

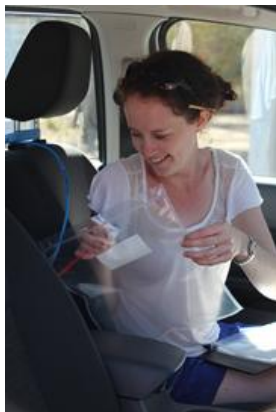
FACULTY OF SCIENCE

SCHOOL OF BIOLOGICAL, EARTH AND ENVIRONMENTAL  
SCIENCES

GEOS3733 / GEOS6733

ENVIRONMENTAL GEOPHYSICS

SESSION 2 2016



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## 1. Staff Contact Details

Position	Name	Email	Availability; times and location
Course Convener	Prof. Andy Baker	<a href="mailto:a.baker@unsw.edu.au">a.baker@unsw.edu.au</a>	E10, room 345. Please send an e-mail to arrange a consultation time
Lecturer	A/Prof Bryce Kelly	<a href="mailto:Bryce.kelly@unsw.edu.au">Bryce.kelly@unsw.edu.au</a>	E10, room 350. Please send an e-mail to arrange a consultation time
Lecturer	Charlotte Iverach	<a href="mailto:Charlotte.iverach@gmail.com">Charlotte.iverach@gmail.com</a>	E10, room 323. Please send an e-mail to arrange a consultation time
Lecturer	Katie Coleborn	<a href="mailto:k.coleborn@unsw.edu.au">k.coleborn@unsw.edu.au</a>	E10, room 323. Please send an e-mail to arrange a consultation time
Lecturer	Monika Markowska	<a href="mailto:monikam@ansto.gov.au">monikam@ansto.gov.au</a>	E10, room 323. Please send an e-mail to arrange a consultation time
Lecturer	Luke McPhan	<a href="mailto:Luke.mcphan@unsw.edu.au">Luke.mcphan@unsw.edu.au</a>	D26, room 510. Please send an e-mail to arrange a consultation time
Lecturer	Dr Safdar Bashir	<a href="mailto:safdar.bashir@uaf.edu.pk">safdar.bashir@uaf.edu.pk</a>	E10, room 323. Please send an e-mail to arrange a consultation time

## 2. Course details

### Credit Points:

6 units

There are no prerequisites for this course.

Note: there is no difference between GEOS3733 and GEOS6733. GEOS3733 is for undergraduate entry and GEOS6733 is for postgraduate entry.

### Summary of the Course

This 6 unit of credit course is run as a 5-day fieldclass, during O-week of Semester 2. In 2016 we will be based at Yarrangobilly Caves, Kosciuszko National Park.

Each day, you will be given short lectures on the theory behind various environmental geophysical methods used in the analysis of air, water, soil, vegetation or the subsurface. This will be followed by field measurements to enable everyone to get hands-on experience of geophysical techniques.

This course aims to provide skills required in research and consulting environments in hydrology, hydrogeology, climatology and environment sciences.

Methods covered will include a selection of the following environmental geophysical techniques, depending on instrument availability:

- weather station design and hydrology measurements using geophysical techniques
- infra-red measurements of soil and atmospheric carbon dioxide concentrations
- x-ray fluorescence analysis of soil mineral properties
- optical geophysics, using fluorescence and absorbance, to measure river organic matter water quality
- cavity-ringdown and off-axis mass spectrometry measurements for mapping methane and carbon dioxide processes in the landscape

### **Aims of the Course**

This course aims to provide each student with the necessary theory and skills to undertake geophysical measurements of air, water, vegetation, soil and rock. These skills are often required in research and consulting environments in hydrology, hydrogeology, climatology and environment sciences.

Students will gain a theoretical understanding of the electromagnetic, optical, and dynamic properties of air, water, vegetation, soil and rock; practical field experience in measuring the properties of air, water, vegetation soil and rock; data analysis skills; group work experience; public presentation skills; and literature research skills.

### **Student learning outcomes**

At the end of this course, you should know how to apply a range of geophysical methods for a range of environmental applications.

These could include the following:

- Understand the theory and application of using time domain reflectometry (TDR) to measure soil moisture.
- Understand the theory and application of optical spectroscopic measurements to determine river and groundwater quality.
- Understand the theory and application of X-ray fluorescence to analyse soil and rock mineralogical properties
- Understand the theory and application of infra-red measurements of gas carbon dioxide concentration and fluxes
- Understand the theory and application of cavity-ringdown mass spectrometry and its application to gas analyses such as methane and carbon dioxide.

### **Graduate Attributes**

The students will be encouraged to develop the following Graduate Attributes by undertaking the selected activities and knowledge content. These attributes will be assessed within the prescribed assessment tasks.

At the conclusion of this course the student will be able to:

1. Understand the theory behind a wide range of field environmental geophysical techniques
2. Apply these theories to the field application of the techniques
3. Undertake analysis of the field data
4. Create reports and presentations based on the theory and application of the techniques.

### 3. Rationale for the inclusion of content and teaching approach

This course content enables students to develop specific skills in the theory and application of environmental geophysical techniques. Students will develop report writing and presentation skills, theoretical, application and communications skills. These skills are often required in research and consulting environments in hydrology, hydrogeology, climatology and environment sciences.

### 4. Teaching strategies

This course is taught as a 5-day field course, as we believe that the best way to reinforce theory and to make the theories relevant to you, is for you to have hands on experience with each technique. Each technique will be introduced with a lecture, which covers the theory of each methodology, followed by up to a whole day applying the method in the field.

### 5. Assessment

Assessment task	Length	Weight	Learning outcomes assessed	Graduate attributes assessed	Due date
Field group presentation	15 minutes + questions	20%	Theoretical understanding, field application, data processing	Presentation skills	Held on fieldtrip
Field report	500 words, 2 figures and 1 table maximum per technique	40%	Field application, data processing	Data analysis and report writing	Week 7
Literature review of one technique	Maximum 2500 words	40%	Knowledge collation	Scientific synthesis and clarity of expression	Week 10



The details of the assessment tasks will be provided at the start of the field course. Please submit your assignments to the BEES School Office.

Assignments and reports must be submitted on time. No extensions will be permitted (apart from the normal provisions in the University calendar). Completed laboratory exercises and assignments **with cover sheet** must be submitted at the correct time as stated for the assignment. **Penalties for late submission – 10% per day up to 5 days, then mark is 0%**

## 6. Academic honesty and plagiarism

### 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; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

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 Learning Centre website is main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via:

[www.lc.unsw.edu.au/plagiarism](http://www.lc.unsw.edu.au/plagiarism)

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- 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.

Students are also 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.

\* 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

## 7. Course schedule

Environmental Geophysics runs in O-week, from Monday 18th to Friday 22nd July 2016 at Yarrangobilly Caves in Kosciuszko National Park.

For information see: <http://www.nationalparks.nsw.gov.au/things-to-do/show-caves/yarrangobilly-caves>

The cost for the fieldtrip is \$450 per person. This covers all food and accommodation costs. You must pay for the trip beforehand. We will post instructions on how to do this at the Moodle site when it is up and running. We will also ask for any dietary requirements.

Accommodation is on site, in the newly refurbished Caves House. It is luxurious!

<http://www.nationalparks.nsw.gov.au/camping-and-accommodation/accommodation/Yarrangobilly-Caves-House>

Please bring warm clothes and walking boots - we will be outside all day irrespective of the weather, and you can expect frost and snow. You might also want to bring your swimmers:

<http://www.nationalparks.nsw.gov.au/things-to-do/walking-tracks/yarrangobilly-caves-thermal-pool-walk>

Yarrangobilly is relatively remote – the nearest town is Tumut (about 1 hours drive). There is no internet or telephone access at Yarrangobilly (or anywhere close). There is one shop in the National Parks office on site with very limited supplies (ice cream, coffee, sweets). If you need to stock up on your own personal supplies, there are supermarkets at Tumut and Gundagai.

All participants are required to make their own way to and from the field class. By law, all drivers have to be in 4WD vehicles or carry snow chains, so please plan your travel in good time. We will set up a discussion forum here for car-sharing. It is approximately 6 hours driving time from Sydney to the field site. Google Maps says 5 hours, but I have done the trip many times and I don't believe that time. So please plan to leave early on the 18th July to give you enough time to travel safely and to arrive well below twilight. I would strongly suggest leaving Sydney before the morning rush hour, and then enjoying the ride.



Remember to stop every two hours. Travelling from Sydney, the route to take is via Gouburn, Yass, Gundagai and Tumut. Please take especial care on the road after Tumut - expect to see a lot of wildlife on the road, there is a steep, winding and long ascent, and the final few kilometres in the National Park is on a narrow, winding dirt road. It may also be frosty or snowy: please take care. Arriving in the mid-afternoon (when it is the warmest) is safest. The last fuel is at Talbingo, but we recommend you fill up at Tumut or Gundagai.

### Before the fieldclass

Pay the course fees. Organise your transport. Download any resources you need from this site, as there is no internet access on the field trip.

### Monday 18th July 2016:

- 3pm Introduction to the course and tour of the site.

### Tuesday - Thursday:

- 9:00 am to 6:00 pm Lectures, fieldwork and data analysis

### Friday 22nd July 2016:

- 9am Group presentations
- 11am Fieldtrip summary and departures

## **8. Expected Resources for students**

There is no single textbook for this course. However, the following books are relevant to specific techniques:

Coble, P.G. et al. (eds) 2014. Aquatic Organic Matter Fluorescence. CUP. 978-11-398-97907.  
(Due Apr 2014)

Flanagan, L.B. et al. 2005. Stable isotopes and biosphere - atmosphere interactions: processes and biological controls. Elsevier Academic ISBN 978-012-0884-476

Kirkham, M.B., 2014. Principles of Soil and Plant Water Relations. Elsevier Academic Press. 2nd Ed ISBN 978-012-4200-227 (Due June 2014)

Price, M. 2013. Introducing Groundwater. Springer. 2nd Edn. ISBN 978-041-2485-008

West, J.B. et al (eds) 2010. Isoscapes. Springer 978-90-481-3354-3.

All lectures will be uploaded onto Moodle and handouts will be made available where appropriate during the field class. Lecture notes and handouts will provide details of additional reading material, available from the UNSW Library website:

<http://info.library.unsw.edu.au/web/services/services.html>

Some potentially useful internet resources that relate to the equipment available to the course are:

<http://www.ictinternational.com/sfm1.html>

[http://www.picarro.com/products\\_solutions/isotope\\_analyzers/13c\\_for\\_ch4](http://www.picarro.com/products_solutions/isotope_analyzers/13c_for_ch4)

[http://www.soilmoisture.com/prod\\_details.asp?prod\\_id=895&cat\\_id=19](http://www.soilmoisture.com/prod_details.asp?prod_id=895&cat_id=19)

<http://www.horiba.com/scientific/products/fluorescence-spectroscopy/steady-state/aqualog/aqualog-our-compact-benchttop-fluorometer-for-cdom-13031/>

<http://www.campbellsci.com.au/grws100>

## 9. Course evaluation and development

This is the third time that this course has been run, and we will collect student feedback to continue to evaluate and develop the course. Based on previous feedback, we have extended the course by one day to provide more time to undertake the fieldwork. The course has also moved from week 1 to O-week on the request of other schools, to prevent timetable clashes.

## 10 . Other information

<b>Expectations of Students</b>	Attendance on the fieldclass is compulsory.
<b>Assignment Submissions</b>	Assignments and reports must be submitted on time. No extensions will be permitted (apart from the normal provisions in the University calendar). Completed laboratory exercises and assignments <b>with cover sheet</b> must be submitted at the correct time as stated for the assignment.
<b>PENALTIES</b>	<b>Penalties for late submission – 10% per day up to 5 days, then mark is 0%</b>
<b>Assessment Procedures</b>	Normal UNSW rules apply to illness, misadventure or other situations which affect attendance at class or submission of assessment tasks.
<b>Equity and Diversity</b>	Students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss study needs with the course Coordinator prior to the course commencing, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or <a href="http://www.equity.unsw.edu.au/disabil.html">www.equity.unsw.edu.au/disabil.html</a> ). 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. Information on designing courses and course outlines that take into account the needs of students with disabilities can be found at:

	<a href="http://www.secretariat.unsw.edu.au/acboardcom/minutes/coe/disabilityguidelines.pdf">www.secretariat.unsw.edu.au/acboardcom/minutes/coe/disabilityguidelines.pdf</a>		
<b><u>Grievance Policy</u></b> <sup>1</sup>	<b>School Contact</b>	<b>Faculty Contact</b>	<b>University Contact</b>
	Dr Jes Sammut School of BEES Tel: 9385 8281	A/Prof Julian Cox Associate Dean (Education) <a href="mailto:julian.cox@unsw.edu.au">julian.cox@unsw.edu.au</a> Tel: 9385 8574 or Dr Gavin Edwards Associate Dean (Undergraduate Programs) <a href="mailto:g.edwards@unsw.edu.au">g.edwards@unsw.edu.au</a> Tel: 9385 4652	Compass University Counselling Services <sup>2</sup> Tel: 9385 5418

<sup>1</sup> UNSW Grievance Policy: [http://www.infonet.unsw.edu.au/poldoc/student\\_grievance\\_resolution.pdf](http://www.infonet.unsw.edu.au/poldoc/student_grievance_resolution.pdf)

<sup>2</sup> Compass – University Counselling Service [http://www.counselling.unsw.edu.au/compass\\_programs/](http://www.counselling.unsw.edu.au/compass_programs/)