



ENVS8104

Climate Change and Adaptation

Session 1, In person-scheduled-weekday, North Ryde 2023

School of Natural Sciences

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General Information

Unit convenor and teaching staff

Neil Saintilan

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Credit points

10

Prerequisites

Admission to MEnv or MSc or GradDipEnv or GradCertEnv or MWldMgt or MConsBiol or GradDipConsBiol or MMarScMgt or MSusDev or GradDipSusDev or GradCertSusDev or MPlan or MEngEnvSafetyEng or MScInnovationEnvSc

Corequisites

Co-badged status

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 draw 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

To pass this unit you must achieve a total mark equal or greater than 50%.

Practical Report: Due 07 April 2023 (30% of final grade)

Students will be allocated to one of eight local government areas within New South Wales. Produce an individual **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.

Use the best available data and projections for temperature, rainfall, extreme fire risk days, and sea-level.

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

<https://climatechange.environment.nsw.gov.au/About-climate-change-in-NSW>

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

<https://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region>

and the new [IPCC interactive tool](#):

For sea-level trends (where relevant), use the resources provided in Week 5 practical (the Port Kembla sea-level rise time-series, and the Coast Adapt and Coastal Risk Australia <http://coastalrisk.com.au/>

<https://coastadapt.com.au/tools/coastadapt-datasets#future-datasets>

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 22 May 2023 (40% 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 in the afternoon and evening on the dates listed below. Students will have 1 hour to complete the quiz including reading time, and accessed through iLearn.

Quiz 1 will cover material presented in lectures weeks 1-3 inclusive and will be held the Wednesday Week 4 (15th March 2023)

Quiz 2 will cover material presented in lectures weeks 4,5 7 and 8 and will be held on the Wednesday Week 9 (3rd May 2023)

Quiz 3 will cover material presented in lectures weeks 9-12 inclusive and will be held on the Wednesday of Week 13 (31st May 2023)

Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a written report or presentation assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. The submission time for all uploaded assessments is **11:55 pm**. A 1-hour grace period will be provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for [Special Consideration](#).

Assessments where Late Submissions will be accepted

- Practical Report and Group Adaptation Report – YES, Standard Late Penalty applies
- Quiz 1,2 and 3 - NO, unless Special Consideration is Granted

Special Consideration

The [Special Consideration Policy](#) aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through ask.mq.edu.au.

Assessment Tasks

| Name | Weighting | Hurdle | Due |
|--|-----------|--------|------------------------------------|
| Climate Change Mitigation/Adaptation Essay | 40% | No | 22/05/2023 |
| Multiple quizzes | 30% | No | 15/03/2023; 03/05/2023; 31/05/2023 |
| Practical report and discussion | 30% | No | 07/04/2023 |

Climate Change Mitigation/Adaptation Essay

Assessment Type ¹: Essay

Indicative Time on Task ²: 30 hours

Due: **22/05/2023**

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:

- research, interpret, and assess data on climate change and draw 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

Multiple quizzes

Assessment Type **1**: Quiz/Test

Indicative Time on Task **2**: 10 hours

Due: **15/03/2023; 03/05/2023; 31/05/2023**

Weighting: **30%**

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

On successful completion you will be able to:

- research, interpret, and assess data on climate change and draw 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: **07/04/2023**

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 draw connections across fields of knowledge
- Demonstrate an understanding of and effectively manage uncertainty in scientific data and complexity with respect to current climate change

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 (uploaded to iLearn on the Friday of the week prior), which can be viewed at a time convenient to the student. An optional question and answer session relating to the week's lecture content will be held each week at 10am on Wednesday, by Zoom (link provided on iLearn). There will be a weekly 2-hour tutorial/practical session on campus, with an on-line option for those students unable to be present on campus. Times are:

Thursday 12 noon - 2pm: 12 Second Way 404 tutorial room

Wednesday 1pm - 3pm: ON-LINE (and recorded)

We will communicate with you via your university email or through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to UNITCOD.E@mq.edu.au from your **university email** address.

For the latest information on the University's response to COVID-19, please refer to the

Coronavirus infection page on the Macquarie website: <https://www.mq.edu.au/about/coronavirus-faqs>. Remember to check this page regularly in case the information and requirements change during semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

Unit Schedule

LECTURE and WORKSHOP PROGRAM 2023: ENV58104/7104

CLIMATE CHANGE AND ADAPTATION

Delivery

| | LECTURE: Online via Echo360, posted Friday the week prior. <i>On-line zoom Q and A Wednesday 10am</i> | WORKSHOP: Campus (12 Second Way Thurs 12-2pm) or on-line (Wed 1-3pm) |
|-------------------------------------|--|--|
| Week 1- (week beginning 20 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 27 Feb) | Timescales of Climate Change and climate variability The Tertiary and the Quaternary, Glacial and Interglacial periods, Trends through the Holocene | Myth-busting 1: The Climate Hiatus |
| Week 3- (week beginning 6 March) | Projections of Climate Change in the 21st Century Climate modelling for the IPCC. The projections of the 6 th Assessment Report. | Working with BOM climate data |
| Week 4 (week beginning 13 March) | The Cryosphere, Ocean warming and Sea Level Rise impacts Ice sheet collapse. Drivers of sea-level rise. Sea level rise observations and projections. Sea level rise impacts | NARCLIM climate change projections Online Quiz 1 (Open 15 March) |
| Week 5 (week beginning 20 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. | Myth Busting 2: Sea-level trends: Online data and imaging tools; analysis of Port Kembla sea-level Data. |

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|-------------------------------------|--|--|
| Week 6 (week beginning 27 March) | Coastal Adaptation case study: Coastal management in Australia, including the NSW Coastal Reforms | Sea-level adaptation in Australia and Indonesia |
| Week 7 (week beginning 3 April) | Adaptation case study: Blue Carbon Approaches to natural climate change mitigation and their limitations | PRAC REPORT DUE APRIL 7 Adaptation planning in NSW: introduction to the report |
| (week beginning 10 April) | Recess (UA Common Week) | |
| (week beginning 17 April) | Recess | |
| Week 8 (week beginning 24 April) | Adaptation case study: environmental water The challenge of climate change adaptation in the Murray Darling Basin. The water market as an adaptation mechanism | Group report preparation, and group/ theme consultations by appointment |
| Week 9 (week beginning 1 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 group/ theme consultations by appointment Online Quiz 2 (Open 3 May) |
| Week 10 (week beginning 8 May) | Mitigation: the IPCC Framework Emissions and temperature outcomes. Contributions to global emissions. Trends in emissions by sector | Seminar: Start-ups and climate mitigation with Mick Liubinskas from Climate salad |
| Week 11 (week beginning 15 May) | Opportunities for mitigation in Australia 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 | No workshop- group work on adaptation report ADAPTATION REPORT DUE MAY 22nd |
| Week 12 (week beginning 22 May) | Reasons for hope: opportunities for global mitigation. Trends in emissions, current commitments (post-Glasgow), prospects and ongoing challenges | Unpacking mitigation targets and trends (simulation game) |
| Week 13 (week beginning 29 May) | Overview and Key Learnings | Online Quiz 3 (Opens 31 May) No tutorial |

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](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](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](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 \(https://policies.mq.edu.au\)](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

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

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

The Writing Centre

The [Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the 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

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

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.