ENVS7104

Climate Change and Adaptation

Session 1, Weekday attendance, North Ryde 2021

Archive (Pre-2022) - Department of Earth and Environmental Sciences

Contents

Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and other small group activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face activities for your unit, please go to timetable viewer. To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff
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by appointment

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Credit points
10

Prerequisites
Admission to MRes

Corequisites

Co-badged status
ENVS8104

Unit description
Global climate change is one of the important issues facing humanity in the 21st century; the ability to mitigate or adapt to projected climate changes depends on developing an integrated perspective on the physical, biological, biogeochemical, socio-economic and cultural factors that influence the climate system. This unit focuses on the scientific framework for understanding climate change, and covers (a) the multiple drivers of climate change, (b) the role of physical and biogeochemical feedbacks in the climate system, (c) climate change projections, (d) impacts from anthropogenic climate change including those from extreme events and (e) the principles of mitigation and adaptation of climate change and how they are performed under national and international context. It will provide students with the background to critically evaluate current understanding of the complex interactions that determine climate trajectories, the reliability of the tools used to make climate-impact projections and the effectiveness of various mitigation and adaptation strategies.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: analyse, question, and synthesise knowledge about climate change from a range of sources

ULO2: research, interpret, and assess data on climate change and drawing connections across fields of knowledge

ULO3: demonstrate an understanding of and effectively manage uncertainty in scientific data and complexity with respect to current climate change

ULO4: identify the impacts from climate change on the environment, energy, economy and health

ULO5: confidently communicate and convey opinions on climate change mitigation and adaptation strategies in forms appropriate to different audiences

General Assessment Information

Practical Report: Due 31 March 2020 (30% of final grade)

Students will be allocated to one of the following four regions within New South Wales: Illawarra-Shoalhaven; Metropolitan Sydney; North Coast; South East and Tablelands). Produce a ***2-page fact sheet*** for public consumption which describes trends over the past few decades, and projections, both short-term (next two decades) and long-term (to 2070). An ***additional one page addendum*** should also be submitted (i.e. bringing the total assignment submission to 3 pages) which provides additional background information on the models used, sources of information and caveats around potential errors and variability in model projections.

The report will integrate the following tutorial tasks:

For Climate trends, use the Bureau of Meteorology data accessed in Tutorial Week 3:

For Climate Projections, use the NARCLIM down-scaled climate modelling results accessed in Tutorial Week 4:

For sea-level trends, use the resources provided in Tutorial Week 5

The report should be intelligible to the lay person, but clearly based on and referencing the best available science.

Reports will be graded with reference to:

- Concise graphical representation of trends
- Meaningful spatial representation of modelling results
- Clear interpretation of the results relevant to the general population
- Explanation of the basis for measurement and prediction

- Explanation of uncertainty

Climate Change Adaptation group report: Due 25 May 2020 (30% of grade)

This is a group report. You will provide an integrated regional vulnerability assessment for your region (allocated for the Practical report), and specific, implementable adaptation options for local and state government.

For the allocated region within New South Wales provide a precis of the potential impacts of climate change between now and 2070. In this section you may wish to reference the regional vulnerability assessments conducted by the NSW government (https://climatechange.environment.nsw.gov.au/Adapting-to-climate-change/Regional-vulnerability-and-assessment)

Informed by current NSW government strategy, you will address vulnerability and provide adaptation options for the four themes below:

- Infrastructure and Tourism
- Agriculture and water resources
- Human Health and emergency services
- Natural ecosystems and cultural heritage

Provide immediate, short term (2-5 years) and long-term (5-10 year) strategies for implementation. Maximum 3000 words.

On-line Quiz

Each on-line quiz will consist of 30 multiple choice questions, based solely on the lecture material. The quiz will be open for 1 hour including reading time, and accessed through iLearn.

Quiz 1 will cover material presented in lectures weeks 1-3 inclusive and will be held 11am on Monday Week 4 (15th March 2021)

Quiz 2 will cover material presented in lectures weeks 4,5 7 and 8 and will be held 11am on Monday Week 9 (3rd May 2021)

Quiz 2 will cover material presented in lectures weeks 9-12 inclusive and will be held 11am on Monday Week 13 (31st May 2021)

Assessment Tasks

Name	Weighting	Hurdle	Due
Multiple quizzes	30%	No	Week 4 15/03; Week 9 03/05; Week 13 31/05
Practical report and discussion	30%	No	Week 5: March 31 2021

Name	Weighting	Hurdle	Due
Climate Change Mitigation/ Adaptation Essay	40%	No	Week 12 May 24 2021

Multiple quizzes

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 10 hours
Due: **Week 4 15/03; Week 9 03/05; Week 13 31/05**
Weighting: **30%**

Online quizzes at set points through the semester, assessing comprehension of knowledge aspects of the unit

On successful completion you will be able to:

- research, interpret, and assess data on climate change and drawing connections across fields of knowledge
- demonstrate an understanding of and effectively manage uncertainty in scientific data and complexity with respect to current climate change
- identify the impacts from climate change on the environment, energy, economy and health
- confidently communicate and convey opinions on climate change mitigation and adaptation strategies in forms appropriate to different audiences

Practical report and discussion

Assessment Type [1]: Report
Indicative Time on Task [2]: 20 hours
Due: **Week 5: March 31 2021**
Weighting: **30%**

Short practical report combining and interpreting the results of several practical aspects of the unit

On successful completion you will be able to:

- analyse, question, and synthesise knowledge about climate change from a range of

sources
- research, interpret, and assess data on climate change and drawing connections across fields of knowledge
- demonstrate an understanding of and effectively manage uncertainty in scientific data and complexity with respect to current climate change

Climate Change Mitigation/Adaptation Essay

Assessment Type [1]: Essay
Indicative Time on Task [2]: 30 hours
Due: **Week 12 May 24 2021**
Weighting: **40%**

Essay to discuss mitigation/adaptation strategies for climate change impact (e.g. heat, wave, drought, storm, bushfire, flood)

On successful completion you will be able to:
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[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

The Unit consists of a weekly lecture (11am - 12 noon Mondays, delivered and recorded on-line) and a 2-hour tutorial (one of which will be recorded). Tutorial times are:

Monday 1pm 11 Wallys Walk Room 180

Thursday 12 noon ONLINE (see iLearn site for login details)

Unit Schedule

	LECTURE: Mondays 11-12pm: **Online via Echo360, followed by zoom Q and A**	**TUTORIAL:** Campus Monday 1pm RM180 11 Wallys Walk and on-line Thursday noon
Week 1- (week beginning 22 Feb)	**Atmospheric composition and climate** Earliest papers on global warming. The link between greenhouse gasses and temperature. Global Climate Models. Observation vs prediction	**Zoom seminar: introduction to the course and assessment tasks**
Week 2- (Week beginning 1 March)	**Timescales of Climate Change and climate variability** The Tertiary and the Quaternary, Glacial and Interglacial periods, Trends through the Holocene, Interdecadal and interannual climate trends in Australia (ENSO, SAM and the IOD)	**Myth-busting 1**: The Climate Hiatus
Week 3- (week beginning 8 March)	**Projections of Climate Change in the 21st Century** Climate modelling for the IPCC. The projections of the 5th Assessment Report.	**Working with BOM climate data**
Week 4 (week beginning 15 March)	**The Cryosphere, Ocean warming and Sea Level Rise: impact and adaptation** Ice sheet collapse. Drivers of sea-level rise. Sea level rise observations and projections. Sea level rise impacts Adaptation/mitigation case study: REDD+ and Blue Carbon.	**NARCLIM climate change projections** and report Online Quiz 1
Week 5 (week beginning 22 March)	**Climate Change Vulnerability and Adaptation in Australia** Bushfires, including the 2020 season. Drought and agriculture. Extreme Heatwaves, snow season, coral bleaching, sea level rise vulnerability. The NSW Coastal Reforms	**Myth Busting 2: Sea-level trends:** Online data and imaging tools; analysis of Port Kembla sea-level Data.
Week 6 (week beginning 29 March)	**Guest Lecture: Professor Andrew Skidmore** Fragmenting landscapes and biodiversity as impacted by climate change	**Facilitated discussion (by zoom, normal tutorial time)**: Causes and consequences of the 2019-2020 Australian drought and Bushfires **PRAC REPORT DUE MARCH 31**
(week beginning 5 April)	**Recess (UA Common Week)**	
(week beginning 12 April	**Recess**	

Week 7 (week beginning 19 April)	**Climate Change and Human Health: A/Prof Paul Beggs** Direct impacts such as heat-related disease. Indirect impacts such as vector-borne and respiratory diseases. Climate change and health adaptation.	**Health and Climate Change:** Changing human exposure to airborne allergens: observations
Week 8 (week beginning 26 April)	**Climate Change and Human Health – The Lancet Countdown: A/Prof Paul Beggs** Tracking progress on health and climate change. Domains and indicators. The MJA-Lancet Countdown in Australia.	**The Lancet Countdown:** Tracking progress on health and climate change, online data viewer, public and political engagement
Week 9 (week beginning 3 May)	**Adaptation/mitigation case study: environmental water** The challenge of climate change adaptation in the Murray Darling Basin. The water market as an adaptation mechanism	**Tutorial**: Facilitated discussion with NSW environmental water managers. **Online Quiz 2**
Week 10 (week beginning 10 May)	**Climate Change winners and losers** Opportunities and vulnerabilities at the global scale. CO_2, warming and agriculture, fisheries, inter-generational equity, poverty and exposure.	Group report preparation, and **zoom-enabled or face-to-face group consultations by appointment**
Week 11 (week beginning 17 May)	**Mitigation: the IPCC Framework** Emissions and temperature outcomes. Contributions to global emissions. Trends in emissions by sector	Group report preparation, and **zoom-enabled or face-to-face group consultations by appointment**
Week 12 (week beginning 24 May)	**Opportunities for mitigation in Australia (Garnaut report)** Market mechanisms, carbon pricing and emissions trading. History of Australian climate and energy policy. Opportunities for transition to low emissions technology. Natural carbon sequestration and storage	**ADAPTATION REPORT DUE** **MAY 25th**
Week 13 (week beginning 31 May)	**Overview and Key Learnings**	Online Quiz 3

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy

- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy

Students seeking more policy resources can visit Student Policies (https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- Getting help with your assignment
- Workshops
- StudyWise
- Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.