HR920-10 Climate Change

24/25

Department
> Life Sciences

Level
> Taught Postgraduate Level

Module leader
> Ed Smith

Credit value
> 10

Module duration
> 2 weeks

Assessment
> 100% coursework

Study location
> University of Warwick main campus, Coventry

Description

Introductory description

Climate Change is widely agreed to be the most important environmental driver of economic and societal change for the 21st century. Almost all areas of policy and planning, commerce and production will take place in the context of how they affect or are affected by climate change outcomes.

Module aims

The purpose of this module is to provide a broad introduction to the science of climate change, its origins and consequences. This module presents the evidence for past and recent climate change. It will introduce the most important greenhouse gases, explain their origins and action. It will consider how predictions of future changes are made; introduce the scenarios that lie beneath them and how these are translated at different spatial and temporal scales. This will lead on to potential impacts, particularly with regard to ecosystems, agriculture and food security. The module will conclude by considering mitigation and adaptation to climate change, particularly in agricultural systems.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be

covered. Actual sessions held may differ.

1. Basic principles of climate change, evidence, examples of changes (phenology), origin and role of IPCC, approaches and methodologies of climate impact studies (2 lectures).
2. Carbon dioxide; Its role in climate change, evidence for increases, mechanism of action, origins and fate of carbon dioxide in the atmosphere, role of biotic and abiotic factors.
3. Methane & other GHGs; Their importance as greenhouse gases, Global cooling, sulphur, aerosols. Factors that affect warming by absorbing or reflecting radiation. Origins, mechanisms.
4. Ozone & UV-B. Origins of ozone, impact at stratospheric and tropospheric level. International agreements and impact. Ozone holes and UV. Ozone, crops and health.
5. Future Climates 2050 & 2080, global and regional. IPCC reports, future scenarios, timescales. Impact projections, global patterns of change. UKCIP projections.
6. Impacts on Sea and coastline. Components of ocean climate; temperature, salinity, circulation, heat exchange. Acidification of the oceans, seal levels, storms and coastal erosion marine ecosystems.
7. Impacts on Agriculture and Food production. How do plants respond to increased temperature and carbon dioxide. How do changes at the individual plant level translate into crop performance. How will these interact with other changes such as water availability and ozone levels.
8. Agriculture and Food Production in the UK. What will be the main drivers for change in the future? The consequences of climate change for where and how crops are grown in the UK. The impact of extreme weather. The potential for new crops.
   9). Politics of Climate Change. Legal and Global Political issues, International Agreements.
9. What are the implications of Climate Change for Food Security. What parts of the world's food production system will be most affected by climate change. What will be the limiting factors.
10. Mitigation of and adaptation to climate change.

Learning outcomes

By the end of the module, students should be able to:

* Critically evaluate the evidence for climate change
* Demonstrate knowledge of future scenarios and climate predictions
* Know the potential impacts of climate change
* Understand how agricultural systems may adapt to climate change

Indicative reading list

Bloom, AJ (2010) Global Climate Change: convergence of disciplines. Sinauer Associates Inc.

Dessler AE & Parson EA (2020). The Science and Politics of Global Climate Change: a guide to the debate. Cambridge University Press.

Houghton (2015) Global warming: the complete briefing. Cambridge University Press.

Timothy Cadman (2013) Climate change and global policy regimes [electronic resource] : Towards

institutional legitimacy. Palgrave Macmillan.

[View reading list on Talis Aspire](#)

Research element

Students have to do their own modelling of future scenarios, graph the data and interpret this data based on their knowledge of what has been taught in the module. This forms the assessment for this module.

International

As the effects of climate change are a global issue, the knowledge and skills learnt on this course will be relevant and applicable in every country of the world.

Subject specific skills

Knowledge of the chemical components that are responsible for climate change and how they drive global warming
Ability to use modelling to predict future climates in specific regions of the world
Knowledge of mitigation and adaptation strategies that can help to reduce the impacts of climate change

Transferable skills

Working with others to deliver a presentation
Analysis of large data sets using Excel (including IF statements and Pivot tables)
Graphical presentation of data

Study

Study time

Type	Required
Lectures	14 sessions of 1 hour (14%)
Seminars	1 session of 4 hours (4%)
Tutorials	(0%)
Practical classes	(0%)
Supervised practical classes	2 sessions of 3 hours 30 minutes (7%)
Private study	48 hours (49%)
Assessment	25 hours (26%)
Total	98 hours

Private study description

Independent research

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A5

	Weighting	Study time	Eligible for self-certification
Data handling and report	100%	25 hours	Yes (extension)

The exercise is based on the potential impact of climate change on wheat growing in the UK. Students should write a report on the potential impact of climate change on wheat production in East Anglia at the end of this century, assuming a high emissions scenario and using the results of the UKCP18 modelling & data analyses introduced in the UKCP18 workshop in the module.

The students are asked to use the outputs from the UKCP18 modelling to identify the predicted timing and frequency of conditions that would be adverse for wheat production in the future compared with the present, and to propose strategies to ensure continued wheat production in the UK.

Feedback on assessment

Written feedback from the marker will be provided to the student via Tabula, they will also be provided with annotated manuscripts if additional comments have been added directly to the piece of work.

Availability

Courses

This module is Core for:

- Year 1 of THRA-D4A1 Postgraduate Taught Environmental Bioscience in a Changing

Climate
- THRA-D4A3 Postgraduate Taught Food Security
  - Year 1 of D4A3 Food Security
  - Year 1 of D4A3 Food Security
- Year 1 of THRA-D4A2 Postgraduate Taught Sustainable Crop Production: Agronomy for the 21st Century

This module is Optional for:

- Year 1 of ULFA-C1A1 Undergraduate Biological Sciences (MBio)