



# ENVS614

## Climate Change

S2 Day 2018

*Dept of Environmental Sciences*

### Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	4
<u>General Assessment Information</u>	5
<u>Assessment Tasks</u>	6
<u>Delivery and Resources</u>	7
<u>Unit Schedule</u>	8
<u>Policies and Procedures</u>	10
<u>Graduate Capabilities</u>	11

#### **Disclaimer**

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## **General Information**

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Credit points

4

Prerequisites

Admission to MEnv or GradDipEnv or GradCertEnv or MSusDev or GradDipSusDev or GradCertSusDev or MSc

Corequisites

Co-badged status

ENVS214

Unit description

Global climate change is one of the most important issues that humanity will have to grapple with in the twenty-first century. This unit investigates our climate system's complex processes, together with the impacts that climate change will have, and what we must do to adapt to and mitigate those impacts. Natural climate variability, abrupt climate change and anthropogenic climate change are key areas of study, together with their impacts on past and modern civilisation. The unit is structured around three themes: - detection and attribution of climate change; - biophysical and socio-economic impacts of climate change; - adaptation, mitigation and decision making. This unit is pitched to a diverse audience. This multidisciplinary unit is taught from scientific, social, economic, engineering and political perspectives by a panel of internationally renowned experts.

## 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:

Develop an informed holistic world view of the climate change issue

Develop and understating and appreciation of the scientific method

Understand the way science is communicated through peer review science journal articles and their interpretation through popular media

Understand fundamental physical mechanisms driving climate variability and change

Differentiate natural climate variability from global warming

Familiarity with the basic data and statistical methods used to study climate change

Explore global impacts of climate change on Earth's physical and biological systems

Examine the socioeconomic and ecological impacts of current and projected climate change

Explore options for mitigating and adapting to projected climate change

## **General Assessment Information**

### **SUBMISSION REQUIREMENTS**

All assignments are to be submitted via Turnitin, the university online submission and marking system - found as a link in iLearn. Turnitin includes Grademark, a paperless grading system where your assignments are marked by staff online. Submissions are also checked for plagiarism by Turnitin. Turnitin automatically compares your work to the work of your classmates, previous students and material available on the internet. Hard copies of assignments are no longer accepted and will not be marked.

For more information on Turnitin and Grademark:

[http://mq.edu.au/iLearn/student\\_info/assignments.htm](http://mq.edu.au/iLearn/student_info/assignments.htm)

### **DEADLINES, EXTENSIONS AND PENALTIES**

Deadlines set for assignment submissions will not be altered except in exceptional circumstances. In all cases, extensions must be applied for before the due date and must be supported with appropriate documentation (medical certificate, counsellor's certificate, statutory declaration). Where an unavoidable disruption warrants an extension, you may also wish to consider applying for Disruption to Studies. Requests for disruption to studies are submitted via [ask.mq.edu.au](http://ask.mq.edu.au). Instructions on how to submit your disruption to studies request can be found here: <http://ask.mq.edu.au/kb.php?record=ce7c4e38-4f82-c4d7-95b1-4e2ee8fd075f>

Extensions will not be granted in cases of poor time management. Only the Unit Convenor can authorise extensions. Late submissions will not be accepted once marked assignments have been returned unless otherwise approved by the Unit Convenor.

Late assignments will incur a late penalty of 10% of the total mark per day. Weekends will be counted as 2 days. Penalties will also be incurred for plagiarism, that is, the use of another person's work and presentation as your own (see University Policies and [http://www.mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://www.mq.edu.au/policy/docs/academic_honesty/policy.html)).

### **GRADING**

Each assignment will be marked, commented upon and returned to you via Turnitin and Grademark. Grading is conducted in line with the university's grading policy (<http://www.mq.edu.au/policy/docs/grading/policy.html>)

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Practical Tasks</u>	30%	No	1 week after practical class
<u>Research report</u>	30%	No	19th October Week 10
<u>Final Exam</u>	40%	No	November 2018

### Practical Tasks

Due: **1 week after practical class**

Weighting: **30%**

You are required to complete and submit an assessable task for each of the 11 practical classes. Instructions for this task will be provided each week in class and via iLearn. Practical tasks contribute a total of 30% towards your final grade, meaning that each task is worth ~2.7%.

On successful completion you will be able to:

- Develop an informed holistic world view of the climate change issue
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- Understand the way science is communicated through peer review science journal articles and their interpretation through popular media
- Understand fundamental physical mechanisms driving climate variability and change
- Differentiate natural climate variability from global warming
- Familiarity with the basic data and statistical methods used to study climate change
- Explore global impacts of climate change on Earths physical and biological systems
- Examine the socioeconomic and ecological impacts of current and projected climate change
- Explore options for mitigating and adapting to projected climate change

### Research report

Due: **19th October Week 10**

Weighting: **30%**

Students will write a 1500 word research report exploring the scientific justification and feasibility of efforts to limit global mean temperature increase to less than 1.5°C. More details on this assignment will be provided in week 7.

On successful completion you will be able to:

- Develop an informed holistic world view of the climate change issue

- Develop and understating and appreciation of the scientific method
- Understand the way science is communicated through peer review science journal articles and their interpretation through popular media
- Understand fundamental physical mechanisms driving climate variability and change
- Differentiate natural climate variability from global warming
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- Explore options for mitigating and adapting to projected climate change

## Final Exam

Due: **November 2018**

Weighting: **40%**

2 hour long final examination during the Semester 2 examination period. Material drawn from all lectures, practicals and assignments. Details of the exam conditions will be discussed during the last lecture.

On successful completion you will be able to:

- Develop an informed holistic world view of the climate change issue
- Develop and understating and appreciation of the scientific method
- Understand fundamental physical mechanisms driving climate variability and change
- Differentiate natural climate variability from global warming
- Explore global impacts of climate change on Earths physical and biological systems
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- Explore options for mitigating and adapting to projected climate change

## Delivery and Resources

### Delivery

There are two lectures each week, and you also need to enrol in a specific practical class.

Timetable information can be found at: <https://timetables.mq.edu.au>

### Lectures

There are 2 x 1 hour lectures each week:

Monday, 2:00 - 3:00, 23 WW T2

Tuesday, 9:00 - 10:00, 23 WW T1

## Practicals

There is 1 x 1 hour practical each week. The options are:

Monday, 1:00 - 2:00, 11 WW 270

Monday, 3:00 - 4:00, 11 WW 260

Monday, 4:00 - 5:00, 11 WW 260

Monday, 5:00 - 6:00, 11 WW 260

Tuesday, 10:00 - 11:00, 11 WW 260

Tuesday, 11:00 - 12:00, 11 WW 260

Tuesday, 12:00 - 1:00, 11 WW 260

## iLearn

The iLearn platform is central to the delivery of course material, assessments and announcements: <http://ilearn.mq.edu.au>

## Resources

The primary resources for this unit will be the Intergovernmental Panel on Climate change (IPCC) Fifth Assessment Report (AR5) (available from <https://www.ipcc.ch/index.htm>) and published research papers relevant to each lecture topic. The following textbooks (available from Macquarie University Library) also provide a good overview of the climate change problem:

1. Bloom, A.J. 2010. Global Climate Change. Convergence of Disciplines. Sinauer Associates, Sunderland, MA, USA.
2. Houghton, J. 2010. Global Warming: The Complete Briefing. Fourth Edition. Cambridge University Press, Cambridge , U.K., 438 pages.
3. Hannah, L. 2010. Climate Change Biology. Academic Press. 416 pages.

## Unit Schedule

Week	Date	Lecture title	Practical and Assessments
1	30-Jul	<b>L1</b> Climate Change: what's the big deal and why should we care? (LH)	No Practical
	31-Jul	<b>L2</b> The historical context: what can we learn? (LH)	



2	6-Aug	L3 Introduction to the climate system and variability (SB)	Human perception and change denial (SB)
	7-Aug	L4 Introduction to the drivers of climate change (SB)	
3	13-Aug	L5 Climate change projections (KC)	How to lie with statistics (KC)
	14-Aug	L6 Using science to clarify climate misconceptions (KC)	
4	20-Aug	L7 Natural ecosystems 1: terrestrial and freshwater systems (LH)	Ecosystem change practical (NS)
	21-Aug	L8 Natural ecosystems 2: marine systems (LH)	
External On-Campus Session 1. Saturday 25th Aug			
5	27-Aug	L9 Cryosphere and alpine environments (IG)	Abrupt change
	28-Aug	L10 Oceans and coastal environments (NS)	
6	3-Sep	L11 Is climate change fair?: the question of social justice (LH)	Climate change historical context (SB)
	4-Sep	L12 Climate change and human civilisations (SB)	
7	10-Sep	L13 Water security (RR)	Measuring the value of water (RR)
	11-Sep	L14 Adapting to water scarcity (RR)	
8	1-Oct	L15 Food security (SB) Public Holiday Online Lecture	Great Barrier Reef: Marine heat waves (SB)
	2-Oct	L16 Tourism and heritage (SB)	
9	8-Oct	L17 Climate change is the biggest global health threat of the 21st century (PB)	Pollen and people (PB)
	9-Oct	L18 Tackling climate change could be the greatest global health opportunity of the 21st century (PB)	
External On-Campus Session 2. Saturday 13th Oct			
10	15-Oct	L19 The international context: implications for Australia (LH)	International Climate Negotiations.  Research report due: 5:00pm, Friday 19th Oct.
	16-Oct	L20 Preventing vs coping with climate change: mitigation and adaptation synergies and tradeoffs (LH)	
11	22-Oct	L21 Extreme solutions: geoengineering (IG)	Geoengineering practical (IG)

	23-Oct	<b>L22</b> Indigenous issues, sovereignty and conflict (SB)	
12	29-Oct	<b>L23</b> Economics of Mitigation and Adaptation (RR)	Analyzing Carbon Tax Impacts through graphs / Energy Efficiency policies and Rebound Effect (RR)
	30-Oct	<b>L24</b> Economics of Mitigation and Adaptation (RR)	
13	5-Nov	<b>L25</b> Plausible Solutions (NS)	No practical
	6-Nov	<b>L26</b> Unit summary (SB)	
PB – A/Prof. Paul Beggs; SB – Dr. Stuart Browning; KC-Kevin Cheung; IG – A/Prof. Ian Goodwin; LH – Prof. Lesley Hughes; RR – Dr. Ram Ranjan; NS – Prof. Neil Saintilan.			

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>). 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](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/student-conduct>

## Results

Results shown in *iLearn*, 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](#).

## 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](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## 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](http://ask.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/](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.

## Graduate Capabilities

### Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

### Learning outcomes

- Explore global impacts of climate change on Earth's physical and biological systems
- Examine the socioeconomic and ecological impacts of current and projected climate change

- Explore options for mitigating and adapting to projected climate change

## **Assessment tasks**

- Practical Tasks
- Research report
- Final Exam

## **Capable of Professional and Personal Judgement and Initiative**

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

## **Learning outcomes**

- Differentiate natural climate variability from global warming
- Explore global impacts of climate change on Earth's physical and biological systems
- Examine the socioeconomic and ecological impacts of current and projected climate change

## **Assessment tasks**

- Practical Tasks
- Research report
- Final Exam

## **Commitment to Continuous Learning**

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

## **Learning outcomes**

- Develop an informed holistic world view of the climate change issue
- Develop and understanding and appreciation of the scientific method
- Understand the way science is communicated through peer review science journal articles and their interpretation through popular media
- Understand fundamental physical mechanisms driving climate variability and change

- Differentiate natural climate variability from global warming
- Explore global impacts of climate change on Earth's physical and biological systems
- Explore options for mitigating and adapting to projected climate change

## **Assessment tasks**

- Practical Tasks
- Research report
- Final Exam

## **Discipline Specific Knowledge and Skills**

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

## **Learning outcomes**

- Develop and understanding and appreciation of the scientific method
- Understand the way science is communicated through peer review science journal articles and their interpretation through popular media
- Understand fundamental physical mechanisms driving climate variability and change
- Differentiate natural climate variability from global warming
- Familiarity with the basic data and statistical methods used to study climate change

## **Assessment tasks**

- Practical Tasks
- Research report
- Final Exam

## **Critical, Analytical and Integrative Thinking**

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

## Learning outcomes

- Develop an informed holistic world view of the climate change issue
- Develop and understating and appreciation of the scientific method
- Understand the way science is communicated through peer review science journal articles and their interpretation through popular media
- Understand fundamental physical mechanisms driving climate variability and change
- Differentiate natural climate variability from global warming
- Familiarity with the basic data and statistical methods used to study climate change
- Examine the socioeconomic and ecological impacts of current and projected climate change
- Explore options for mitigating and adapting to projected climate change

## Assessment tasks

- Practical Tasks
- Research report
- Final Exam

## Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

## Learning outcomes

- Develop an informed holistic world view of the climate change issue
- Develop and understating and appreciation of the scientific method
- Understand fundamental physical mechanisms driving climate variability and change
- Differentiate natural climate variability from global warming
- Familiarity with the basic data and statistical methods used to study climate change
- Explore options for mitigating and adapting to projected climate change

## Assessment tasks

- Practical Tasks
- Research report
- Final Exam

## Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

### Learning outcome

- Understand the way science is communicated through peer review science journal articles and their interpretation through popular media

### Assessment tasks

- Practical Tasks
- Research report

## Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

### Learning outcomes

- Develop an informed holistic world view of the climate change issue
- Explore global impacts of climate change on Earth's physical and biological systems
- Examine the socioeconomic and ecological impacts of current and projected climate change
- Explore options for mitigating and adapting to projected climate change

### Assessment tasks

- Practical Tasks
- Research report
- Final Exam

## Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and

country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

## **Learning outcomes**

- Develop an informed holistic world view of the climate change issue
- Differentiate natural climate variability from global warming
- Explore global impacts of climate change on Earth's physical and biological systems
- Examine the socioeconomic and ecological impacts of current and projected climate change
- Explore options for mitigating and adapting to projected climate change

## **Assessment tasks**

- Practical Tasks
- Research report
- Final Exam