



CVEN4503

Groundwater Resource Investigation

Term One // 2021

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Martin Andersen	m.andersen@unsw.edu.au		WRL, Manly Vale	

Lecturers

Name	Email	Availability	Location	Phone
Will Glamore	w.glamore@unsw.edu.au		WRL, Manly Vale	
Dr Mahmood Sadat-Noori	m.sadat-noori@unsw.edu.au		WRL, Manly Vale	

School Contact Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

Course Details

Credit Points 6

Summary of the Course

Review of groundwater occurrence in Australia. Physical properties of groundwater and groundwater occurrence. Principles of groundwater flow. Storage and transmissivity - impacts of groundwater abstraction. Groundwater in the hydrological cycle: flow nets; surface water groundwater interconnectivity. Groundwater modelling. Unsaturated zone flow and calculation of infiltration. Groundwater recharge mechanisms and water balance calculations. Drilling methods for groundwater abstraction; geophysical logging; well design and completion for water production bores. Solutions to the radial flow equation; pumping test interpretation; a program of field work and data analysis will be undertaken at the UNSW Farm in Wellington.

Course Aims

The aim of this course is to develop a student's understanding of the occurrence of groundwater and how it is interlinked with surface water. In addition, the student will understand the basic methods of groundwater development.

List of programme attributes:

- The skills involved in scholarly enquiry
- An in-depth engagement with the relevant disciplinary knowledge in its interdisciplinary context
- Capacity for analytical and critical thinking and for creative problem solving
- Ability to engage independent and reflective learning
- Information literacy and the skills to appropriately locate, evaluate and use relevant information
- A respect for ethical practice and social responsibility
- Skills for effective communication

Course Learning Outcomes

1. Have an ability to understand the occurrence of groundwater
2. Understand the connectivity of surface water and groundwater resources, and
3. Understand how to develop groundwater resources

<i>Have a professional understanding of groundwater processes</i>	<i>PE1.1, PE1.2, PE1.3, PE2.1, PE2.3</i>
<i>Understand the principles behind the development of a groundwater resource</i>	<i>PE1.2, PE1.3, PE1.5, PE2.1, PE2.3</i>
<i>Understand the theoretical background for methods for investigating groundwater occurrence and its quality</i>	<i>PE1.1, PE1.2, PE1.3, PE2.1, PE2.2,</i>
<i>Ability to apply selected field investigation methods to data</i>	<i>PE2.1, PE2.2,</i>
<i>Gained competencies in using methods in the field</i>	<i>PE2.1, PE2.2, PE3.1, PE3.5, PE3.6</i>
<i>Ability to report on hydrogeological field data and their interpretations</i>	<i>PE3.1, PE3.2, PE3.3, PE3.4, PE3.6</i>

Teaching Strategies

TEACHING STRATEGIES

Private Study

- Review lecture material and textbook
- Do set problems and assignments
- Join Moodle discussions of problems
- Reflect on class problems and assignments
- Download materials from Moodle
- Keep up with notices and find out marks via Moodle Lectures
- Find out what you must learn
- See methods that are not in the textbook
- Follow worked examples
- Hear announcements on course changes Exercises
- Be guided by demonstrators
- Practice solving set problems
- Ask questions Assessments (multiple choice questions, quizzes, tests, examinations, assignments, site visit reports, hand-in exercises, laboratory reports etc.)
- Demonstrate your knowledge and skills
- Demonstrate higher understanding and problem solving Laboratory Work
- Hands-on work, to set studies in context

Additional Course Information

This course have a mandatory fieldwork component. 50% of the course mark will be based on this field component. Lectures and exercises will be presented in Weeks 1-4 of Term 1. There will then be a 3 day short course at the UNSW Field Station in Wellington (NSW) where practical work will be undertaken to consolidate the understanding achieved in the 4 weeks of lectures. The field course will commence on Monday 15th of March and conclude on Friday 19th of March. A bus will be hired for the transport to and from Wellington. On the Monday evening we will hold a BBQ at the field course accommodation on arrival.

Assessment

This course will be assessed by three minor assignments and one final report (Note: **There is no exam at the end of this course**). The three minor assignments, which total 50% of the course mark, are meant to test that the students understand the content of key chapters in the course notes and test their competencies in using groundwater investigation methods. They will also provide the students with early feedback on how they are progressing with the course. The final report (50% of the course mark) is a group assignment (3 students to a group). The report will consist of 1) a summary of the field activities at the Wellington Field Research Station; 2) presentation of the results; and 3) an integrated synthesis of the groundwater processes at the field station based on all results. Each student will have to do a specific part of the report for individual assessment, but it is very much a collaborative effort.

The final report will assess the students understanding of the methods demonstrated in the field, ability to present and critically assess the quality of groundwater field data obtained by a range of methods and finally their ability to interpret the findings in relation to groundwater processes. The purpose of the assessment tasks are to enable students to develop the necessary depth of understanding of groundwater resources so that they can enter the workforce and contribute accordingly.

Students who perform poorly in the minor assignments are recommended to discuss progress with the lecturer during the semester. The final grade is calculated based on the individual assessments. Passing the course requires a final grade of 50%. The Course Coordinator reserves the right to adjust the final scores by scaling if agreed by the Head of School.

Late submissions will be penalised at the rate of 10% per day after the due time and date have expired. Submissions more than 3 days late without a valid reason will automatically receive a fail (0 marks).

Assessment Tasks

Assessment task	Weight	Due Date	Student Learning Outcomes Assessed
Assignment 1	20%	05/03/2021 05:00 PM	1, 2
Assignment 2	30%	15/03/2021 09:00 AM	1, 2
Wellington Field Assignment	50%	23/04/2021 05:00 PM	1, 2, 3

Assessment Details

Assessment 1: Assignment 1

Start date: 23/02/2021 11:00 AM

Length: N/A

Details: This assignment will assess how well the student understand material in Chapter 2 and Chapter 3 and ability to use the physical properties of water for calculating groundwater flow.

Submission notes: Use the hand-in box on Moodle

Turnitin setting: This is not a Turnitin assignment

Assessment 2: Assignment 2

Start date: 02/03/2021 11:00 AM

Length: N/A

Details:

This assignment will assess how well the student understand material in Chapter 4 and ability to use methods groundwater chemistry in groundwater investigations.

Submission notes: Use the hand-in box on Moodle

Turnitin setting: This is not a Turnitin assignment

Assessment 3: Wellington Field Assignment

Start date: 15/03/2021 09:00 AM

Length: N/A

Details: This assignment will assess the students understanding of the methods demonstrated in the field, ability to present and critically assess the quality of groundwater field data obtained by a range of methods and finally their ability to interpret the findings in relation to groundwater processes.

Turnitin setting: This is not a Turnitin assignment

Attendance Requirements

For this course the Wellington Field component is mandatory. 50% of the course mark is based on the Wellington field assignment. Students who think that they may have a problem with attending the field component should contact the course coordinator A/Prof Martin Andersen.

Course Schedule

[View class timetable](#)

Timetable

Date	Type	Content
O Week: 8 February - 12 February		
Week 1: 15 February - 19 February	Seminar	Tuesday 9:00-11:00 CLB6 (Central Lecture Block Theater 6) Introduction to hydrogeology A/Prof Martin Andersen
	Workshop	Tuesday 11:00-13:00 CLB6 (Central Lecture Block Theater 6) Workshop on 3D geological structures and implications for groundwater occurrence
Week 2: 22 February - 26 February	Seminar	Tuesday 9:00-11:00 CLB6 (Central Lecture Block Theater 6) Physical properties of soil and water and equations of groundwater flow A/Prof Will Glamore
	Workshop	Tuesday 11:00-13:00 CLB6 (Central Lecture Block Theater 6) This workshop 2 is on material for Assignment 1 (assessable): Physical properties of water and calculation of groundwater flow
Week 3: 1 March - 5 March	Seminar	Tuesday 9:00-11:00 CLB6 (Central Lecture Block Theater 6) Geochemical investigations A/Prof Martin Andersen
	Workshop	Tuesday 11:00-13:00 CLB6 (Central Lecture Block Theater 6)

		This is Workshop 3 and is on material for Assignment 2 (assessable):
Week 4: 8 March - 12 March	Seminar	Tuesday 9:00-11:00 CLB6 (Central Lecture Block Theater 6) Surface water groundwater interactions A/Prof Will Glamore / Dr Mahmood Sadat-Noori
	Workshop	Tuesday 11:00-13:00 CLB6 (Central Lecture Block Theater 6) This is Workshop 4 and is on material for Assignment 3 (assessable): Surface water - groundwater interactions
Week 5: 15 March - 19 March	Fieldwork	This is the Wellington Field Course week . We will be leaving Sydney on Monday the 15th around noon (exact time and place TBA). We will stay at the Wellington Caves Campground. The return to Sydney will be on Friday the 19th in the early afternoon.
Week 6: 22 March - 26 March	Group Work	Tuesday 9:00-13:00 CLB6 (Central Lecture Block Theater 6) Wellington field trip follow-up. Data processing, trouble shooting and data quality assessment. Q&A
Week 7: 29 March - 2 April	Group Work	Tuesday 9:00-13:00 CLB6 (Central Lecture Block Theater 6) Q&A on Hydrogeology, Geochemistry and Surface water groundwater interactions.
Week 8: 5 April - 9 April	Group Work	Tuesday 9:00-13:00 CLB6 (Central Lecture Block Theater 6) Q&A on Hydrogeology, Geochemistry and Surface water groundwater interactions.
Week 9: 12 April - 16 April	Group Work	Tuesday 9:00-13:00 CLB6 (Central Lecture Block Theater 6) Q&A on Hydrogeology, Geochemistry and Surface water groundwater interactions.
Week 10: 19 April - 23 April	Group Work	Individual work in reporting groups and report submission on the Friday before 5 pm.

Resources

Prescribed Resources

This course will mainly rely on the lecture notes. The actual lectures and the powerpoints will also be available online on Moodle and recording on Echo360.

Recommended Resources

Recommended general textbooks are:

- Applied Hydrogeology - Fourth Edition (2001) by C.W. Fetter; published by Prentice Hall - For a basic introduction.
- Physical and Chemical Hydrogeology - Second Edition (1997) by Domenico and Schwartz; published by John Wiley and Sons - More detailed theoretical discussion of many aspects.
- Groundwater Hydrology - Conceptual and Computational Models (2003) by K.R. Rushton; published by Wiley - Excellent practical and theoretical approach to groundwater resource assessment.
- Water Wells and Boreholes - Misstear, Banks and Clark (2006); published by Wiley
- Groundwater in the Environment - An Introduction: by Paul L Younger (2007); published by Blackwell
- Geochemistry, Groundwater, and Pollution (2005); Appelo, C.A.J., Postma, D.; 2nd ed. A.A. Balkema, Rotterdam. 649 pp. ISBN: 04 1536 428 0. - Best textbook on the market for groundwater chemistry! It can be ordered via website www.crcpress.com

The UNSW Connected Waters website provides a portal to the groundwater world. This can be accessed at: <http://www.connectedwaters.unsw.edu.au>. The Hydrogeology Journal is the academic publication of the International Association of Hydrogeologists. The web address for the IAHR is <http://www.iah.org/> and journal articles are online at <http://link.springer.de/link/service/journals/10040/index.htm>.

Course Evaluation and Development

The course relies on the students providing their constructive criticism and suggestions for improvement anonymously using the course evaluation MyExperience. We also welcome feedback (positive and negative) at anytime during the lectures and workshops and via confidential email if necessary.

Submission of Assessment Tasks

Please refer to the Moodle page of the course for further guidance on assessment submission.

Academic Honesty and Plagiarism

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

Plagiarism is the use of another person's work or ideas as if they were your own. When it is necessary or desirable to use other people's material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:

<https://student.unsw.edu.au/plagiarism>

Academic Information

[Key UNSW Dates](#) - eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.

Final Examinations:

Final exams in Term 1 will be held online between 30th April - 13th May inclusive. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

Supplementary Examinations:

Supplementary Examinations for Term 1 2021 will be held on 24th - 28th May inclusive should you be required to sit one. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

ACADEMIC ADVICE

For information about:

- Notes on assessments and plagiarism;
- Special Considerations: student.unsw.edu.au/special-consideration;
- General and Program-specific questions: [The Nucleus: Student Hub](#)
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC/SURVSOC/CEPCA

Refer to Academic Advice on the School website available at:

<https://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/academic-advice>

Image Credit

Image credit Dr Martin Andersen

CRICOS

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Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.