



# ENVS8104

## Climate Change and Adaptation

Session 1, Online-scheduled-weekday 2022

*School of Natural Sciences*

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## General Information

Unit convenor and teaching staff

Course Convenor

Professor Neil Saintilan

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Contact via 0409378863

12 Wallys Walk Room 435

by arrangement

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

### ASSESSMENT INFORMATION: ENV58104/ENV57104 2022 Offering

#### Practical Report: Due 08 April 2022 (30% of final grade)

Students will be allocated to one of four regions within New South Wales. 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.

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>

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 27 May 2022 (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 (16<sup>th</sup> March 2022)

**Quiz 2** will cover material presented in lectures weeks 4,5 7 and 8 and will be held on the Wednesday Week 9 (4<sup>th</sup> May 2022)

**Quiz 3** will cover material presented in lectures weeks 9-12 inclusive and will be held on the Wednesday of Week 13 (25<sup>th</sup> May 2022)

### **General Faculty Policy on assessment submission deadlines and late submissions:**

Online quizzes, in-class activities, or scheduled tests and exam must be undertaken at the time indicated in the unit guide. Should these activities be missed due to illness or misadventure, students may apply for Special Consideration.

All other assessments must be submitted by 5:00 pm on their due date. Should these assessments be missed due to illness or misadventure, students should apply for Special Consideration.

Assessments not submitted by the due date will receive a mark of zero **unless** late submissions are specifically allowed as indicated in the unit guide or on iLearn.

If late submissions are permitted as indicated in the unit guide or on iLearn a consistent penalty will be applied for late submissions as follows:

A 12-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given. For example, an assessment worth 20% is due 5 pm on 1 January. Student A submits the assessment at 1 pm, 3 January. The assessment received a mark of 15/20. A 20% deduction is then applied to the mark of 15, resulting in the loss of three (3) marks. Student A is then awarded a final mark of 12/20

## **Assessment Tasks**

Name	Weighting	Hurdle	Due
<u>Practical report and discussion</u>	30%	No	08/04/2022
<u>Climate Change Mitigation/Adaptation Essay</u>	40%	No	27/05/2022

Name	Weighting	Hurdle	Due
<u>Multiple quizzes</u>	30%	No	16/03/2022; 04/05/2022; 25/05/2022

## Practical report and discussion

Assessment Type <sup>1</sup>: Report

Indicative Time on Task <sup>2</sup>: 20 hours

Due: **08/04/2022**

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

## Climate Change Mitigation/Adaptation Essay

Assessment Type <sup>1</sup>: Essay

Indicative Time on Task <sup>2</sup>: 30 hours

Due: **27/05/2022**

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 <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 10 hours

Due: **16/03/2022; 04/05/2022; 25/05/2022**

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:

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- Demonstrate an understanding of and effectively manage uncertainty in scientific data and complexity with respect to current climate change
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<sup>1</sup> 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.

<sup>2</sup> 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) which can be viewed at a time convenient to the student. There will be a weekly 2-hour tutorial/

practical session, with an on-line option for those students unable to present at campus. On Campus tutorial times are:

Monday 2pm-4pm 29WW room 134

Monday 4pm-6pm ONLINE and recorded

Wednesday 1pm-3pm 29WW room 132

### Off-shore students

Off-shore students **must** email the convenor as soon as possible to discuss study options.

### COVID Information and on-campus classes

On-campus teaching continues to be scheduled for Session 1, 2022. Masks are compulsory for all classes in indoor spaces and social distancing will be implemented wherever possible. Students will also be required to sanitise surfaces before and after use.

Students are requested to minimise the risk of spreading COVID to themselves and others in accordance with the university and NSW Health guidelines: <https://www.mq.edu.au/about/corona-virus-faqs> and <https://www.nsw.gov.au/covid-19/stay-safe>.

## Unit Schedule

	<b>LECTURE:</b> Mondays 11-12pm: <b>Online via Echo360,</b>	<b>TUTORIAL:</b> Campus (29WW 134 Mon/132 Wed) and on-line (Wed)
Week 1- (week beginning 21 Feb)	<b>Atmospheric composition and climate</b>  Earliest papers on global warming. The link between greenhouse gasses and temperature. Global Climate Models. Observation vs prediction	<b>Zoom seminar: Introduction to the course and assessment tasks</b>
Week 2- (Week beginning 28 Feb)	<b>Timescales of Climate Change and climate variability</b>  The Tertiary and the Quaternary, Glacial and Interglacial periods, Trends through the Holocene	<b>Myth-busting 1: The Climate Hiatus</b>
Week 3- (week beginning 7 March)	<b>Projections of Climate Change in the 21<sup>st</sup> Century</b>  Climate modelling for the IPCC. The projections of the 6 <sup>th</sup> Assessment Report.	<b>Working with BOM climate data</b>



<p>Week 4</p> <p>(week beginning 14 March)</p>	<p><b>The Cryosphere, Ocean warming and Sea Level Rise impacts</b></p> <p>Ice sheet collapse. Drivers of sea-level rise. Sea level rise observations and projections. Sea level rise impacts</p>	<p><b>NARCLIM climate change projections</b></p> <p>Online Quiz 1</p> <p>(Open 16 March)</p>
<p>Week 5</p> <p>(week beginning 21 March)</p>	<p><b>Climate Change Vulnerability and Adaptation in Australia</b></p> <p>Bushfires, including the 2020 season. Drought and agriculture. Extreme Heatwaves, snow season, coral bleaching, sea level rise vulnerability. The NSW Coastal Reforms</p>	<p><b>Myth Busting 2: Sea-level trends:</b></p> <p>Online data and imaging tools; analysis of Port Kembla sea-level Data.</p>
<p>Week 6</p> <p>(week beginning 28 March)</p>	<p><b>Coastal Adaptation:</b> Case study of the NSW Coastal Reforms</p>	<p><b>Sea-level adaptation in Australia and Indonesia</b></p>
<p>Week 7</p> <p>(week beginning 4 April)</p>	<p><b>Blue Carbon</b></p> <p>Approaches to natural climate change mitigation and their limitations</p>	<p><b>PRAC REPORT DUE APRIL 8</b></p> <p><b>Adaptation planning in NSW:</b> introduction to the report</p>
<p>(week beginning 11 April)</p>	<p><b>Recess (UA Common Week)</b></p>	
<p>(week beginning 18 April)</p>	<p><b>Recess</b></p>	
<p>Week 8</p> <p>(week beginning 25 April)</p>	<p><b>Adaptation/mitigation case study: environmental water</b></p> <p>The challenge of climate change adaptation in the Murray Darling Basin. The water market as an adaptation mechanism</p>	<p>Facilitated discussion with NSW environmental water managers (<b>Zoom only</b>)</p>
<p>Week 9</p> <p>(week beginning 2 May)</p>	<p><b>Climate Change winners and losers</b></p> <p>Opportunities and vulnerabilities at the global scale. CO<sub>2</sub>, warming and agriculture, fisheries, inter-generational equity, poverty and exposure.</p>	<p>Group report preparation, and <b>group/ theme consultations</b></p> <p>Online Quiz 2 (Open 4 May)</p>
<p>Week 10</p> <p>(week beginning 9 May)</p>	<p><b>Mitigation: the IPCC Framework</b></p> <p>Emissions and temperature outcomes. Contributions to global emissions. Trends in emissions by sector</p>	<p>Group report preparation, and <b>group/ theme consultations</b></p>
<p>Week 11</p> <p>(week beginning 16 May)</p>	<p><b>Opportunities for mitigation in Australia</b></p> <p>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</p>	<p>Group report preparation, and <b>group/ theme consultations</b></p> <p><b>ADAPTATION REPORT DUE</b> <b>MAY 27<sup>th</sup></b></p>

Week 12 (week beginning 23 May)	<b>Opportunities for global mitigation.</b> Trends in emissions, current commitments (post-Glasgow), prospects and ongoing challenges	<b>Unpacking mitigation targets and trends</b>  Online Quiz 3 (Opens 25/05/2022)
Week 12 (week beginning 30 May)	<b>Overview and Key Learnings</b>	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](https://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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 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/](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.