glaciology, including mass balance, glacial dynamics, glacial hydrology and sedimentology, glacial geomorphology, Antarctic and Greenland ice sheets. 2) Approaches and Techniques in Glaciology, such as remote sensing, and geophysics.	
Intended Learning Outcomes: At the end of this module you will have knowledge and understanding of: <ol style="list-style-type: none"> 1. The physical processes controlling the behaviour of glaciers and ice sheets. 2. How glaciers and ice sheets interact with the landscape. 3. The 'practice of Glaciology': techniques used to investigate glacial systems. <p>At the end of this module you will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the key concepts of glacier and ice sheet behaviour 2. Evaluate state-of-the-science hypotheses in Glaciology 3. Appraise the usefulness of different approaches to problems in Glaciology 	
Assessment:	Examination 1 (70%) Coursework 1 (15%) Group Work - Presentation (15%)
Assessment Description: Examination 70% Group work - Presentation 15% Coursework 1 - individual 15%	
Moderation approach to main assessment: Moderation by sampling of the cohort	
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: Failure is non-redeemable in level 3	

Reading List: Benn, Douglas I., Evans, David J. A., *Glaciers & glaciation* / Douglas I. Benn and David J. A. Evans., Hodder Arnold,, 2008.ISBN: 9780340905791
K. M. Cuffey (Kurt M.) author., W. S. B Paterson, *The physics of glaciers* / K.M. Cuffey, W.S.B. Paterson., Burlington, MA : Butterworth-Heinemann is an imprint of Elsevier, 2010.ISBN: 9780080919126
Paterson, W. S. B., *The physics of glaciers* / W.S.B. Paterson., Butterworth/Heinemann,, 1998.ISBN: 9780750647427
Knight, Peter,, *Glacier science and environmental change* / edited by Peter G. Knight., Wiley-Blackwell,, 2009.ISBN: 9781405196536
Ralf. Greve, Heinz Blatter, *Dynamics of ice sheets and glaciers* / Ralf Greve, Heinz Blatter., Springer, 2009.ISBN: 9783642034152
John Menzies, *Modern and past glacial environments* editor, John Menzies., Butterworth-Heinemann, 2002.ISBN: 128101320X
M. Tedesco 1971- editor., *Remote sensing of the cryosphere* / edited by M. Tedesco., Hoboken, New Jersey : John Wiley & Sons, Inc., 2015.ISBN: 1118368908
Richard S Williams; Jane G Ferrigno; Anker Weidick; Geological Survey (U.S.), *Satellite image atlas of glaciers of the world. C. Greenland* / by Anker Weidick; edited by Richard S. Williams and Jane G. Ferrigno. ;with a section on Landsat images of Greenland by Richard S. Williams and Jane G. Ferrigno., U.S. G.P.O., 1995.ISBN: 0607714549
Richard S Williams; Jane G Ferrigno; Geological Survey (U.S.), *Satellite image atlas of glaciers of the world. E. Glaciers of Europe* / edited by Richard S. Williams and Jane G. Ferrigno., U.S. G.P.O., 1993.ISBN: 0607714557

Additional Notes: Delivery of teaching will be blended - most will be face-face on campus but seminars are online.

This module has no pre- or co- requisites

GEG346 Capital and Labour in the 21st century

Credits: 20 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr KG Rees, Dr CM Muellerleile

Format: 34, 28 lectures, 6 seminars

Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

Delivery Method: The module will be delivered through in person lectures and student seminars, supplemented by additional learning materials available on the Canvas Digital Learning Platform. A half-day field visit may also be included within the Swansea Bay area (to be confirmed by host firm).

Module Aims: This module examines the geographies of work, production, and exchange in 21st century capitalism. Since the 1970s, capital's quest for profit has resulted in a distinctly flexible economy, but also an economy that has expanded into social and cultural spheres where some believe it does not belong. At the same time, both the capital and labour of this expansive and flexible economy are fixed, both in and by geography. Spatially, production has become associated with agglomeration into districts and clusters, while simultaneously globalisation enables firms to spread across geographic scales more than at any time in history. When it comes to the digital economy, many would argue that production is happening anywhere and everywhere that we are online. Not surprisingly then, along with changes in the geographies of production, the nature of the firm and the commodities those firms produce have changed. All of this has resulted in various struggles and crises, of capitalism, of production, of politics, and even of everyday life. It has also blurred the boundaries of what might be considered 'economic', and as such, has necessitated new methods of research and new ways of 'knowing' economic geographies.

The module begins by considering at the same time the changing nature of capitalism and the academic discipline of economic geography. We will discuss several of the key theoretical frameworks available for making sense of the spaces of 21st century capitalism, including social, institutional and evolutionary perspectives. From there we explore the geographies of capitalist production and exchange of some of the important commodities of the 21st century including money, land, and knowledge. The relationship between people as labourers, a troublesome commodity, and capital will be covered extensively in the latter section of the module.

Module Content: Introduction to the module: Economic Geography as a practice, a discipline, and a state of the world

The evolution of Capitalism

Crisis and difference within the capitalist system

Polanyi, Commodification and Fictitious Commodities

Institutions, the Firm and the Embedded Economy

Production as a spatial and socially embedded process.

Evolutionary perspectives on economic decline and renewal

Money, the State and Production

Money, Nature and Land

Knowledge and Data Economies

Methods and Methodologies for the Embedded Economy

Knowledge as Property: tracking the knowledge economy

Labour Markets: human capital and segmentation

Labour Markets: the reproduction of labour inequality

Organising labour: worker (dis)empowerment in an era of hyper-flexibility

Student presentations

<p>Intended Learning Outcomes: At the end of this module you should be able to:</p> <ul style="list-style-type: none"> • Conceptualise the firm, capital, labour, value, commodities and production, and discuss their influence on the geography of contemporary capitalism. • Debate the role of 'geography' in creating multiple rather than a singular form of capitalism. • Theorise and illustrate the evolutionary nature of capitalism, including the influence of technological innovation and regular crises of accumulation and regulation. • Identify and understand production as a spatial and socially embedded process. • Identify the influence of institutionalist, evolutionary, cultural, epistemological, and hermeneutic approaches within economic geography. • Explain the increasing influence of finance and financial markets in production. • Explain the concept of platform capitalism and what it implies for production and labour. • Discuss the extent to which labour markets reproduce inequality of opportunity and reward. • Explain the rise of contingent labour and debate the relevance of organised labour in shaping how and where firms employ workers. 	
Assessment:	<p>Examination 1 (50%) Coursework 1 (25%) Group Work - Presentation (25%)</p>
<p>Assessment Description: Coursework 1 = 2,000 word essay Group work presentation Examination = answer two questions for six (one from each of two sections)</p>	
<p>Moderation approach to main assessment: Moderation by sampling of the cohort</p>	
<p>Assessment Feedback: Students will receive examination feedback after exams if taken in January. Continual assessment feedback is given in writing and verbally through individual meetings.</p>	
<p>Failure Redemption: Failure is non-redeemable in level 3</p>	

Reading List: Roger Lee and Jane Wills, Roger Lee 1945-; Jane Wills, Geographies of economies / edited by Roger Lee and Jane Wills., Arnold, 1997.ISBN: 0340677163

Yuko Aoyama, James T. Murphy, Susan Hanson., Key concepts in economic geography, SAGE, 2011.ISBN: 9781847878953

Yuko Aoyama, James T. Murphy, Susan Hanson., Key concepts in economic geography, SAGE, 2011.ISBN: 9781847878953

Yuko Aoyama, James T. Murphy, Susan Hanson., Key concepts in economic geography, SAGE, 2011.ISBN: 9781847878953

Trevor J. Barnes author., Brett Christophers 1971- author., Economic geography : a critical introduction / Trevor Barnes, Brett Christophers., Hoboken, NJ : Wiley Blackwell, 2018.ISBN: 9781118874301

Roger Lee and Jane Wills, Roger Lee 1945-; Jane Wills, Geographies of economies / edited by Roger Lee and Jane Wills., Arnold, 1997.ISBN: 0340677163

Sheppard, Eric S., Barnes, Trevor J., A companion to economic geography / edited by Eric Sheppard and Trevor J. Barnes., Blackwell,, 2003.ISBN: 0631235795

Trevor J. Barnes 1956-, editor; Jamie Peck editor.; Eric S. Sheppard 1950, editor; Wiley-Blackwell (Firm), The Wiley-Blackwell companion to economic geography / edited by Trevor J. Barnes, Jamie Peck, and Eric Sheppard., Chichester, West Sussex, England : Wiley-Blackwell, 2012.ISBN: 9786613628886

Chris Benner author., Work in the new economy : flexible labor markets in Silicon Valley / Chris Benner., Malden, MA : Blackwell Publishers Ltd, 2002.ISBN: 9780470696163

Karl Polanyi 1886-1964., The great transformation : the political and economic origins of our time / Karl Polanyi ; foreword by Joseph E. Stiglitz ; introduction by Fred Block., Beacon Press, 2001.ISBN: 9780807056431

Karl Polanyi 1886-1964.; Conrad M Arensberg; Harry W Pearson, Trade and market in the early empires : economies in history and theory / edited by Karl Polanyi, Conrad M. Arensberg and Harry W. Pearson., The Free Press, 1957.

Nick Srnicek author., Platform capitalism / Nick Srnicek., Cambridge : Polity, 2017.ISBN: 9781509504862

Karl Polanyi 1886-1964.; Conrad M Arensberg; Harry W Pearson, Trade and market in the early empires : economies in history and theory / edited by Karl Polanyi, Conrad M. Arensberg and Harry W. Pearson., The Free Press, 1957.

Ash Amin, Post-Fordism : a reader / edited by Ash Amin., Blackwell, 1994.ISBN: 0631188568

Knox, Janelle Kallie, 1983- editor.; Wojcik, Dariusz, 1972- editor., The Routledge handbook of financial geography, Routledge, Taylor & Francis Group, 2021 - 2021.ISBN: 9780815369738

Bugra, AyseAgartam, Kaan, Reading Karl Polanyi for the Twenty First Century.ISBN: 9781403983930

Pathways to Industrialization and Regional Development, Taylor & Francis, 1992.ISBN: 1134882696

Knox, Janelle Kallie, 1983- editor.; Wojcik, Dariusz, 1972- editor., The Routledge handbook of financial geography, Routledge, Taylor & Francis Group, 2021.ISBN: 9780815369738

Storper, Michael.; Scott, Allen John., Pathways to industrialization and regional development, Routledge, 1992.ISBN: 041508752x

Hayter, Roger,, The dynamics of industrial location : the factory, the firm, and the production system / Roger Hayter., Wiley,, c1997..ISBN: 0471971197

Becattini, Giacomo., Bellandi, Marco., De Propriis, Lisa., A handbook of industrial districts / edited by Giacomo Becattini, Marco Bellandi, Lisa de Propriis., Edward Elgar,, c2009..ISBN: 9781847202673

Lundvall, Bengt-Ake, ebrary, Inc, National systems of innovation toward a theory of innovation and interactive learning / edited by Bengt-Ake Lundvall., Anthem Press, 2010.ISBN: 1843318822

Trevor J Barnes; Meric S Gertler, The new industrial geography regions, regulations and institutions / [edited by] Trevor J. Barnes and Meric S. Gertler., Routledge, 1999.ISBN: 1134602251

Hayter, Rogerebrary, Inc, Flexible crossroads the restructuring of British Columbia's forest economy / Roger Hayter., UBC Press, 2000.ISBN: 077480775X

Bryson, J. R., 1963-, Knowledge, space, economy, Routledge, 2000.ISBN: 0415189713

Ray Hudson 1948-, Economic geographies : circuits, flows and spaces / Ray Hudson., SAGE Publications, 2005.ISBN: 0761948945

Saxenian, AnnaLee., American Council of Learned Societies., Regional advantage culture and competition in Silicon Valley and Route 128, Harvard University Press, 1996.ISBN: 0674753399

Nelson, Richard R., National innovation systems : a comparative analysis, Oxford University Press, 1993.ISBN: 0195076176

Cooke, Philip, Heidenreich, Martin., Braczyk, Hans-Joachim., Regional innovation systems : the role of governance in a globalized world / edited by Philip Cooke, Martin Heidenreich and Hans-Joachim Braczyk., Routledge,, 2004.ISBN: 0415303699

Hayter, Roger,, Patchell, Jerry., Economic geography : an institutional approach / Roger Hayter and Jerry

Patchell., Oxford University Press., 2011.ISBN: 9780195433791

Peck, Jamie., Work-place : the social regulation of labor markets / Jamie Peck., Guilford Press., c1996..ISBN: 1572300434

Lee, Roger., Wills, Jane., Geographies of economies / edited by Roger Lee and Jane Wills., Arnold., 1997.ISBN: 0340677163

Asheim, Bjørn Terje., Cooke, Philip, Martin, Ron, Clusters and regional development : critical reflections and explorations / edited by Bjørn Asheim, Philip Cooke and Ron Martin., Routledge., 2006.ISBN: 9780415349147

Freeman, Christopher., Soete, Luc., The economics of industrial innovation / Christopher Freeman and Luc Soete., Pinter., 1997.ISBN: 1855670712

McGrath-Champ, Susan, Herod, Andrew., Rainnie, Al., Handbook of employment and society : working space / edited by Susan McGrath-Champ, Andrew Herod, Al Rainnie., Edward Elgar., 2011.ISBN: 9780857935830

Le Heron, Richard B., Harrington, J. W., New economic spaces: new economic geographies / edited by Richard Le Heron, James W. Harrington., Ashgate., c2005..ISBN: 0754644502

Storper, Michael., The regional world : territorial development in a global economy / Michael Storper., Guilford Press., c1997..ISBN: 1572303158

Bryson, J. R., The economic geography reader : producing and consuming global capitalism / edited by John Bryson [et al.], Wiley., 1999.ISBN: 0471985287

Barnes, Trevor J., Reading economic geography / edited by Trevor J. Barnes ... [et al.], Blackwell Pub., 2003, c.2004..ISBN: 9780631235545

Barnes, Trevor J., Logics of dislocation : models, metaphors, and meanings of economic space / Trevor J. Barnes., Guilford Press., c1996..ISBN: 1572300337

Daniels, P. W., Lever, William., The global economy in transition / edited by Peter W. Daniels, William F. Lever., Longman., 1996.ISBN: 0582253284

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Dicken, Peter., Global shift : mapping the changing contours of the world economy, SAGE, 2015.ISBN: 9781446282106

Malecki, Edward J., Technology and economic development : the dynamics of local, regional, and national competitiveness / Edward J. Malecki., Longman., 1997.ISBN: 058227723X

Piore, Michael J., Sabel, Charles F., The second industrial divide : possibilities for prosperity / Michael J. Piore & Charles F. Sabel., Basic Books., c1984..ISBN: 0465075622

Schoenberger, Erica J., The cultural crisis of the firm / Erica Schoenberger., Blackwell Publishers., 1997.ISBN: 1557866384

Scott, Allen John., Storper, Michael., Production, work, territory : the geographical anatomy of industrial capitalism / edited by Allen J. Scott and Michael Storper., Allen & Unwin., 1986.ISBN: 0043381278

Kenney, Martin., Florida, Richard L., Beyond mass production : the Japanese system and its transfer to the U.S. / Martin Kenney, Richard Florida., Oxford University Press., 1993.ISBN: 0195071107

David Harvey 1935- author., Seventeen contradictions and the end of capitalism / David Harvey., London : Profile Books, 2015.ISBN: 9781781251614

Schoenberger, E., The Oxford handbook of economic geography, Oxford University Press, 2000.ISBN: 9780198234104

Roger Hayter and Jerry Patchell., Hayter, R & Patchell, J., Economic geography : an institutional approach, Oxford University Press, 2011.ISBN: 9780195433791

Harvey, D, The condition of postmodernity, Blackwell, 1989.ISBN: 9780631162940

Spyer, Patricia, 1957-, S, Border Fetishisms: Material Objects in Unstable Spaces, Routledge, 1998.ISBN: 9780415918572

Harvey, D., The condition of postmodernity, Blackwell, 1989.ISBN: 9780631162940

Ho, K, Ho, Karen., Liquidated : An Ethnography of Wall Street, Duke University Press, 2009.ISBN: 9780822345800

Hall, P. and Soskice, Varieties of Capitalism: The Institution Foundations of Comparative Advantage., Oxford University press, 2001.ISBN: 9780199247752

Handbook of employment and society : working space, Edward Elgar, 2011.ISBN: 9780857935830

Handbook of employment and society : working space, Edward Elgar, 2011.ISBN: 9780857935830

Handbook of employment and society : working space, Edward Elgar, 2011.ISBN: 9780857935830

Storper, M., Pathways to industrialization and regional development, Routledge, 1992.ISBN: 9780415087520

Peck, J., Work-place : the social regulation of labor markets, The Guilford Press, 1996.ISBN: 9781572300446

Amin, A., Post-Fordism : a reader, Blackwell, 1994.ISBN: 9780631188568

Sayer, A. and Walker, R., Sayer, A. and Walker, R., The new social economy : reworking the division of labour, Blackwell, 1992.ISBN: 9781557862808

Thrift,N. and Olds, K., Refiguring the economic in economic geography, Arnold, E/ SAGE Publications, 1996.ISBN: 03091325

Mann, G., Mann, G., Disassembly Required : a Field Guide to Actually Existing Capitalism., AK Press, 2013.ISBN: 9781849351263

Michel Serres author., Anne-Marie Feenberg-Dibon 1943- translator., Times of crises : what the financial crisis revealed and how to reinvent our lives and future / Michel Serres ; translated by Anne-Marie Feenberg-Dibon., London : Bloomsbury, 2015.ISBN: 9781501307898

David Correia 1968- author., Tyler Wall author., Police : a field guide / David Correia and Tyler Wall., London : Verso, 2018.ISBN: 9781786630148

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

Available to Visiting and Exchange Students.

GEG348 Plate Tectonics and Global Geophysics

Credits: 20 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof B Kulesa

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: 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

Depending on exact 'new normal' situation in TB2, move to a combination of live lecture (in-person in an appropriate university teaching space that is also broadcast live online as well as recorded and made available to students on CANVAS), combined with online flipped learning and large-group learning activities that all emphasize active learning. The weighting of these activities will of course depend on 'new normal' situation but I could imagine a live lecture in above manner for 1x2 hrs per week, with 1x2 hrs per week of online flipped / large group / active learning. If live in-person lecture is not possible then have a small number of live online lectures for cohort building and providing instructions as well as feedback on assignments, and otherwise emphasize flipped / large group / active learning online.

Module Aims: Over the past century our view of the dynamic earth system has shifted from continental drift to sea floor spreading and, in the 1960s and 70s, to plate tectonics. However, given greatly improved observational data and mathematical models a new revolution has been initiated in the last decade: it turns out that many familiar concepts of plate tectonics may in fact be incorrect and outdated! This includes, for instance, what we thought were established concepts of mantle plumes, hot spots, evolving subduction zones and the plates' driving mechanisms. Consequently, a fully revamped plate dynamics framework is currently being drawn up and integrated into a whole-earth geodynamic model. This model views the earth's lithosphere, deeper mantle and core-mantle boundary as coupled entities that are considerably more complex than previously thought. This has fundamentally surprising and challenging, but at the time exciting and intellectually rewarding, consequences for the dynamics of the earth's lithospheric plates on which we live.

This module thus aims to attract open-minded students excited at the prospect of turning their view of the workings of our planet upside down, as challenged with the latest scientific hypotheses of the internal anatomy and dynamics of the earth; and indeed those of many planets in the solar system! The majority of up-to-date hypotheses and concepts will be new to the student, and are not covered by existing undergraduate textbooks. Successful completion of the module will thus require the ability and willingness to engage critically with the latest scientific literature, along with conscientious lecture attendance and continuous review of lecture materials.

Module Content: The birth of Earth and Moon

Seismology and Earth's global anatomy

Nothing happens without heat: Earth's heat engine

Divergent plate margins: where it all begins

Hot spots: plume model battles plate model

Gravity: attractive but wobbly earth

Anatomy and evolution of passive and convergent plate margins

Geomagnetism and geoelectricity: high-voltage earth

Plate dynamics: how to move on a sphere?

Driving forces of plate tectonics and the fate of subducted slabs

Intended Learning Outcomes: 1. Understand the anatomy and fundamental physical and chemical properties of, and processes within, the solid body of the Earth.	
2. Understand the characteristics of the plate dynamics framework as it is currently being re-formulated towards a whole-earth geodynamic model, their measurement and their implications for earth-surface processes and hazards.	
3. Enhanced team-working skills in interpreting geophysical and geological evidence in terms of plate dynamic processes and their geoscientific and hazard implications.	
4. Be critically aware of current hot topics in plate tectonics and the physics and dynamics of the whole Earth.	
Assessment:	Examination 1 (34%) Coursework 1 (33%) Coursework 2 (33%)
Assessment Description: TBC	
Moderation approach to main assessment: Moderation by sampling of the cohort	
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: Failure is non-redeemable in level 3	

Reading List: Rogers, N. W., An introduction to our dynamic planet / edited by Nick Rogers ; authors Stephen Blake ... [et al.], The Open University ;, 2008.ISBN: 9780521729543

Grotzinger, John P., author., Jordan, Thomas H. (Thomas Hilman), 1948- author., Understanding Earth, Macmillan Learning, 2020.ISBN: 1319325424

Lowrie, William, 1939- author., Fichtner, Andreas, 1979- author., Fundamentals of geophysics, Cambridge University Press, 2020 - 2020.ISBN: 9781108492737

P. Kearey, Keith A Klepeis; F. J Vine, Global tectonics / Philip Kearey, Keith A. Klepeis, Frederick J. Vine., Blackwell Pub., 2009.ISBN: 9781405107778

Marshak, Stephen, 1955- author., Earth : portrait of a planet, W.W. Norton & Company, Inc., 2019.ISBN: 9780393617511

Stephen Marshak 1955- author., Earth : portrait of a planet / Stephen Marshak., New York : W.W. Norton & Company, 2015.ISBN: 9780393937503

Stephen Marshak 1955-, Earth : portrait of a planet / Stephen Marshak., W. W. Norton, 2012.ISBN: 9780393118261

Acworth, R. Ian ; Halloran, Landon J. S ; Rau, Gabriel C ; Cuthbert, Mark O ; Bernardi, Tony L, An objective frequency domain method for quantifying confined aquifer compressible storage using Earth and atmospheric tides, American Geophysical Union (AGU), 2016-11-28.ISBN: 00948276

Bredenhoef, John D, Response of well-aquifer systems to Earth tides, American Geophysical Union (AGU), 1967-06-15.ISBN: 01480227

Briciu, Andrei-Emil, Wavelet analysis of lunar semidiurnal tidal influence on selected inland rivers across the globe, Springer Science and Business Media LLC, 2014-02-26.ISBN: 20452322

Delorey, Andrew A ; van der Elst, Nicholas J ; Johnson, Paul A, Tidal triggering of earthquakes suggests poroelastic behavior on the San Andreas Fault, Elsevier B.V, 2017-02-15.ISBN: 0012821X

Gross, Richard S, the excitation of the Chandler wobble, 2000-08-01.ISBN: 00948276

Bernd Kulesa ; Bryn Hubbard ; Giles H. Brown ; Julia Becker, Earth tide forcing of glacier drainage, American Geophysical Union, 2003-01-07.ISBN: 00948276

Rufu, Raluca ; Aharonson, Oded ; Perets, Hagai B, A multiple-impact origin for the Moon, 2017-02.ISBN: 17520894

Aarons, Sarah M ; Reimink, Jesse R ; Greber, Nicolas D ; Heard, Andy W ; Zhang, Zhe ; Dauphas, Nicolas, Titanium isotopes constrain a magmatic transition at the Hadean-Archean boundary in the Acasta Gneiss Complex, United States, 2020-12.

Renee C. Weber ; Pei-Ying Lin ; Edward J. Garnero ; Quentin Williams ; Philippe Lognonné, Seismic Detection of the Lunar Core, American Association for the Advancement of Science, 2011-01-21.ISBN: 00368075

Davies, J. Huw, Global map of solid Earth surface heat flow, 2013-10.ISBN: 15252027

GUBBINS, David ; SREENIVASAN, Binod ; MOUND, Jon ; ROST, Sebastian, Melting of the Earth's inner core, Nature Publishing Group, 2011.ISBN: 00280836

Thébault, Erwan ; Finlay, Christopher C ; Beggan, Ciarán D ; Alken, Patrick ; Aubert, Julien ; Barrois, Olivier ; Bertrand, Francois ; Bondar, Tatiana ; Boness, Axel ; Brocco, Laura ; Canet, Elisabeth ; Chambodut, Aude ; Chulliat, Arnaud ; Coïsson, Pierdavide ; Civet, François ; Du, Aimin ; Fournier, Alexandre ; Fratter, Isabelle ; Gillet, Nicolas ; Hamilton, Brian ; Hamoudi, Mohamed ; Hulot, Gauthier ; Jager, Thomas ; Korte, Monika ; Kuang, Weijia ; Lalanne, Xavier ; Langlais, Benoit ; Léger, Jean-Michel ; Lesur, Vincent ; Lowes, Frank J ; Macmillan, Susan ; Manda, Mioara ; Manoj, Chandrasekharan ; Maus, Stefan ; Olsen, Nils ; Petrov, Valeriy ; Ridley, Victoria ; Rother, Martin ; Sabaka, Terence J ; Saturnino, Diana ; Schachtschneider, Reyko ; Sirol, Olivier ; Tangborn, Andrew ; Thomson, Alan ; Tøffner-Clausen, Lars ; Vigneron, Pierre ; Wardinski, Ingo ; Zvereva, Tatiana, International Geomagnetic Reference Field: the 12th generation, Springer Berlin Heidelberg, 2015-12.ISBN: 18805981

Peter Bird, An updated digital model of plate boundaries, American Geophysical Union, 2003-03-14.ISBN: 15252027

Sallarès, Valentí ; Charvis, Philippe ; Flueh, Ernst R ; Bialas, Joerg, Seismic structure of the Carnegie ridge and the nature of the Galápagos hotspot, Blackwell Science Ltd, 2005-06.ISBN: 0956540X

Steinberger, Bernhard ; Becker, Thorsten W, A comparison of lithospheric thickness models, Elsevier B.V, 2018-10-30.ISBN: 00401951

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

Available to Elective, Visiting and Exchange Students.

GEG358 Measuring Climate Change

Credits: 20 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr I Robertson, Prof MH Gagen

Format: Lectures 20; Workshops 6. Contact Hours will be delivered through lectures and workshops." Remove online activities.

Delivery Method: The module will be delivered through lectures and workshops.

Module Aims: The aim of this module is to provide the participants with the relevant skills to place the widely reported anthropogenic influences upon climate into the perspective of a naturally changing climatic system. The module focuses upon the techniques used to reconstruct changes in climate over the last 1000 years and presents reconstructions at differing temporal scales. The module is directed towards students with a basic scientific and mathematical background.

Module Content: Description

The aim of this module is to provide the participants with the relevant skills to place the widely reported anthropogenic influences upon climate into the perspective of a naturally changing climatic system. The module focuses upon the techniques used to reconstruct changes in climate over the last 1000 years and presents reconstructions at differing temporal scales. There is an emphasis upon dendrochronology reflecting the relative importance of this topic within the literature. The mathematical techniques used to reconstruct past climates are discussed briefly. The module is directed towards students with a basic scientific and mathematical background.

Intended Learning Outcomes: - Develop a knowledge and understanding of the physical basis, application and limitations of the main techniques used in reconstructing the climate of the last 1000 years
- Synthesize the existing information on the climate of the last 1000 years
- Critically evaluate the published literature on the climate of the last 1000 year
- Assess the techniques used to obtain climatic information from proxy data.
- Discuss the key concepts involved in standardizing proxy indices to remove non-climatic trends
- Place the widely-reported anthropogenic trends in recent climate into the perspective of a naturally changing climatic system

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

Assessment Description: Outline of typical lecture topics:

- 1) Climate past, present – Prof. Mary Gagen
- 2) Climate future – Prof. Mary Gagen
- 3) Introduction to tree-ring proxies - Dr I Robertson
- 4) Stable isotopes in tree-rings – Dr I Robertson
- 5) Dating archives – Dr I Robertson
- 6) Peat - Dr I Robertson
- 7) Collapse of civilisations – Dr I Robertson
- 8) Sea-level changes - Dr I Robertson
- 9) Laminated sediments – Dr I Robertson
- 10) Ice cores – Dr I Robertson
- 11) Tephrochronology – Dr I Robertson
- 12) Methods of Climatic Reconstruction – Dr I Robertson
- 13) Documentary and historical records - Dr I Robertson
- 14) Summary – Dr I Robertson

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

Assessment Feedback: Continual assessment feedback is provided online using standard departmental feedback forms.

Failure Redemption: Failure is non-redeemable in level 3

Reading List: Fritts, Harold C., Tree rings and climate / H.C. Fritts., Blackburn Press,, 2001.ISBN: 9781930665392

H. Fritts, Tree Rings and Climate., Elsevier Science, 2012.ISBN: 9780323145282

W. F. Ruddiman (William F.), 1943- author., Earth's climate : past and future / William F. Ruddiman., New York : W.H. Freeman and Company, 2014.ISBN: 9781429255257

John Houghton (John Theodore), author., Global warming : the complete briefing / Sir John Houghton., Cambridge : Cambridge University Press, 2015.ISBN: 9781107091672

Stocker, Thomas,, Climate change 2013 : the physical science basis : Working Group I contribution to the Fifth assessment report of the Intergovernmental Panel on Climate Change / edited by Thomas F. Stocker, Working Group I co-chair, University of Bern [and nine others]., Cambridge University Press,, [2014].ISBN: 9781107661820

J. J. Lowe (Joseph John), 1946- author., Mike Walker author., Reconstructing quaternary environments / John Lowe and Mike Walker., Abingdon, Oxon : Routledge is an imprint of the Taylor & Francis Group, an informa business, 2015.ISBN: 9781317753704

Diamond, Jared M., Collapse : how societies choose to fail or survive, Penguin Books, 2011.ISBN: 9780241958681

Additional Notes: The module is taught in Semester 2 usually with an introductory lecture in Semester 1.

Normally available to elective, exchange and visiting students.