



Course Outline

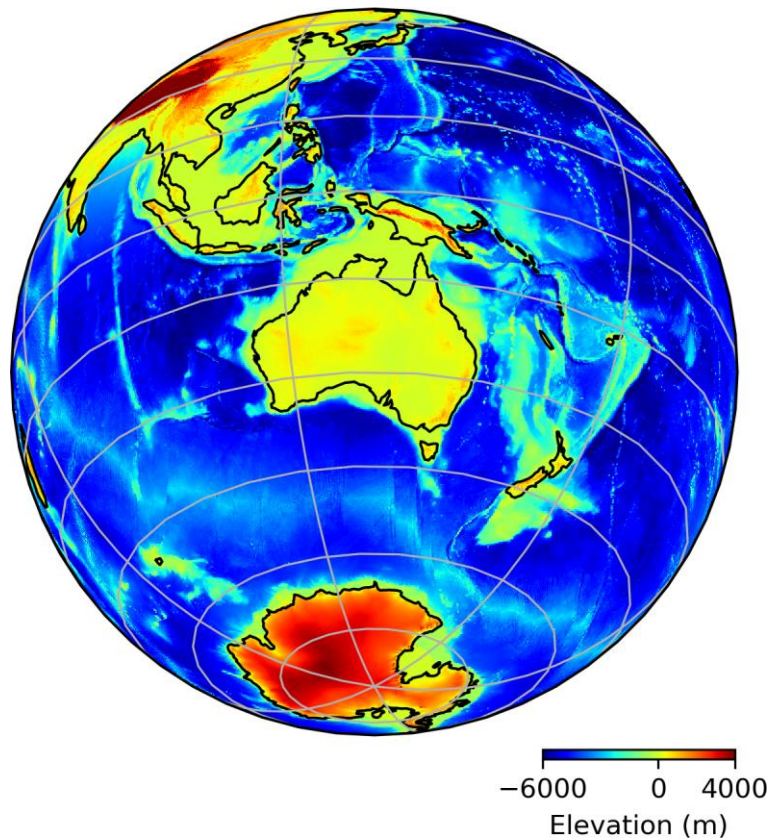
BEES1041

Exploring the Natural World

School of Biological, Earth and Environmental Science

Faculty of Science

T3, 2022



1. Staff

Course Convenor:

- Adrian Fisher
- adrian.fisher@unsw.edu.au
- Room G14C, Samuels Building (F25)



Module	Name	Email
Habitat Restoration	Adrian Fisher	adrian.fisher@unsw.edu.au
	Richard Kingsford	richard.kingsford@unsw.edu.au
	Recce Pedler	r.pedler@unsw.edu.au
	Katherine Moseby	k.moseby@unsw.edu.au
	Rebecca West	rebecca.west@unsw.edu.au
	Adriana Verges	a.verges@unsw.edu.au
	Mariana Mayer Pinto	m.mayerpinto@unsw.edu.au
Climate change impacts on biota	Laura Parker	l.parker@unsw.edu.au
	Angela Moles	a.moles@unsw.edu.au
	Stephen Bonser	s.bonser@unsw.edu.au
	Mark Ooi	mark.ooi@unsw.edu.au
Earth History and sustainability	Martin Van Kranendonk	m.vankranendonk@unsw.edu.au
	Mike Archer	m.archer@unsw.edu.au
	Scott Mooney	s.mooney@unsw.edu.au
	Donna Green	donna.green@unsw.edu.au
Evolution and behaviour	Rob Brooks	rob.brooks@unsw.edu.au
	Russell Bonduriansky	r.bonduriansky@unsw.edu.au
	Terry Ord	t.ord@unsw.edu.au
	Michael Kasumovic	m.kasumovic@unsw.edu.au

Staff are available to meet with students by appointment via email.

2. Course information

Units of credit: 6

Pre-requisite(s): None

Teaching times and locations: <http://timetable.unsw.edu.au/2022/BEES1041.html>

Online hours each week: 2hrs of lectures and 2hrs of computing exercises.

Face-to-face hours each week: 2hrs of labs either Monday 11:00-13:00 or Tuesday 11:00-13:00 in Teaching Lab 6 (E26-G007). The computer lab (D26-G29) is also available for help sessions one hour before and after each lab.

2.1 Course summary

BEES 1041 is a broad introduction to the scientific methods used to explore the natural world, covering aspects of biology, ecology, geography, and geology. Each topic is described using case studies taken from recent and active research projects in the School of Biological, Earth and Environmental Sciences (BEES), demonstrating a wide range of technologies used for exploring the natural world. The diverse research, presented by many different research teams, will highlight potential future subjects, and the many career opportunities for graduates from BEES disciplines. The course also contains a computing component, to introduce basic data analysis techniques, which are common across all BEES disciplines.

2.2 Course aims

The aim of BEES 1041 is to introduce many of the skills common to the scientific methods used to explore the natural world. These skills will be described in the context of recent and active research projects as well as through computing exercises and hands-on lab experiences.

The computing exercises prepare students for BEES 2041 Data analysis for life and earth sciences, while the diverse research topics presented provide background for many of the other courses offered through the School of BEES.

2.3 Course learning outcomes (CLO)

At the successful completion of this course, you should be able to:

- CLO1 Demonstrate an understanding of experimental methods in the biological, earth and environmental sciences.
- CLO2 Apply knowledge of field methods to collect, process, analyse, and interpret biological, earth and environmental data.
- CLO3 Demonstrate the capacity to communicate results in written and visual forms that are suitable for scientific reports.
- CLO4 Identify how research can be applied to contemporary biological, earth and environmental science issues, and how research skills can impact career pathways.

2.4 Relationship between course and program learning outcomes and assessments

Course Learning Outcome (CLO)	Program Learning Outcome (PLO)	Activities and Assessments
CLO1. Demonstrate an understanding of experimental methods in the biological, earth and environmental sciences.	<ul style="list-style-type: none"> • Knowledge • Personalised, self-guided, flipped classroom and blended, learning skills • Practical skills 	<ul style="list-style-type: none"> • Lectures, Labs, Computing • Quiz, New technologies report, Final exam
CLO2. Apply knowledge of field methods to collect, process, analyse, and interpret biological, earth and environmental data.	<ul style="list-style-type: none"> • Knowledge • Critical thinking and problem solving • Team/group work • Personalised, self-guided, flipped classroom and blended, learning skills • Practical skills 	<ul style="list-style-type: none"> • Labs, Computing • Quiz, Final exam
CLO3. Demonstrate the capacity to communicate results in written and visual forms that are suitable for scientific reports.	<ul style="list-style-type: none"> • Knowledge • Critical thinking and problem solving • Personalised, self-guided, flipped classroom and blended, learning skills • Written communication • Practical skills 	<ul style="list-style-type: none"> • Computing • Communicating results report, Final exam
CLO4. Identify how research can be applied to contemporary biological, earth and environmental science issues, and how research skills can impact career pathways.	<ul style="list-style-type: none"> • Knowledge • Critical thinking and problem solving • Written communication 	<ul style="list-style-type: none"> • Lectures, Labs • New technologies report, Communicating results report, Final exam

3. Strategies and approaches to learning

3.1 Learning and teaching activities

Online lectures: Lectures are pre-recorded and available online for viewing at a time of your choosing. Each lecture will also include some written material and quiz questions. They will be delivered by a wide range of BEES academic staff and cover a wide variety of topics, grouped into four modules. All lecture topics will investigate the following three questions as common themes:

1. How is data on the natural world collected?
2. What skills are needed to work with this data?
3. What jobs are available to people with these skills?

Laboratory classes: These are face-to-face classes in Teaching Lab 6 (E26-G007). The labs will be delivered by a variety of BEES academic staff and cover a wide variety of topics. Activities will include making measurements, observing experiments, and problem solving.

Online computing exercises: Computing exercises will be available online and can be completed at any time each week. They are designed to take around 2 hours each, though students more experienced in computing may complete them quicker. The exercises will use a variety of websites, and some software that you will need to install on your own computers. Online help will be delivered through a Moodle forum. Face-to-face help will be available in the computer lab (D26-G29) one hour before and after each laboratory class.

Field trip: The course has a short field trip to Centennial Park during the laboratory class times in week 2. This is to work in groups to collect data, which will be used in subsequent computer exercises and on of the assessment reports.

3.2 Expectations of students

Announcements: Announcements will be made online via the course Moodle page. It is the responsibility of students to ensure they are aware of and read all announcements.

Assistance: General enquiries should be directed to the Science Student Centre Nucleus Student Hub on Level 2 of the Library Building (Ph: 9385 6125) or lodge an online enquiry via unsw.to/webforms with your zID. BEES course and program enquiries should be directed to Faye Mo (faye.mo@unsw.edu.au). Queries regarding BEES 1041 should be directed to Adrian Fisher (adrian.fisher@unsw.edu.au) or the staff member delivering the content in question.

Attendance: Lectures are recorded, and students are strongly recommended to listen to these in a timely manner. Students must complete all online material related to the computing exercises and laboratory classes and participate in online sessions when required to. Students who miss a significant amount of course material, or miss an assessment task, due to ill health or other issues are advised to contact Adrian Fisher (adrian.fisher@unsw.edu.au) as soon as possible and provide certified documentation.

Online Needs: As many activities will be run online, students need access to a personal computer or laptop, and reliable access to the internet. Students should ensure that their device has a working microphone and while a camera is not essential, it is highly recommended.

- Workload:** The normal workload expectations at UNSW (<https://student.unsw.edu.au/uoc>) are approximately 25 hours per term for each unit of credit. This included class lectures, labs, computing exercises, fieldtrips, and time spent on assessments.
- Illness:** You can apply for Special Consideration when illness or circumstances that are beyond your control, or are unexpected, interfere severely with your academic performance. More information on Special Consideration can be found at: <https://student.unsw.edu.au/special-consideration>
- Exam Period:** The University expects that all students (domestic and international) be present and available for the entire duration of the UNSW end of trimester examination period (26 Nov-9 Dec). Bear this in mind when making end of trimester work or travel plans.
- Evaluation:** Student evaluative feedback on the course is gathered every year through UNSW MyExperience (<https://student.unsw.edu.au/myexperience>), which is available through your MyUNSW account and on the Course Moodle page towards the end of the trimester. MyExperience allows you to provide feedback on both the course itself and the teaching provided in the course. Student feedback is taken seriously and will influence course improvements.

4. Course schedule and structure

The lectures and laboratory exercises are organised in four main modules, each 2 weeks long. Most lectures will be recorded in short sections (10-20 minutes). The four modules cover different disciplines in the School of BEES:

Habitat restoration	Research projects endeavouring to restore habitats and monitor landscapes that have been degraded. Examples will include arid zone and marine habitats.
Climate change impacts on biota	Research investigating climate change impacts on biota, and ongoing efforts to build resilience. Examples will include impacts on marine organisms and impacts on plants.
Earth history and sustainability	This module will focus on the long-term history of the Earth and its relevance to environmental change and sustainability. Examples will include how knowledge of fossils, and fire history can guide conservation.
Evolution and behaviour	The evolution of animals and their behaviour will be examined in this module. Examples will include how understanding the evolution of animals can help with conservation, and how trust evolved in humans.

The following staff will deliver the lectures and laboratories as outlined in the timetable below.

AF - Adrian Fisher	MK - Michael Kasumovic	RusB - Russell Bonduriansky
AM - Angela Moles	MMP - Mariana Mayer Pinto	RW - Rebecca West
AV - Adriana Verges	MO - Mark Ooi	SI - Shane Ingrey
DG - Donna Green	MVK - Martin Van Kranendonk	SB - Stephen Bonser
KM - Katherine Moseby	RK - Richard Kingsford	SM - Scott Mooney
LP - Laura Parker	RobB - Rob Brooks	TO - Terry Ord
MA - Mike Archer	RP - Recce Pedler	

Module	Week	Starting date	Lecture topics	Lab activity	Computer exercise	Assessments	
	1	Mon 12 Sep	Introduction to BEES1041 (AF) Quantitative skills, mapping, and coding (AF)	How to measure trees (AF)	Accessing and managing data, and intro to R		
Habitat restoration	2	Mon 19 Sep	Monitoring desert ecosystems (AF) Restoring Wild Deserts (RK, RP, KM, RW)	Centennial Park field trip (AF)	Exploring data and the Goulburn drought		
	3	Mon 26 Sep	Living Seawalls (MMP) Operation Posidonia (AV)	Marine measurements (MMP)	Linear models and vegetation structure	Quiz	
Climate change impacts on biota	4	Tues 4 Oct	Ocean acidification, warming and oysters (LP) Changing marine environments (AV)	Computing help online (AF)	Introduction to QGIS		
	5	Mon 10 Oct	Adaptation and migration in plants (AM, SB, MO) Fire ecology and conservation (MO)	Indigenous Sydney (SI)	Intro to python and spatial data	New technology report due	
	6	Mon 17 Oct	Flexibility week				
Earth history and sustainability	7	Mon 24 Oct	Deep time and planetary evolution (MVK) Using fossils for conservation (MA)	Riversleigh fossils (MA)	Tree heights and lidar		
	8	Mon 31 Oct	Were the 2019-2020 fires unprecedented? (SM) The CleanAir Schools project (DG)	Scientific writing (AF)		Communicating results report due	
Evolution and behaviour	9	Mon 7 Nov	Animal behaviour for ecology and conservation (TO) Insects as model organisms in evolutionary ecology (RusB)	Resources and sexual competition in flies (RusB)	Elevation models		
	10	Mon 14 Nov	Evolution, learning, and intelligence (RobB) Using videogames to explore human competition (MK)	Using videogames to explore trust (MK)	Cross sections		
		Fri 25 Nov	Exam period (Fri 25 Nov – Thurs 8 Dec)				Exam

4.2 Computer exercises

The computer exercises focus on building quantitative skills for data analysis relevant to all modules.

Collecting data	Methods of sampling the natural world, including using new technologies, and accessing existing data.
Managing data	Digitising, tidying, and manipulating data, including integrating digital technologies with field work.
Visualising data	Simple graphics, plots, and mapping, including visualising spatial data.
Analysing data	Summarising data, linear models, and investigating patterns.
Communicating results	Skills for report writing, focusing on the showing results using visual graphics.

Required Software

The following software is required:

- Microsoft Excel (<https://www.myit.unsw.edu.au/software-students>)
- Quantum GIS (QGIS) latest stable release 3.22.10 (<https://www.qgis.org>)
- Cloustor SWAN through Chrome, Firefox, or Vivaldi at <https://cloudstor.aarnet.edu.au>
- Install the Avenza maps app on your phone or tablet <https://www.avenzamaps.com>

Optional software

If you wish to run Jupyter notebooks containing R and python code on your own computers, you can do so using Anaconda. You might like to run R code using RStudio, but python requires Anaconda.

- Download and install Anaconda (Python 3) from <https://www.anaconda.com/distribution> accepting all the default options.
- In Windows, start the program called "Anaconda Prompt (anaconda3)". In MacOS open a terminal and type: `conda activate`
- Type the following commands to install the libraries you need into an environment called jlab. Some of the commands might take a while run.

```
conda update conda
conda config --add channels conda-forge
conda config --add channels r
conda create -n jlab jupyterlab r-irkernel r-essentials rios matplotlib cartopy
conda activate jlab
conda update r-caret
R
install.packages("SCI")
install.packages("cowplot")
quit()
conda deactivate
```

- To start jupyter lab in your default browser, type `conda activate jlab`, then `jupyter lab`

5. Assessment

5.1 Assessment tasks

Assessment task	Length	Weight	Date
Quiz This is a Moodle quiz that will test your understanding of the aspects of data analysis that have been presented in the first two labs and the first three computer exercises. This includes collecting, accessing, managing and exploring data, and the basics of coding.	1 hour	15%	Week 3 Fri 30 Sep Quiz on Moodle
New technology report You need to identify a new technological method for generating data on an aspect of the natural world that interests you. Methods can be selected from those presented in lectures, or your own interests. Write a report with the following three sections: <ul style="list-style-type: none">Describe in your own words how the method works and what sort of data it produces, including a figure.Explain how you would design a new experiment that would use the method to explore the natural world.Include a list of information sources.	2 pages	15%	Week 5 Fri 14 Oct Submitted using Turnitin on Moodle
Communicating results report Write the results section for a scientific report, that presents the data collected by the class in Lab 2, other supplied data, and any other relevant data you have found. The report must include three important elements: <ul style="list-style-type: none">A written description of the results.Figures that illustrate the results.The results of appropriate data analyses, which support the key findings.	4 pages	30%	Week 8 Fri 4 Nov Submitted using Turnitin on Moodle
Exam The exam for the course will be online. It will include a variety of question types (multiple choice and numerical calculations) selected from the topics discussed in the lectures, laboratories, and computer exercises.	2 hours	40%	Exam period 25 Nov -8 Dec

Further information

UNSW grading system: <https://student.unsw.edu.au/grades>

UNSW assessment policy: <https://student.unsw.edu.au/assessment>

5.2 Assessment criteria and standards

The Quiz assessment will require you to have completed the first two labs and first three computing exercises. It will require some numerical calculations and will include questions on interpreting the results of analysis, but you will not have to write any code. The reports will be assessed using marking rubrics, which will be made available through Moodle. All assessments will follow the UNSW grading system: <https://student.unsw.edu.au/grade>. You should also familiarise yourself with the UNSW assessment policy: <https://student.unsw.edu.au/assessment>

5.3 Submission of assessment tasks

Students will need to submit their assessments using Turnitin through the course Moodle page, as either a Word document or a PDF. Late work will be penalised by 5% of the value of the assignment per day (not including weekends). After 5 late days the work will be given a value of 0%. This is UNSW policy and there are no exceptions unless an extension is provided. Extensions are only provided by the Course Convenor (Adrian Fisher) for valid reasons (medical or otherwise), following the UNSW Special Consideration process (<https://www.student.unsw.edu.au/special-consideration>).

5.4. Feedback on assessment

Marking of your assessments will be provided by lecturers with assistance from academic staff in the School of BEES and a peer review process on occasion. Where multiple markers are involved, the marks will be checked for consistency. Some specific feedback on assessments will be provided on the returned Assessments. Generic feedback will be provided through class forums announcements. Feedback on the final exam is possible by appointment only. Final examinations are retained in the School of BEES for a period of 6 months, after which they are destroyed.

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 <https://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. Further information about academic integrity and **plagiarism** can be located at:

- The *Current Students* site <https://student.unsw.edu.au/plagiarism>, and
- The *ELISE* training site <http://subjectguides.library.unsw.edu.au/elise/presenting>

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

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

7. Readings and resources

This course is available online through the UNSW Moodle system which can be accessed by:

1. Going to <https://moodle.telt.unsw.edu.au/login/index.php>
2. Enter your Username (your UNSW zID) and Password (your zPass) and click the 'Agree and sign on' button
3. Look for BEES1041 under the 'My Courses Tab'

The BEES1041 Moodle page will contain information regarding course announcements, lectures, labs, computer exercises and assessments. You will find that the course has been divided into various sections related to Course Information, Trimester Weeks, and others. Please visit the Support Section at <https://student.unsw.edu.au/moodle-support> for more information and tutorials about Moodle.

8. Administrative matters

8.1 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 convener (Adrian Fisher) prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (<https://student.unsw.edu.au/disability>). 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. The School of Biological, Earth and Environmental Sciences aims to provide a safe, supportive and welcoming environment for all staff and students regardless of their race, sex, age, religion, disability, sexual orientation or gender identification. As such, the School strongly supports UNSW's Equity and Diversity Policy in regard to these matters (<http://www.bees.unsw.edu.au/equity>). Definitions, policies and reporting portals can be found here: <https://student.unsw.edu.au/equity>

8.2 Grievance policy

In all cases you should first try to resolve any issues with the course convener (Adrian Fisher). If this is unsatisfactory, you should contact the School Student Ethics Officer (A/Prof Stephen Bonser, s.bonser@unsw.edu.au) or the Deputy Head of School (A/Prof Scott Mooney s.mooney@unsw.edu.au) who is the School's Grievance Officer and 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 (<https://student.unsw.edu.au/complaints>).

8.3 Additional support for students

- The Current Students Gateway: <https://student.unsw.edu.au/>
- Academic Skills and Support: <https://student.unsw.edu.au/academic-skills>
- Student Wellbeing, Health and Safety: <https://student.unsw.edu.au/wellbeing>
- Disability Support Services: <https://student.unsw.edu.au/disability-services>
- UNSW IT Service Centre: <https://www.it.unsw.edu.au/students/index.html>