FACULTY OF SCIENCE

SCHOOL OF BIOLOGICAL, EARTH AND ENVIRONMENTAL SCIENCES

GEOS6733

ENVIRONMENTAL GEOPHYSICS

SESSION 2 2014

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1. Staff Contact Details

Position	Name	Email	Availability; times and location
Course Convener	Prof. Andy Baker	a.baker@unsw.edu.au	G17, room 407. Please send an e-mail to arrange a consultation time
Lecturer	A/Prof Bryce Kelly	Bryce.kelly@unsw.edu.au	G17, room 408. Please send an e-mail to arrange a consultation time
Demonstrators	Mohammadreza Keshavarzi		
	Liza McDonough		
	Charlotte Iverach		
	Eliza Wells		

2. Course details

Credit Points:
6 units

Summary of the Course
This is a 4-day field course run at the Wellington Caves, Wellington, NSW. Each day, students 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, data processing, data analysis and presentation of the results to the class.

Methods covered will include a selection of the following techniques, depending on instrument availability: resistivity imaging of the subsurface, time-domain reflectometry measurements of soil water content, sonar streamflow measurements, optical geophysics and water quality, cavity-ringdown and off-axis mass spectrometry of gases, heat measurements of tree water use, pressure transducer measurements of water level.

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, gravitational, acoustic 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 would include a selection of the following (depending on instrument availability):

- Understand the theory and application of resistivity imaging methods for mapping subsurface properties.
- Understand the theory and application of using pressure transducers to measure ground water level.
- 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 heat to determine sap flow and stem water potential in trees
- Understand the theory and application of geophysical techniques used in a standard automatic weather station.
- Understand the theory and application of off-axis and cavity-ringdown mass spectrometry and its application to gas analyses such as methane and carbon dioxide.
- Understand the theory and application of Doppler acoustic radar in the determination of river flow rates and discharge determination.

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 4-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 as a one to two hour 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

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

GEOS9633 will run in O-week, from Monday 21st to Friday 25th July at Wellington Caves Reserve, Wellington, NSW. For information about the town see:
http://www.visitwellington.com.au/

Students are expected to make their own way to Wellington Caves Reserve. It takes about 6 hours to drive there from Sydney. If driving, please remember to take a break every two hours, and allow enough time for the prevailing weather conditions. If driving early in the day, ice, snow and fog are all possible driving hazards when crossing the Blue Mountains. Please also be alert for wildlife, especially around dawn and dusk.

There is also a daily train from Sydney to Wellington, and the field course is planned around this. The train (Central West XPT) leaves Central at 07:18 and gets to Wellington around 13:00. We will then transport those who come by train to Wellington Caves. The return train leaves Wellington at 14:44 and gets in Central around 20:50. Please check the countrylink website before travelling, as train times can change at short notice due to engineering works:
http://www.countrylink.info/timetables/western/sydney_to_dubbo
http://www.countrylink.info/timetables/western/dubbo_to_sydney

Accommodation will be in shared units is at the Wellington Caves Reserve:
http://www.visitwellington.com.au/stay/caravans-cabins-camping/wellington-caves-holiday-complex

Local colleagues will coordinate the catering. Please send Andy Baker (a.baker@unsw.edu.au) an email if you have any special dietary requirements at least two weeks before attending the field trip.

You must pay for the trip beforehand. We will post instructions on how to do this at the Moodle site.

Estimated total cost is $280.00 per person (This covers food, shared accommodation, and a caves tour on Monday afternoon). Please note that food is provided starting Monday Dinner and finishing with Friday breakfast. Please provide your own lunch for the journey to and from Wellington.

You must fill out:
HS009 Fieldwork Authorisation & Medical Questionnaire for Students which can be accessed here:
http://www.bees.unsw.edu.au/fieldwork-approval
Please forward the completed form to a.baker@unsw.edu.au

Monday:
- 1:00pm transfers from station to Wellington Caves Reserve as required.
- 1:00-2:30pm Check-in at Wellington Caves. Meet at the Caves Kiosk.
- 2:30 to 5:00pm Introduction to the course and tour of the Wellington Caves Reserve.

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

Friday:
- 9:00 to 11:00 Group presentations
- 11:00 to 12:00 Fieldtrip summary
- 12:00- 1:00 pm Departures and transfers to station as required.

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.solinst.com/products/dataloggers-and-telemetry/3001-levelogger-series/levelogger-edge/datasheet/
http://www.ictinternational.com/sfm1.html

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.horiba.com/scientific/products/fluorescence-spectroscopy/steady-state/aqualog/aqualog-r-our-compact-benchtop-fluorometer-for-cdom-13031/
http://www.campbellsci.com.au/grws100
http://www.sontek.com/productsdetail.php?RiverSurveyor-S5-and-M9-14

9. Course evaluation and development

This is the second 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

Expectations of Students	Attendance on the fieldclass is compulsory.
Assignment Submissions **PENALTIES**	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%**
Assessment Procedures	Normal UNSW rules apply to illness, misadventure or other situations which affect attendance at class or submission of assessment tasks.
Equity and Diversity	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 www.equity.unsw.edu.au/disabil.html). 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: www.secretariat.unsw.edu.au/acboardcom/minutes/coe/disabilityguidelines.pdf		
Grievance Policy[1]	**School Contact**	**Faculty Contact**	**University Contact**
	Dr Jess Sammut School of BEES Tel: 9385 8281	A/Prof Julian Cox Associate Dean (Education) julian.cox@unsw.edu.au Tel: 9385 8574 or Dr Gavin Edwards Associate Dean (Undergraduate Programs) g.edwards@unsw.edu.au Tel: 9385 4652	Compass University Counselling Services[2] Tel: 9385 5418

[1] UNSW Grievance Policy: http://www.infonet.unsw.edu.au/poldoc/student_grievance_resolution.pdf
[2] Compass – University Counselling Service http://www.counselling.unsw.edu.au/compass_programs/