ENVE216

The Atmospheric Environment

S1 Day 2014

Dept of Environment & Geography

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
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E7A 601

Credit points
3

Prerequisites
ENVE117(P) or GEOS117(P) or GEOS112(P) or 3cp in PHYS units at 100 level

Corequisites

Co-badged status
Not co-badged with another unit.

Unit description
This unit provides an introduction to the main atmospheric, oceanic and other environmental processes that are responsible for our weather and climate. The unit builds on themes introduced in ENVE117 and GEOS112. While the unit ranges from microclimates up to global climates, the focus is on Australian region weather and climate. On-campus students participate in some local field exercises, such as releasing weather balloons and taking weather measurements. Specific lecture themes include: atmospheric energy, understanding weather charts, weather forecasting, wind systems, cloud processes, severe weather, tropical cyclones, tornadoes, and El Nino.

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:

Understand the fundamental principles on which meteorology and climatology are based

Understand important meteorological and oceanic processes which shape weather and climate

Recall and appropriately utilise meteorological and climatological terminology

Recognise and appropriately utilise basic equations which govern weather and climate

Apply basic concepts and equations to practical (real world) problems

Acquire field skills to collect data by measurement or observation (e.g., familiarity with the use of basic meteorological instruments)

Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology

Analyse and evaluate categorical and numerical data (e.g., interpreting environmental data)

Conceptualise and apply simple models relating to weather and climate processes

Assessment Tasks

Name	Weighting	Due
Peer discussion	10%	Week 13
Report 1	15%	11 April 2014
Report 2	15%	9 May 2014
Report 3	20%	6 June 2014
Final exam	40%	TBA

Peer discussion

Due: **Week 13**
Weighting: **10%**

The ‘Reading Game” is a new utility developed by our Learning and Teaching Centre that allows you to generate your own questions and answer those created by your peers. There is a scoring system in the game to let you compete with your peers. This is the first year we implement this utility in this unit. The aim is to let you think about the weather phenomena occurring around you, and try to understand them.

On successful completion you will be able to:

- Understand the fundamental principles on which meteorology and climatology are based
- Understand important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Apply basic concepts and equations to practical (real world) problems

- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Conceptualise and apply simple models relating to weather and climate processes

Report 1

Due: **11 April 2014**
Weighting: **15%**

The physical concepts behind cloud and rain development is the focus of this project. The associated lecture topics are water in the atmosphere, condensation and static stability. Through an online practical students will learn to apply aerological diagrams for analysing the temperature, water content and stability in the atmosphere. Then such techniques will be applied to analyse some actual weather station observations. A written report has to be submitted.

On successful completion you will be able to:

- Understand the fundamental principles on which meteorology and climatology are based
- Understand important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Acquire field skills to collect data by measurement or observation (e.g., familiarity with the use of basic meteorological instruments)
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Analyse and evaluate categorical and numerical data (e.g., interpreting environmental data)

Report 2

Due: **9 May 2014**
Weighting: **15%**

This module in the unit is about the governing principles of the winds. Students learn to apply the appropriate models and mathematical equations in different weather systems, and should be able to quantitatively estimate the winds at locations of interest based on available observations. Assignment-type questions will be set and answers to the questions will be compiled in a report for submission.

On successful completion you will be able to:

- Understand the fundamental principles on which meteorology and climatology are based
- Understand important meteorological and oceanic processes which shape weather and climate

- Recall and appropriately utilise meteorological and climatological terminology
- Recognise and appropriately utilise basic equations which govern weather and climate
- Apply basic concepts and equations to practical (real world) problems
- Acquire field skills to collect data by measurement or observation (e.g., familiarity with the use of basic meteorological instruments)

Report 3

Due: **6 June 2014**
Weighting: **20%**

In this project, students will apply the physical principles discussed in the lectures to perform meteorological analysis. Severe weather systems will be analysed to examine how the phenomena are related to observations, what principles are appropriate to understand such phenomena and what diagnoses are available to explain the behavior of the weather systems. Students are asked to work in groups of two to three and select their weather phenomena to analyse. Times near the end of unit have been allocated for the student groups to present their case studies. An assoicated written report on such case studies will be submitted.

On successful completion you will be able to:

- Understand the fundamental principles on which meteorology and climatology are based
- Understand important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Apply basic concepts and equations to practical (real world) problems
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Analyse and evaluate categorical and numerical data (e.g., interpreting environmental data)
- Conceptualise and apply simple models relating to weather and climate processes

Final exam

Due: **TBA**
Weighting: **40%**

A formal examination that cover all topics in the unit.

On successful completion you will be able to:

- Understand the fundamental principles on which meteorology and climatology are based
- Understand important meteorological and oceanic processes which shape weather and climate

- Recall and appropriately utilise meteorological and climatological terminology
- Recognise and appropriately utilise basic equations which govern weather and climate
- Apply basic concepts and equations to practical (real world) problems
- Analyse and evaluate categorical and numerical data (e.g., interpreting environmental data)
- Conceptualise and apply simple models relating to weather and climate processes

Delivery and Resources

Delivery: Day and external

Unit web page

The new iLearn (https://ilearn.mq.edu.au/) learning management system will be used to deliver lecture materials, assignments and quizzes. It is also a platform for you to communicate with your lecturers and fellow students. Please notify the Convenor of the unit as soon as possible if you are not able to access this unit when you login iLearn.

Lecture times and locations

On-Campus Times

Lectures

Wed, 1p.m. - 2 p.m. (W6B 325)

Fri, 11 a.m. - 12 p.m. (W6B 345)

Practicals (E5A 270)

Wed, 4 p.m. - 6 p.m. (group 1)

Fri, 12 p.m. - 2 p.m. (group 2)

1. There are two lectures per week. You can confirm lecture times and rooms at the Macquarie University Timetables website: www.timetables.mq.edu.au

2. External students listen to recorded lectures available in Echo360. These are usually available 30 minutes after a lecture is delivered.

3. Lecture topics are detailed in course schedule below.

Practical sessions for internal students

1. There is one two-hour practical class or tutorial per week for internal students.

2. In this year, practical sessions are consultation times with the lecturers when you work on your projects (with associated reports to submit). It is not compulsory to attend the practical sessions, but strongly recommended to do so when you want to discuss your work with the lecturers.

Practical sessions for external students:

1. **There are no compulsory on-campus sessions for this unit.**

2. To complete the practical work and read tutorial notes, external students must have access to a computer with internet access and a web browser. Most of the work can be done with Microsoft Office and software to read 'pdf' documents.

3. All the practical project materials are online such that the external students are able to access and perform the same work as the internals. If necessary, externals students can select to attend one of the practical sessions to consult the lecturers.

Required and recommended unit materials

Textbooks

The recommended textbook for the unit is The Weather and Climate of Australia and New Zealand (Second Edition, Oxford University Press) by A. P. Sturman and N. J. Tapper (2006). Also recommended: Wallace, J.M. and Hobbs, P.V., 1977: Atmospheric science: an introductory survey, New York: Academic Press, 467pp. (QC861.2.W34). Although dated, this is one of the best introductions to the fundamental concepts in the atmospheric science. In additional, open courseware will be recommended whenever appropriate.

Unit Schedule

THEME: ENERGY

Week 1

Lecture 1. Course Overview

Lecture 2. Radiation I

Week 2

Lecture 3. Radiation II

Lecture 4. Energy Balance

THEME: WINDS

Week 3

Lecture 5. Hydrostatic Balance

Lecture 6. General Circulation I

Week 4

Lecture 7. General Circulation II

Lecture 8. Ocean Circulation

THEME: WATER

Week 5

Lecture 9. Water in the Atmosphere

Lecture 10. Atmospheric Stability

Week 6

Lecture 11. Clouds and Precipitation

Lecture 12. Microphysics

THEME: UNDERSTANDING WINDS

Week 7

Lecture 13. Horizontal Motion I

Lecture 14. Horizontal Motion II

THEME: METEOROLOGICAL ANALYSIS

Week 8

Lecture 15. Synoptic-scale Circulation

Lecture 16. Weather Systems

Week 9

Lecture 17. Monsoons

Lecture 18. Mesoscale Processes I

Week 10

Lecture 19. Mesoscale Processes II

Lecture 20. Weather Forecasting

THEME: FORECAST

Week 11

Lecture 21. Operational Meteorology

Lecture 22. Weather and Climate

Week 12

Lecture 23. Student presentations

Lecture 24. Student presentations

Week 13

Lecture 25. Student presentations

Lecture 26. Summary, Exam Structure

(A more detailed schedule with assessment tasks is available in iLearn.)

Learning and Teaching Activities

Lectures

Attnd the weekly 2-hour lectures.

Practical/projects

Perform the research and analysis work in the projects associated with assessment tasks Reports 1-3.

Assignments

Complete the written reports of assessment tasks.

Weekly reading

Read the related sections in the assigned textbook and other recommended literature and online materials.

Private study

Revision of the key concepts in lectures and practical projects.

Discussion board

Participate in the peer discussion module.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of 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/support/student_conduct/

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 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

IT Help

For help with University computer systems and technology, visit http://informatics.mq.edu.au/help/.

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

Graduate Capabilities

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

- Recognise and appropriately utilise basic equations which govern weather and climate
- Acquire field skills to collect data by measurement or observation (e.g., familiarity with the use of basic meteorological instruments)
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Analyse and evaluate categorical and numerical data (e.g., interpreting environmental data)
- Conceptualise and apply simple models relating to weather and climate processes

Assessment tasks

- Peer discussion
- Report 1
- Report 2
- Report 3
- 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

- Apply basic concepts and equations to practical (real world) problems
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology

- Conceptualise and apply simple models relating to weather and climate processes

Assessment tasks

- Peer discussion
- Report 2
- 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

- Understand the fundamental principles on which meteorology and climatology are based
- Understand important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Recognise and appropriately utilise basic equations which govern weather and climate
- Apply basic concepts and equations to practical (real world) problems
- Acquire field skills to collect data by measurement or observation (e.g., familiarity with the use of basic meteorological instruments)
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- Conceptualise and apply simple models relating to weather and climate processes

Assessment tasks

- Peer discussion
- Report 1
- Report 2
- Report 3
- 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

- Understand the fundamental principles on which meteorology and climatology are based
- Understand important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Recognise and appropriately utilise basic equations which govern weather and climate
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Assessment tasks

- Peer discussion
- Report 1
- Report 2
- Report 3
- 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

- Recognise and appropriately utilise basic equations which govern weather and climate
- Apply basic concepts and equations to practical (real world) problems
- Acquire field skills to collect data by measurement or observation (e.g., familiarity with the use of basic meteorological instruments)
- Analyse and evaluate categorical and numerical data (e.g., interpreting environmental data)
- Conceptualise and apply simple models relating to weather and climate processes

Assessment tasks

- Report 1
- Report 2
- Report 3
- Final exam

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

- Recognise and appropriately utilise basic equations which govern weather and climate
- Apply basic concepts and equations to practical (real world) problems
- Acquire field skills to collect data by measurement or observation (e.g., familiarity with the use of basic meteorological instruments)
- Analyse and evaluate categorical and numerical data (e.g., interpreting environmental data)
- Conceptualise and apply simple models relating to weather and climate processes

Assessment tasks

- Peer discussion
- Report 3

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 outcomes

- Acquire field skills to collect data by measurement or observation (e.g., familiarity with the use of basic meteorological instruments)
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology
- Conceptualise and apply simple models relating to weather and climate processes

Assessment tasks

- Peer discussion
- Report 3
- Final exam

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

- Recall and appropriately utilise meteorological and climatological terminology
- Apply basic concepts and equations to practical (real world) problems
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology

Assessment task

- Peer discussion

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

- Understand important meteorological and oceanic processes which shape weather and climate
- Recall and appropriately utilise meteorological and climatological terminology
- Critically evaluate scientific literature in the fields of meteorology, oceanography and climatology

Assessment tasks

- Report 1
- Final exam

Changes since First Published

Date	Description
14/01/2014	The Prerequisites was updated.