



UNSW Course Outline

CVEN4503 Groundwater Resource Investigation - 2024

Published on the 28 Jan 2024

General Course Information

Course Code : CVEN4503

Year : 2024

Term : Term 1

Teaching Period : T1

Is a multi-term course? : No

Faculty : Faculty of Engineering

Academic Unit : School of Civil and Environmental Engineering

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Postgraduate, Undergraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

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.

Relationship to Other Courses

This course builds on the basic groundwater theory covered in CVEN3501 Water Resource Engineering, which is a mandatory prerequisite.

Course Learning Outcomes

| Course Learning Outcomes |
|--|
| CLO1 : Describe key groundwater processes including its occurrence and connectivity to surface water |
| CLO2 : Undertake appropriate field investigation methods |
| CLO3 : Evaluate hydrological field data |
| CLO4 : Produce a report based on field data |

| Course Learning Outcomes | Assessment Item |
|--|---|
| CLO1 : Describe key groundwater processes including its occurrence and connectivity to surface water | <ul style="list-style-type: none">• Assignment 1• Assignment 2• Wellington Field Assignment |
| CLO2 : Undertake appropriate field investigation methods | <ul style="list-style-type: none">• Wellington Field Assignment |
| CLO3 : Evaluate hydrological field data | <ul style="list-style-type: none">• Wellington Field Assignment |
| CLO4 : Produce a report based on field data | <ul style="list-style-type: none">• Wellington Field Assignment |

Learning and Teaching Technologies

Moodle - Learning Management System

Additional Course Information

This course has 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 4-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 11th of March and conclude on Friday 15th of March (3 days in the field). A bus will be hired for the transport to and from Wellington. On the Monday evening we will hold a BBQ info session at the field course accommodation on arrival.

We will follow current NSW state and UNSW guidelines regarding COVID19 requirements.

If you have concerns in regards to the field trip or covid, please contact course coordinator Dr Martin Andersen.

There will be a small personal fee for attending the field component to cover food and accommodation. In 2023 this was \$330. The cost in 2024 is to be determined.

Assessments

Assessment Structure

| Assessment Item | Weight | Relevant Dates |
|--|--------|--|
| Assignment 1 Assessment Format: Individual | 20% | Start Date: 13/02/2024 01:00 PM Due Date: 27/02/2024 09:00 AM |
| Assignment 2 Assessment Format: Individual | 30% | Start Date: 05/03/2024 09:00 AM Due Date: 26/03/2024 09:00 AM |
| Wellington Field Assignment Assessment Format: Individual | 50% | Start Date: 11/03/2024 06:00 PM Due Date: 26/04/2024 05:00 PM |

Assessment Details

Assignment 1

Assessment Overview

This assignment will assess the student's ability to use the physical properties of water for calculating groundwater flow.

Course Learning Outcomes

- CL01 : Describe key groundwater processes including its occurrence and connectivity to surface water

Detailed Assessment Description

This assignment will assess how well the student understand material in Chapter 2 and Chapter 3 of the course notes.

Assessment Length

N/A

Submission notes

Upload one pdf document to Moddle

Assessment information

Please see further Information on Moddle

Assignment submission Turnitin type

This is not a Turnitin assignment

Assignment 2

Assessment Overview

This assignment will assess the student's ability to use groundwater chemistry methods in groundwater investigations.

Course Learning Outcomes

- CL01 : Describe key groundwater processes including its occurrence and connectivity to surface water

Detailed Assessment Description

This assignment will assess how well the student understand material in Chapter 4.

Assessment Length

N/A

Submission notes

Submit one pdf document on Moodle

Assessment information

Please see further information on Moodle

Assignment submission Turnitin type

Not Applicable

Wellington Field Assignment

Assessment Overview

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. Work is completed as a group but individuals nominate which section they wrote and are marked accordingly.

Course Learning Outcomes

- CL01 : Describe key groundwater processes including its occurrence and connectivity to surface water
- CL02 : Undertake appropriate field investigation methods
- CL03 : Evaluate hydrological field data
- CL04 : Produce a report based on field data

Assessment Length

N/A

Submission notes

Submit one pdf on Moodle

Assignment submission Turnitin type

Not Applicable

General Assessment Information

This course will be assessed by two assignments and one final report (Note: There is no exam at the end of this course). The two assignments are individual, which totals 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 two first assignments are recommended to discuss progress with the lecturer during the semester.

Grading Basis

Standard

Requirements to pass course

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.

Course Schedule

| Teaching Week/Module | Activity Type | Content |
|------------------------------------|---------------|--|
| Week 1 : 12 February - 18 February | Lecture | Lecture 1. Introduction to groundwater investigations. |
| | Workshop | Workshop 1. Part of the first workshop will be assessable in Assignment 1. |
| Week 2 : 19 February - 25 February | Lecture | Lecture 2. Physical properties of soil and water. Equations of groundwater flow. Surface water - groundwater interactions. |
| | Workshop | Workshop 2. Part of this workshop will be assessable in Assignment 1. |
| Week 3 : 26 February - 3 March | Lecture | Lecture 3. Geophysical groundwater investigations. |
| | Workshop | Workshop 3. Geophysical Groundwater Investigations. |
| | Assessment | Assignment 1 is due 9 am on Tuesday the 27/02. |
| Week 4 : 4 March - 10 March | Lecture | Lecture 4. Groundwater geochemistry used in investigations. |
| | Workshop | Workshop 4. Groundwater geochemistry investigations. This workshop will be part of Assignment 2. |
| Week 5 : 11 March - 17 March | Fieldwork | Wellington fieldtrip 11 - 15 of March (both days inclusive). Mandatory attendance. More information on logistics will be announced in class and on Moodle. |
| Week 6 : 18 March - 24 March | Other | Break week. Individual review and revision of field notes from Wellington. Work on Assignment 2. Catch up reading the course notes. |
| Week 7 : 25 March - 31 March | Workshop | Group work on Wellington report (Assignment 3). Q&A with Lecturers. |
| | Assessment | Assignment 2 due 9 am on Tuesday the 26 of March. |
| Week 8 : 1 April - 7 April | Workshop | Group work on Wellington report (Assignment 3). Q&A with Lecturers. |
| Week 9 : 8 April - 14 April | Workshop | Group work on Wellington report (Assignment 3). Q&A with Lecturers. |
| Week 10 : 15 April - 21 April | Workshop | Group work on Wellington report (Assignment 3). Q&A with Lecturers. |
| Week 11 : 22 April - 28 April | Other | NO Lecture, Individual work on Wellington report (Assignment 3). |
| | Assessment | Assignment 3 (Wellington report) due on Friday the 26 of April at 5 pm. |

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 to discuss. Also undergraduate students must attend at least 80% of the workshop/lab in which they are enrolled for the duration of the session. Students are strongly encouraged to participate in all classes, and workshops.

General Schedule Information

CVEN4503 is divided into 3 sections:

Weeks 1 to 4: Consists of seminars and workshops introducing the theory, the necessary material for Assignments 1 and 2, and information for the field trip. Seminars and workshops will

be taught face to face in Mathews 102.

Week 5: The Wellington field trip (Monday to Friday).

Weeks 6 to 10: Face to Face workshops and group work on the collected Wellington data in Mathews 102.

Course Resources

Prescribed Resources

This course will rely on the lecture notes and face to face lecture presentations. The actual lectures and the powerpoints will also be available online on Moodle.

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 IAH is <http://www.iah.org/> and journal articles are on line at <http://link.springer.de/link/service/journals/10040/index.htm>.

Additional Costs

The students will have to pay a small fee of the food and accommodation for the field trip. The School will pay for the transport to and from site.

Course Evaluation and Development

The course rely 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.

Staff Details

| Position | Name | Email | Location | Phone | Availability | Equitable Learning Services Contact | Primary Contact |
|----------|-----------------|-------|-----------------|-------|--------------|-------------------------------------|-----------------|
| Convenor | Martin Andersen | | WRL, Manly Vale | | | No | Yes |
| | Stuart Clark | | | | | No | No |
| | Evan Jensen | | | | | No | No |

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and policies. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)

- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

III. 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 prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. 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.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You 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 tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific 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)

School-specific Information

Final Examinations

Final Exams in T1 2024 will be held on campus between the 26th April and 9th May, and Supplementary Exams between the 20th - 24th May 2024. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

School Contact Information

For assistance with enrolment, class registration, progression checks and other administrative matters, please see [the Nucleus: Student Hub](#). They are located inside the Library – first right as you enter the main library entrance. You can also contact them via <http://unsw.to/webforms> or reserve a place in the face-to-face queue using the UniVerse app.

For course administration matters, please contact the Course Coordinator.

Questions about the this course should normally be asked during the scheduled class so that everyone can benefit from the answer and discussion.