UNSW SYDNEY

Course Outline

CLIM2001/PHYS2801

Fundamentals of Atmospheric science

School of BEES

Faculty of Science

T1, 2022

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1. Staff

Position	Name	Email	Consultation times and locations
Course Convenor	Martin Jucker	martin.jucker@unsw.edu.au	By appointment
Lab assistant	Valentina Ortiz	v.ortiz@unsw.edu.au	By appointment

2. Course information

Units of credit: 6UOC

Pre-requisite(s): None

Teaching times and locations:

Component	HPW	Time & Location
Lecture	*3 x 1h*	*Tue, 1-2pm* *Wed, Thu 9-10pm*
Tutorial	*2*	*Fri, 9-11am*

http://www.timetable.unsw.edu.au/2022/CLIM2001.html

2.1 Course summary

This course covers the basic physical principles and processes which govern our atmosphere and its climate. First of all, this course provides an introduction and overview of our atmosphere, the main physical principles that govern its behaviour, and how to apply them to important questions about weather and climate. This shows students an important application of basic physics (and a bit of chemistry), and for Oceanography, Meteorology and Climate students this will provide a necessary foundation upon which later courses will build. For instance, you will learn about the greenhouse effect, how to use charts to determine the likelihood of storms developing, why deserts occur at certain latitudes, how weather systems evolve, and how to use the Bureau of Meteorology's radar images on its website to track thunderstorms. This course will also train students in how to apply basic principles of physics and mathematics (including calculus) to real-world problems and situations. This skill will add value to the work you have already invested in learning those principles and will be relevant no matter what later path in life you take.

We will cover about one third of the Wallace & Hobbs textbook. This respected textbook does go beyond the scope of this course. It provides a good resource if you are keen to take atmospheric and climate science further, and you are encouraged to browse the parts of the book not explicitly covered in order to get a more comprehensive view of the science. However, all necessary material is discussed during the lectures and will be contained in the provided lecture notes.

2.2 Course aims

This course has three aims. One is to provide an introduction and overview of our atmosphere, the main physical principles that govern its behaviour, and how to apply them to important questions about weather and climate. The second aim of the course, is to train students in how to apply basic principles of physics and mathematics (including calculus) to real-world problems and situations. The third aim is to provide opportunities to develop oral presentation skills which will be beneficial far beyond this course.

2.3 Course learning outcomes (CLO)

At the successful completion of this course you (the student) should be able to:

1. Describe the main processes at work in the atmosphere
2. Explain some weather and climatic phenomena
3. Possess a basic understanding of global climate and its changes
4. Be more able to use and understand calculus and simple physics and apply these practically - understand the role of simple models in helping to understand complex phenomena
5. Do some basic calculations relevant to a variety of applications (meteorological changes, energy / solar power, climate, many others)
6. Be confident in discussing science related subjects

3. Strategies and approaches to learning

3.1 Learning and teaching activities

Lectures are supplemented by 2-hour lab/tutorials in which students work together in an interactive environment with mentoring and assistance from instructors. These sessions are where most of the real learning takes place, as concepts from lectures and course texts are applied toward problem-solving. Exercises are used to ensure that students have assimilated the key concepts. Regular short quizzes provide ongoing feedback on individual understanding of the course material.

3.2 Expectations of students

It is assumed that students are mature enough to judge what works best for them and attendance in lectures is not a formal requirement. However, it is a common experience that students who attend classes and labs and participate actively will do better. Lab participation is a requirement, although the students will not have to be present at all labs and at all times. We welcome and encourage questions relevant to any aspect of atmospheric science – don't be shy!

Academic misconduct will not be tolerated in any form in this course. Substantiated instances of cheating, plagiarism or copying answers may result in a failure grade or significant deduction of marks. Please investigate http://www.lc.unsw.edu.au/academic-integrity-plagiarism if you are in any way unsure of what constitutes plagiarism. Assignments in this class are to be done independently.

4. Course schedule and structure

Week	Lecture 1 (1h)	Lecture 2 (1h)	Lecture 3 (1h)	Tutorial (2h)
1	Earth's orbit	Earth's radiation budget	Radiation laws	Planetary Orbit
2	Greenhouse gases	Radiative scattering	Thermodynamic gas laws	Radiative transfer
3	1st law of thermodynamics	Adiabatic processes	Moisture in the atmosphere	Radiation & Thermodynamics
4	Thermodynamic charts	Chemistry: Pollution	Chemistry: Ozone	Soundings
5	Cloud formation & types	Microphysics & precipitation	Cloud droplet growth	Airflow & Chemistry
6	*No classes*			
7	Main dynamical forces	Hypsometric equation and Coriolis forces	Geostrophic wind & thermal circulation	Clouds
8	General circulation	Climate change mechanisms	Climate prediction	Geostrophy
9	Feedback processes	TBA (Guest lecture slot)	TBA (Guest lecture slot)	*No lab (Easter)*
10	TBA (Guest lecture slot)	TBA (overflow)	TBA (overflow)	Climate prediction

5. Assessment

5.1 Assessment tasks

Laboratory exercises, including simple computer model experiments, will illustrate and extend many of the course topics in a setting where students can work together in teams. Each student will have to present the solution to one exercise during the term, which will be assessed. For all other labs, each student will have to either give feedback or ask a question. Midterm and final exam are conducted orally.

Short quizzes	10%	1 quiz per lecture.
Lab presentation	20%	1 exercise to present
Mid-term	30%	1 oral assignment mid-term
Final exam	40%	Oral exam

Further information

UNSW grading system: student.unsw.edu.au/grades

UNSW assessment policy: student.unsw.edu.au/assessment

5.2 Assessment criteria and standards

Please see Moodle for a marking rubric for each assessment task

5.3 Submission of assessment tasks

Lab exercises: Online forum interaction required for each lab.

5.4. Feedback on assessment

Please see Moodle for details on how feedback will be provided for each assessment task.

6. Academic integrity, referencing and plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at student.unsw.edu.au/referencing

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits**:** honesty, trust, fairness, respect, responsibility and courage.[1] At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

[1] International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

Further information about academic integrity and **plagiarism** can be located at:

- The *Current Students* site http://www.lc.unsw.edu.au/academic-integrity-plagiarism**,** and
- The *ELISE* training site subjectguides.library.unsw.edu.au/elise

The *Conduct and Integrity Unit* provides further resources to assist you to understand your conduct obligations as a student: student.unsw.edu.au/conduct.

6. Grievance policy

In all cases you should first try to resolve any issues with the course convenor. If this is unsatisfactory, you should contact the School Student Ethics Officer or the School's Grievance Officer / Designated Officer under the UNSW Plagiarism Procedure. UNSW has formal policies about the resolution of grievances that can be reviewed in myUNSW A to Z Guide (see https://student.unsw.edu.au/complaints).

Grievance Officer / Designated Officer	**School Student Ethics Officer**	**University Contact**
A/Prof Scott Mooney School of BEES s.mooney@unsw.edu.au Tel: 9385 8036	A/Prof Stephen Bonser School of BEES s.bonser@unsw.edu.au Tel: 9385 3863	University Counselling Services Tel: 9385 5418

8. Readings and resources

TEXTBOOK

Wallace and Hobbs: Atmospheric Science, An Introductory Survey (2nd Ed.)

OPTIONAL/LAB REFS

Stull: Meteorology for Scientists and Engineers (2nd Edition)

Sturman and Tapper: The Weather and Climate of Australia and New Zealand

Iribarne and Cho: Atmospheric Physics

McIlveen: Fundamentals of Weather and Climate

Graedel and Crutzen: Atmospheric Change, An Earth System Perspective

Vallis: Essentials of Atmospheric and Oceanic Dynamics

COURSE MATERIALS WILL BE POSTED ON MOODLE

9. Administrative matters

School information	School website: http://www.bees.unsw.edu.au/ School office – The Biosciences Student Office is where to go for administrative matters relating to BEES courses. It is located on the ground floor of the biological sciences building, room G27. BEESinfo@unsw.edu.au
Occupational Health and Safety	Information on relevant Occupational Health and Safety policies and can be found on the following website: http://www.bees.unsw.edu.au/health-and-safety UNSW OHS Home page: http://safety.unsw.edu.au/
Equity and Diversity	Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course Convenor prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or http://www.studentequity.unsw.edu.au/). Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.
Student complaint procedure	http://student.unsw.edu.au/complaints **School contact** Dr Jes Sammut j.sammut@unsw.edu.au **Faculty contact** A/Prof Chris Tisdell, Associate Dean (Education) cct@unsw.edu.au, Tel: 9385 6792 **University contact** Student Conduct and Appeals Officer (SCAO) within the Office of the Pro-Vice-Chancellor (Students) and Registrar. Telephone 02 9385 8515, email studentcomplaints@unsw.edu.au

10. Additional support for students

- The *Current Students* Gateway: student.unsw.edu.au
- Academic Skills and Support: student.unsw.edu.au/skills
- Student Wellbeing, Health and Safety: student.unsw.edu.au/wellbeing
- Disability Support Services: student.unsw.edu.au/disability
- UNSW IT Service Centre: www.it.unsw.edu.au/students
- Special Consideration: https://student.unsw.edu.au/special-consideration
- Assessment Implementation Procedure: https://www.gs.unsw.edu.au/policy/documents/assessmentimplementationprocedure.pdf