

# GEOS3761 ENVIRONMENTAL CHANGE



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*'If we teach only the findings and products of science—no matter how useful and inspiring they may be—without communicating its critical method, how can the average person possibly distinguish science from pseudoscience?'*

CARL SAGAN (1934-1996)

## COURSE OUTLINE

Imagine a world of wildly escalating temperatures, apocalyptic flooding, devastating storms and catastrophic sea level rise. This might sound like a prediction for the future or the storyline of a new Hollywood blockbuster but it is something quite different: it's our past. When we're bombarded with worrying forecasts for the future, it seems hard to believe that such things could come to pass. Yet almost everywhere we turn, the landscape is screaming out that the world is a capricious place. But if we don't tune in, the message is lost. In a day and age of environmental crises, we need to urgently decipher the past and learn from it.

Past environmental changes provide valuable insights into how our planet works and what this means for the future. The aim of this course is to provide you with a critical understanding of environmental changes and their impacts. Over the ten weeks we will delve into some of the great scientific and archaeological questions about what happened when...and why. And to achieve this we will provide you with a range of key skills and capabilities that you can use in the future, regardless of whether you pursue a career in science or not.

## GEOS3761 OVERVIEW

[Prof. Chris Turney](#) is the Course Convener and should be the first point of contact for any problems. Chris' office is on Level 5 of the Hilmer Building (Room 538). [Dr Zoë Thomas](#) and [Dr Haidee Cadd](#) will also be supporting your learning.

We have now transitioned to online teaching of the course. As a result, GEOS3761 is delivered using a mixture of short films, eBooks, quizzes and virtual fieldtrips that will be made live on Moodle at the beginning of each week. To support your learning, the Discussion Forum (see 'Questions and Answers' on Moodle) will provide an opportunity for engagement with one another and your tutors: Zoë, Haidee and Chris. We will also be providing optional one-hour drop in sessions every Tuesday and Thursday (12-1 pm) using Blackboard, where we will answer any questions you might have (for instance, on the virtual field trips) and host discussions on recent environmental stories in the news. Feel free to suggest topics that you'd like to explore; we're keen to learn what you think.

|   |   |
|---|---|
| <p><b>Course Description</b></p>        | <p>Environmental change occurs over all temporal and spatial scales and influences the atmosphere, climate, landforms, soils and vegetation. This course will explore: Evolution of the Earth system; Modelling and impacts of past, present and future environmental change; Humans as part of the environment; Human impact on the atmosphere and climatic consequences; Impacts of natural changes on human populations; and Techniques for environmental reconstruction and dating the past.</p>  |
| <p><b>Aims of the Course</b></p>        | <p>In the course <i>Environmental Change</i>, anthropogenic environmental change and human responses will be placed in the context of natural processes. Drawing on examples from extreme events and long-term changes, we will look at what lessons can be learned for the future. Underpinning this course will be the scientific methods and implications for the future. This course will hone your critical thinking, developing a wide range of skills and capabilities that are transferrable beyond a career in science.</p>  |
| <p><b>Student Learning Outcomes</b></p> | <p>By the end of this course, you will have an appreciation of environmental change over a variety of timescales, ranging from ice ages and super-interglacial warming, to contemporary interactions between humans and the natural world, and their value in managing future change. Emphasis is placed on understanding the various techniques for the reconstruction of past environmental change. The online delivery will investigate current issues within the discipline, leading to an appreciation of the complexity of contemporary challenges the world faces. The assessments will help develop your ability to read the landscape and communicate your findings to the public. GEOS3761 emphasises critical thinking, and the application of palaeoenvironmental research to decision and policy making. Specific learning outcomes for GEOS3761 are:</p> <ol style="list-style-type: none"> <li>1. Demonstrate an advanced understanding of the causes and impacts of past environmental change, and implications for the future.</li> <li>2. Analyse critically, reflect on and synthesise information to solve complex problems.</li> <li>3. Demonstrate leadership through interpreting and communicating applied knowledge to specialist and non-specialist audiences.</li> </ol> |

|                         |   |
|-------------------------|---|
| <b>Course Structure</b> | <p>GEOS3761 aims to introduce key events in our planet's history. This course is delivered over ten weeks. Each week we will be exploring at least one new event with you via a mixture of eBooks, short films, quizzes and virtual fieldtrips that will be made live on Moodle each week. The key texts for each session are provided on Moodle.</p> <p>Do please pay close attention to announcements on Moodle. The most important announcements will be sent to your UNSW email account (so forward this to whatever email account you use regularly).</p> <p>To help support your learning remotely at this difficult time, we have increased the number of optional one-hour drop in sessions. These will now be run every Tuesday and Thursday (12-1 pm) using Blackboard, where we will be answering any questions you might have (for instance, on the virtual field trips). We hope this provides extra flexibility, especially if you are juggling your studying with employment and other responsibilities. But if you can't make any session, do remember there is also the online Discussion Forum on Moodle, or you can contact <a href="#">Prof. Chris Turney</a> directly.</p> <p>Importantly, there is no longer an exam for GEOS3761. Instead, you will be undertaking assessments through the course that will support your learning (see below).</p> |
|-------------------------|---|

## LEARNING PROGRAMME

By its very nature, environmental change is a truly multidisciplinary subject that cuts across a wide range of disciplines, including biological, physical and social sciences. Each week we will be introducing a new topic that aims to scaffold your learning to understand contemporary environmental changes. **Selected reading for each topic will be provided on Moodle each week. These have been carefully chosen to support your learning so do please read them to develop your learning beyond a superficial understanding.**

Remember, Week 6 is a study week so there is no teaching (however, do note that there is an assessment submission deadline by the 10 July, which is Friday of that week; though you are very welcome to submit this assessment before Week 6).

We strongly encourage you to use the online Discussion Forum on Moodle to exchange ideas and ask questions through the course.

| <u>Week</u>       | <u>Topic</u>   |
|-------------------|--|
| 1. 1-5 June       | Introduction to Environmental Change: What is it?            |
| 2. 8-12 June      | Welcome to the Anthropocene!<br>In Search of the Human Epoch |
| 3. 15-19 June     | Hothouse Earth<br>Zombie Virus                               |
| 4. 22-26 June     | The Last Global Warming<br>Australian Ice Age                |
| 5. 29 June-3 July | Abrupt Climate Change<br>Megafaunal Extinction               |
| 6. 6-10 July      | <b>STUDY WEEK</b>  |
| 7. 13-17 July     | Firestorm<br>Fire-Vegetation Dynamics                        |
| 8. 20-24 July     | Green Deserts<br>The Great Flood                             |
| 9. 27-31 July     | Societal Collapse on Easter Island<br>Megadrought            |
| 10. 3-7 August    | The Lost City of Z<br>'The Great Global Warming Swindle'     |

**ASSESSMENT**

The assessment of GEOS3761 comprises three parts. The details about the individual assessments are provided on Moodle. **In contrast to previous years, there is NO exam.**

| Description                                   | %                       | Due by...   |
|---|-------------------------|---|
| <b>1. Small weekly tasks (x10)</b>            | 20%<br>(worth 2% each)  | 5 pm Friday each week<br>(Wks 1-10)   |
| <b>2. Science communication articles (x3)</b> | 45%<br>(worth 15% each) | 5 pm Friday 19 June (Wk 3)<br>5 pm Friday 3 July (Wk 5)<br>5 pm Friday 31 July (Wk 9) |
| <b>2.Three-Minute Movie</b>                   | 35%                     | 5 pm Friday 7 August<br>(Wk 10)   |

1. The instructions for each assignment are available on Moodle.

2. It is School policy that penalties will be deducted for the late submission of work (at 10% of the assignment mark for every day late – up to a maximum of 7 days after which the assignment will receive 0). Work will only be accepted after the end of Week 10 if accompanied by a medical certificate. Please follow the instructions on Moodle if you wish to apply for Academic Consideration.

3. To pass GEOS3761 a satisfactory performance is required in all components of the assessment. This means that all components of the assessment must be attempted. Unsatisfactory performance in any component may result in an UF grade (“unsatisfactory performance in an essential component of a course”) even if your marks exceed 50%.

**The Assessment Rubrics for GEOS3761 are provided on Moodle.**

4. The reading has been set up to scaffold your learning. Previous cohorts of students have left their reading to the last minute. Because the assessments are staggered through the course, please do try to keep up.

5. Academic misconduct will not be tolerated in any form in this (or any other) course. Sadly, cases of plagiarism are becoming more commonplace in Higher Education. Students should familiarise themselves with what constitutes plagiarism and the repercussions when caught. Further details are provided below and on Moodle.



## GUIDE TO STUDYING

The world is experiencing a worrying amount of environmental changes and as a result, scientific study across the many fields is vast. It is all too easy to lose track of your reading when you consider all the scientific papers, reports, magazine and books on the subject. We will guide you as best we can but the main thing is to engage with as much reading as you can on the topics being covered, and explore the concepts with your fellow students and teaching staff.

GEOS3761 does not have a text book *per se* but we have identified key texts that complement the topics being covered and these are provided on Moodle. These are just to get you started so you will need to use these to find other articles and books. [Google Scholar](#) and [Scopus](#) are excellent resources for searching who is citing what. You may also want to consider using [CiteHero](#), a new academic search engine that supports your research and writing, including automatic search and cite as you write.

If you would like to get a sense of the multidisciplinary research undertaken by UNSW scientists working in the most remote and extreme part of our planet, you might be interested in reading:

**Turney, C.** (2017) [\*Shackled: How a Scientific Expedition to Antarctica Became a Fight for Survival\*](#). Penguin Random House, Australia. Published in the USA as [\*Iced In: Ten Days Trapped on the Edge of Antarctica\*](#).

This is not a compulsory read!

As you have hopefully now started to realise, it is not the aim at university level to provide comprehensive notes for students to copy verbatim that cover the entire syllabus. Apart from being an impossible aim for a subject as vast as environmental change (and indeed for any other subject examined at university level), such an approach stultifies thought and development. Rather, we will be using the contact hours to introduce, develop and debate ideas. We hope you'll develop a background in theory by reading the relevant core materials and associated articles you may find. This is crucial for developing as an independent, critical thinker. We cannot provide all the reading material on Moodle but virtually everything you should need can be accessed through the [UNSW Library](#) (though do note that not everything is in an e-format; in some instance you may have to request material from the Library; under current conditions, the Library is offering *Click and Collect* - for more details, see Moodle). **If for some reason you do not know how to find material in the [UNSW Library](#) please seek the assistance of the librarians and ensure you know how to search topics and/or authors.**

This is a unique time in your career where you will be able to devote substantial time to wrestle with a generation-defining topic. Use this time as carefully as you can. Because the subject matter is so large, you might want to set up a (virtual) reading group to share the reading and discuss your thinking and observations with fellow students.

## Resources

A number of scientific journals publish the latest findings in past environmental change, most of which you will find in the library with past copies online. Ask the librarians for guidance if any problems. The most important journals to get to know are:

[Nature](#)  
[Science](#)  
[Nature Geoscience](#)  
[Nature Communications](#)  
[Scientific Reports](#)

Excellent papers on 'hot' (current) topics can be found through leafing through the contents pages of these major science journals. By clicking on the links above you can search the titles and abstracts. If you wish to access the pdfs of the papers you will need to login via the university library system. Relevant papers also appear in a wide spectrum of other scientific journals, depending upon the topic covered. If you have not yet done so, find out where the above can be accessed (past and current issues). If you are not already familiar with the Library's browsing and electronic search systems, please seek the assistance of the librarians and ensure you know how to search topics and/or authors. This is an invaluable way of seeking out those helpful and crucial sources that may lay the foundation for a deep understanding of the course.

To support your reading, [New Scientist](#) is recommended for an overview of recent developments in scientific understanding. For podcasts, [Nature](#) and [Science](#) offer summaries of the key scientific findings published in their weekly issues. For an alternative (arguably more fun!) view of science, [The Guardian](#) does a fantastic weekly podcast of science in the news and is well worth subscribing to. Climate is an intrinsic part of environmental change. For an up-to-date view on climate change with regular contributions on the value of the past we highly recommend the excellent and accessible website [www.realclimate.org](http://www.realclimate.org).

If you do use web-based resources, please remember that not all sources are provided by reputable (scientific) sources. Unfortunately, there are a number of highly-visited sites that are maintained by individuals with limited scientific training and appear to have anger-management issues!

Please do remember to check the dedicated pages for *GEOS3761* in Moodle regularly: all resources and announcements will be managed online. We want to encourage you to use the dedicated Discussion Forum on Moodle to ask any questions you might have and explore topics in the course (or any other environmental themes you might be interested in!).

## What Is Expected From You

If you read the suggested texts and understand them thoroughly, this will provide an excellent background for the module. To be awarded a High Distinction you will need to provide evidence of wider reading of the subject. Excellent answers show evidence of familiarity with specialist literature.

**As a guide, the UNSW Academic Board suggests that a normal workload for a 6 UOC course is approximately 9.4 hours per week (including contact hours, time spent on assessable tasks and preparation/reading).**

## COURSE LEARNING OUTCOMES AND SKILL DEVELOPMENT

During this course, you will learn a range of skills that will directly benefit you in your academic and professional careers. Specific learning outcomes for GEOS3761 are:

- Demonstrate an advanced understanding of the causes and impacts of past environmental change, and implications for the future;
- Analyse critically, reflect on and synthesise information to solve complex problems; and
- Demonstrate leadership through interpreting and communicating applied knowledge to specialist and non-specialist audiences.

The learning and teaching rationale underpinning the course draws on of the following concepts:

- Learning is best achieved where students undertake a variety of tasks (reading, writing, discussing) and particularly those that stimulate higher-order thinking such as analysis, synthesis and evaluation. A variety of teaching methods and modes of instruction are employed in GEOS3761. Higher-order thinking is encouraged in GEOS3761 via interactive sessions, through discussion where questions and critical thinking are encouraged, and via the assessment tasks.
- The learning experience is also enhanced through the use of activities that are interesting and challenging. Students are more engaged in the learning process when the relevance of the material to professional, disciplinary and/or personal contexts is obvious. In GEOS3761 past environmental change is considered in the context of contemporary and possible future anthropogenic environmental alteration, making it relevant to all undertaking the course.
- GEOS3761 aims for an inclusive learning and teaching experience, creating a community of learners: dialogue is encouraged through the use of discussion/posts on Moodle.

| <b>Graduate Attributes Developed in this Course</b>           |   |  |
|---|---|--|
| <b>Attribute</b>  | 3 = Major<br>2 = Minor<br>1 = Minimal<br>0 = No Focus | <b>Activities/Assessment</b>   |
| <b>Research, inquiry and analytical thinking abilities</b>    | <b>3</b>  | An ability to illustrate and discuss the contested and provisional nature of knowledge and understanding; an ability to critically evaluate a diverse range of specialised techniques and approaches involved in collecting geographical information; an ability to identify, acquire, critically evaluate and synthesise data from a range of sources; an ability to use dates and ages to effectively and appropriately to understand past change; an ability to effectively and appropriately interpret and use numerical information; and an ability to reflect on the process of learning and evaluate personal strengths and weaknesses. |
| <b>Capability and motivation for intellectual development</b> | <b>3</b>  | A critical understanding of a diverse range of approaches to the generation of knowledge and understanding across various geo-, bio- and environmental science disciplines; and an understanding of the nature of change within physical environments.   |
| <b>Ethical, social and professional understanding</b>         | <b>3</b>  | An understanding of reciprocal relationships between physical and human environments; contemporary environmental issues considered with respect to past environmental change; and an understanding of the significance of time on physical and human environments.   |
| <b>Communication</b>  | <b>3</b>  | An ability to communicate ideas, principles and theories effectively and fluently by written means; an ability to describe, apply and evaluate the diversity of specialised techniques and approaches involved in analysing geographical information.  |
| <b>Teamwork, collaborative and management skills</b>          | <b>3</b>  | An ability to undertake individual and group learning (including time management, library resource use and website investigation) to achieve consistent, proficient and sustained attainment.  |
| <b>Information literacy</b>                                   | <b>3</b>  | An ability to develop a sustained and reasoned argument; and an ability to formulate and evaluate questions and identify and evaluate approaches to problem-solving.   |

## OTHER IMPORTANT INFORMATION

### What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.

Examples include\*:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; or
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

\*Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle.

†Adapted with kind permission from the University of Melbourne.

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism. Knowingly permitting your work to be copied by another student may also be considered to be plagiarism. Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material. The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does not amount to plagiarism. The University recently updated its procedures on student plagiarism and these are available on the [UNSW Governance website](#).

Students are reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

The [Learning Centre website](#) provides a wealth of resources and support to help you develop and refine your academic skills. This is the main repository for resources for students on plagiarism and academic honesty. These resources can be located via <https://student.unsw.edu.au/plagiarism>. The [Learning Centre](#) also provide substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management; and
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from [The Learning Centre](#).

## Relationship to Other Courses

*Environmental Change* is a 6 units of credit (UOC) Stage 3 course and contributes to the *Geography Major in Science* (3970), the *Physical Geography Major in Advanced Science* (3972), to the *Environmental Science* (3988) and *Environmental Management* (3965) programs at the University of New South Wales. Whilst the course has synergies with biogeography, palaeoclimatology and climatology, Quaternary Science, other geo- and environmental sciences and palaeoanthropology and archaeology it is designed to be accessible to all upper level students.

## Work Health and Safety in GEOS3761

There are relatively few WHS issues associated with this course. Nonetheless, students should be aware that the BEES WHS site (<http://www.bees.unsw.edu.au/health-and-safety>) contains important information relating to workplace safety. This information complements that which can be obtained from the UNSW WHS website (<http://www.ohs.unsw.edu.au>).

## Equity and Diversity

Those students who have a disability that requires some adjustment in their learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with Equitable Learning Services (<http://www.studentequity.unsw.edu.au/>; email: [els@unsw.edu.au](mailto:els@unsw.edu.au); tel.: 02 8374 9201). 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.

## Grievance Policy

The UNSW Student Complaint Procedure is located at <https://www.gs.unsw.edu.au/policy/documents/studentcomplaintprocedure.pdf> and the procedure for the resolution of complaints about student experiences at the University is located at <https://student.unsw.edu.au/complaints>.

In all cases you should first try to resolve any issues with the course convenor Prof. Chris Turney. If this is unsatisfactory, you should contact the School Grievance contact who is our Head of School, Professor Alistair Poore ([a.poore@unsw.edu.au](mailto:a.poore@unsw.edu.au)). Director of Teaching and Learning in BEES Associate Professor Stephen Bonser ([s.bonser@unsw.edu.au](mailto:s.bonser@unsw.edu.au)). The University Counselling Services can also offer support (tel.: 02 9385 5418 or email: [counselling@unsw.edu.au](mailto:counselling@unsw.edu.au)).

## Course Evaluation and Development

Student feedback is gathered regularly in GEOS3761 by various means, including 'myExperience'. Such feedback, together with comments and discussion on Moodle and in classes really do help so please be as constructive as possible. This feedback has helped to shape and develop the course for the better. If you do have any ideas with a view to making this an even better course please do feel contact the course convener or initiate discussion on Moodle.

We look forward to working with you on GEOS3761 in *Environmental Change*.

**Chris Turney**  
**Zoë Thomas**  
**Haidee Cadd**  
May 2020