

Welcome to EMSC 1006 / 6107 – The Blue Planet: An Introduction to Earth System Science!

Course overview

This course provides an integrated understanding of Earth as a system. Topics include: a history of Earth's environment; systems theory; the physical and biophysical processes that characterise the oceans, atmosphere and land surface; together with an introduction to the global water and carbon cycles.

A lecture (Tues 9-10am, Colleges of Science Teaching Building Rm 3.07 / Seminar Rm 1) and **workshop** (Wed 4-6pm, same location) will provide an essential scientific perspective on critical global change processes. While the lectures will present research content that is current in the discipline, the workshops will engage students in research discussions, allow students to undertake research & inquiry exercises and develop science skills and techniques. Please note, that occasionally, these workshop sessions may be replaced with additional lecture material, depending on the particular topic being covered.

Practical sessions (Fri 1-3pm or 3-5pm, Gould Building Rm 107) offer hands-on experience to provide you with grounding in the basic principles of Earth Systems Science. **Sign Up** for a lab section is available on Wattle.

There will be **two 1-day field trips** that introduce students to methods for environmental measurement and observation.

Learning outcomes

Upon completing this course, students will have the knowledge and skills to:

1. use systems thinking to describe the physical and biophysical processes that define the Earth, and especially those processes that drive large-scale environmental change
2. explain how the previous changes in Earth's environmental conditions and on-going Earth system processes provide a basis for understanding human-environmental interactions and impacts
3. analyse to what extent humans can force global environmental change by deliberately or incidentally influencing the Earth system
4. understand how the atmosphere, the land and the oceans interact and the feedback mechanisms between the three

Lecturers in the course

Lecturers in the course are from the Research School of Earth Sciences (RSES) for most of the time up until the mid-semester break and then the Fenner School of Environment and Society and Department of Australian Natural History (ANH) afterwards:

Dr. Penny King - RSES - **course co-convenor**

Mr. Nicholas Engerer, M.Sc. - FSES - **course co-convenor**

Dr. Stephen Eggins –RSES

Prof. Janette Lindesay - FSES

Prof. Patrick De Deckker – RSES

Prof. Simon Haberle – ANH

Class policies

- All submitted work must comply with the *ANU Code of Practice for Student Academic Honesty*.
- All students must *read* the *Student Safety and Conduct Guidelines* and must follow those guidelines. Before signing up for a lab section, all students must indicate that they have read these instructions on the Wattle website.
- **All assessment items** will be conducted using the Wattle online submission system.
- Late submission of reports is possible through the Wattle site, but the submission will incur a **5% penalty per day (weekends & holidays count as days)**. Weekly assessment reports will not be accepted after the assessment has been graded and handed back, unless alternate arrangements have been made (below).

- **All requests for extensions** should be negotiated *in advance* with the course convenor (emsc1006@anu.edu.au Penny King before mid-semester break and Nicholas Engerer after). If the extension cannot be arranged before the due date, supporting documentation such as certificates from medical or mental health professionals may be requested.

Policies for practicals

- Students should **answer the pre-lab questions in advance of the practical**.
- **A roll will be taken in the practicals**. Students must participate in practicals to pass the course.
- **If you need to miss more than two practical session** due to illness or otherwise, please contact emsc1006@anu.edu.au with a short explanation. If possible, please tell *us in advance of the third practical session* that you will miss so that we can make the best arrangements to consider your situation.
- Students should bring calculators (calculators on smart phones are fine) to each laboratory session.

Text and resources that students need for this course

The required text for this course is *Skinner and Murck (2011), The Blue Planet: An Introduction to Earth System Science, 3rd edition, Wiley*. The text can be purchased at the University Co-op bookshop. Copies are also available for loan from the University Library, and have been made available in Reserve.

Field trip fee There will be two one day field trips this year. There *may* be a small fee (<\$50) to cover transport for **each** trip (total of \$100). Students will be advised of the cost closer to the date. Students experiencing financial hardship should contact the course convenors.

Scanning Online submission of all assessed work in this course requires access to a scanner or a camera with appropriate scanning software. Scanners are available at the ANU libraries or at other locations in Canberra (e.g., print shops, public libraries etc.).

Assessment

Course assessment will be decided upon in the first few weeks of semester.

Indicative assessment:

Weekly assessment report - 45% - The best 8/10 reports will be counted. Nine of the reports will include questions from the lab and in some cases the workshop. The 10th report consists of the notes and records that you took during the labs that you attended. These reports and labs provide opportunities for students to apply knowledge, skills and techniques to new problems.

Field trips - 15% - Two one-day field trip reports (2 pages each). These trips provide opportunities for students to apply knowledge and learn new skills and techniques relevant to the natural world.

Test 1 - 20% - first half of the course. 2% for an online quiz in advance of the test and 18% for the final test.

Test 2 - 20% - second half of the course. 2% for an online quiz in advance of the test and 18% for the final test. The tests help us assess your knowledge of the course content and examine competency in applying knowledge, skills and techniques. The online quizzes include feedback that is intended to help you study for the tests.

Submission of assessment items will be on Wattle.

Feedback from staff & students

Staff Feedback

Students will receive feedback from the lecturers, demonstrators and PAL mentors in many different ways in this course, including:

- **written comments** (on assessment items and via Wattle)
- **verbal comments** (in the classroom, lab, field and via Wattle)
- **feedback** to the whole class (in person and via Wattle), to groups, and to individuals
- **hints** are given on Wattle for the online quizzes.

Staff will make their best efforts to give students feedback within two weeks of submission.

Student Feedback

ANU is committed to the demonstration of educational excellence and regularly seeks feedback from students. In this course, we will use several methods to get your feedback and will try to address your concerns.

- Through asking you to answer **questions in class**.
- Through your **class representatives** who report to the Associate Directors of Education.
- Through the ANU **Student Experience of Learning Support (SELS)** surveys. The feedback given in these surveys is anonymous and provides the Colleges, University Education Committee and Academic Board with opportunities to recognise excellent teaching, and opportunities for improvement. **The surveys are given to the course convenors and we use them to improve the course.** For more information on student surveys at ANU and reports on the feedback provided on ANU courses, go to: <http://unistats.anu.edu.au/surveys/selt/students/> and <http://unistats.anu.edu.au/surveys/selt/results/learning/>

Four important tips for using Wattle in this course & what to do now!

- 1) **More information** will be added to the Wattle site throughout the semester, remember it is the Wattle site where you will find ALL the information you need for lectures, practicals, assessment, field trips etc.!
- 2) If you want to **print out** some of the content of the Wattle site, click on the "Print Book / Chapter" tab in the Setting section – you can find this on the lower left hand area of the browser page.
- 3) After reading the introduction section of Wattle, go to [the prac tab](#) to read and fill in the **Student Safety and Conduct Declaration**, once you have done this then you can **register for your Friday pm Practical class**.
- 4) **To submit assessment items on Wattle please follow the following steps:**
 1. Prepare your material as a **single pdf document** -- either by conversion to pdf from word processing software (e.g., "print as" or "save as" a pdf) or by scanning handwritten pages.
Scanners are available at ANU Hancock or Chiefly libraries, instructions can be found at the following link: <http://itservices.anu.edu.au/print-copy-scan/scanning-using-an-mfd/index.php>.

Ensure that the **file size does not exceed 5 MB**. Do not prepare your materials as more than one pdf - the last pdf will overwrite all of the previous pdfs and your assignment will be incomplete.

 2. Go to the EMSC1006 site on Wattle, scroll to the appropriate week for the assignment and click on the "Upload" button that is appropriate for the assignment - it should look like "**Weekly Assessment # upload**", where # is the number of the report.
 3. Click on the "**Browse...**" then **link to select your file** from your local hard drive, and then *do not forget to then click "Upload this file"*.
 4. Always go back into Wattle to **double check that it was submitted successfully**...if you don't then you might wish that you had...but in most cases your assignment should now be submitted!
 5. **Keep a separate copy** of your assignment (don't delete it!).

EMSC1006/EMSC6107 Course Schedule - 2014

 Course convenor contact: emsc1006@anu.edu.au

Wk	Wk Start	Section	Lecture & workshop 2014	Taught by	PAL session	Lab	Lab staff	Assessment / Field Trips
1	17/2	Introduction	Lecture: Introduction to the Earth System Workshop: Energy, radiation and heat	All	Unpacking a week Preparing figures	No lab		
2	24/2	The Geosphere	Lecture: Plate tectonics & rock cycle Workshop: Sedimentary rocks & time (figures)	King	Preparing tables	Density & Earth's spheres	King Eggins	Assessment 1 (figures)
3	3/3	The Geosphere	Lecture: Water properties Workshop: Habitable environments (table)		Preparing a presentation	Properties of water		Assessment 2 (table)
4	10/3	The Hydrosphere	Lecture: Soils & weathering Workshop: Hydrologic cycle & salinization (presentation)		Unravelling residence time & flux	Acidification of soils & the ocean		Assessment 3 (presentation) Online quiz 10/3
5	17/3	Introduction to Cycles	Lecture: Residence time & flux Workshop: Where should we store CO ₂ ?	Eggins	Online quiz review & test revision	Residence time & flux		Assessment 4 (questions)
6	24/3	Evolution of life & Earth's atmosphere	Lecture: Origin of life & the rise of oxygen Lecture: Reefs through time. Test 1	De Deckker	No PAL	Corals as environmental indicators	De Deckker	Test 1 26/3 & Field trip 29/3
7	31/3	The Atmosphere	Atmosphere- Global circulation Atmosphere- Climate & weather		Field trip session	Australasian weather & climate	Lindesay	Assessment 5
<i>Mid semester break</i>				<i>Mid semester break</i>				
8	21/4	The Atmosphere	Atmosphere - Past climate change & glacial cycles	Lindesay Engerer	Putting together the atmosphere	Public holiday		Field trip 1 report due 22/4
9	28/5	The Ocean	Ocean		Revision questions	Vostok ice core	Lindesay	Assessment 6
10	5/5	Biogeography	Biogeography - key concepts Biogeography - terrestrial & marine examples		Preparing an abstract	Biogeography	Blair	Assessment 7 Field trip 3/5
11	12/5	Cycles	Lecture: Understanding cycles & climate proxies Workshop: Climate & the ocean biological pump (poster)	Eggins	Revision questions	Climate proxies over geologic time	King Eggins	Assessment 8 Online quiz 15/5
12	19/5	Cycles, evolution, plate tectonics	The Anthropocene Quaternary of Australia	Lindesay Haberle	Reviewing the online quiz & test revision	Quaternary of Australia	Lindesay Haberle	Assessment 9 Field Trip 2 report due 20/5
13	26/5	Current climate	The Earth System Revisited Review	All		Review session	All	Assessment 10=Lab book Test 2 - 3 hrs in Exam Period