



UNSW Course Outline

CVEN4703 Advanced Water Quality Principles - 2024

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General Course Information

Course Code : CVEN4703

Year : 2024

Term : Term 2

Teaching Period : T2

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

Fundamental aspects of the chemistry and biology of aquatic environments are reviewed and extended enabling analysis and interpretation of processes occurring in surface and ground waters, as well as water and wastewater treatment systems. Consideration is given to recent

developments in water and wastewater technologies.

Course Aims

This course aims to re-familiarise the student with the fundamental principles of water physics, chemistry and biology. Students will develop a sound knowledge of the factors influencing water composition in natural and engineered systems and will apply the knowledge gained to analysis of, and development of solutions to, a range of common water quality problems typically encountered by Environmental Engineers and Public Health and Waste Management specialists.

This course is designed to assist the student in locating and interpreting relevant literature with emphasis given to i) identification of current status of knowledge, ii) development of appropriate solutions and iii) recognition of remaining knowledge gaps.

Relationship to Other Courses

- CVEN2701: Foundation of Water Chemistry
- CVEN3502: Water Quality Standards and Analysis + Treatment Processes
- CVEN4504: Advanced Water Treatment Processes (with emphasize on non-traditional/emerging contaminants)
- CVEN9884/CVEN9856/CVEN9887: Environmental Chemical and Biological Processes
- CVEN9855: Water and Wastewater Quality Analysis
- CVEN9856: Water Treatment

Course Learning Outcomes

Course Learning Outcomes
CL01 : Identify key biogeochemical processes that operate within natural and engineered aquatic systems, and examine how these processes influence water quality.
CL02 : Recognize the challenges that exist in maintaining acceptable water quality and the knowledge gaps that remain with regard to understanding and mitigating particular water quality problems.
CL03 : Apply knowledge of both conventional and advanced methods for treating water and wastewater to achieve desired water quality standard.
CL04 : Demonstrate interpersonal and process management skills in real-world dynamic team-work environments.
CL05 : Evaluate knowledge and technologies from published literature and effectively disseminate findings through written reports and seminar presentations.

Course Learning Outcomes	Assessment Item
CL01 : Identify key biogeochemical processes that operate within natural and engineered aquatic systems, and examine how these processes influence water quality.	<ul style="list-style-type: none"> • Quizzes • Group work assessment • Final Exam
CL02 : Recognize the challenges that exist in maintaining acceptable water quality and the knowledge gaps that remain with regard to understanding and mitigating particular water quality problems.	<ul style="list-style-type: none"> • Quizzes • Group work assessment • Final Exam
CL03 : Apply knowledge of both conventional and advanced methods for treating water and wastewater to achieve desired water quality standard.	<ul style="list-style-type: none"> • Quizzes • Group work assessment • Final Exam
CL04 : Demonstrate interpersonal and process management skills in real-world dynamic team-work environments.	<ul style="list-style-type: none"> • Group work assessment
CL05 : Evaluate knowledge and technologies from published literature and effectively disseminate findings through written reports and seminar presentations.	<ul style="list-style-type: none"> • Group work assessment

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Echo 360

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Quizzes Assessment Format: Individual	25%	Start Date: Not Applicable Due Date: Not Applicable
Group work assessment Assessment Format: Individual	25%	Start Date: Not Applicable Due Date: Not Applicable
Final Exam Assessment Format: Individual	50%	Start Date: During the exam period Due Date: During the exam period

Assessment Details

Quizzes

Assessment Overview

Three online Moodle quizzes

- Quiz 1 (5%): Assessment based on materials covered in weeks 1 and 2.
- Quiz 2 (14%): Assessment based on materials covered from weeks 3 to 10.
- Quiz 3 (6%): Assessment based on materials covered in research topics.

Course Learning Outcomes

- CL01 : Identify key biogeochemical processes that operate within natural and engineered aquatic systems, and examine how these processes influence water quality.
- CL02 : Recognize the challenges that exist in maintaining acceptable water quality and the knowledge gaps that remain with regard to understanding and mitigating particular water quality problems.
- CL03 : Apply knowledge of both conventional and advanced methods for treating water and wastewater to achieve desired water quality standard.

Detailed Assessment Description

Quiz 1: 45 min, 10 questions, due on Sunday 16 June 2024 at 11 pm

Quiz 2: 60 min, 12 questions, due on Sunday 04 August 2024 at 11 pm

Quiz 3: 20 min, 5 questions, due on the night before the corresponding research topic presentations.

Submission notes

All quizzes are online submission.

Assignment submission Turnitin type

This is not a Turnitin assignment

Group work assessment

Assessment Overview

Literature Review (10%): 10 pages literature review

Presentation (12%): 30 min talk plus 15 min Q & A

Participation (3% in total): Attendance and participation in group presentations

Course Learning Outcomes

- CL01 : Identify key biogeochemical processes that operate within natural and engineered aquatic systems, and examine how these processes influence water quality.
- CL02 : Recognize the challenges that exist in maintaining acceptable water quality and the knowledge gaps that remain with regard to understanding and mitigating particular water quality problems.
- CL03 : Apply knowledge of both conventional and advanced methods for treating water and wastewater to achieve desired water quality standard.
- CL04 : Demonstrate interpersonal and process management skills in real-world dynamic team-work environments.
- CL05 : Evaluate knowledge and technologies from published literature and effectively disseminate findings through written reports and seminar presentations.

Detailed Assessment Description

Details of the assessment are given on a separate assignment guideline.

Literature review and presentation are due two weeks after the research topic is assigned to the group.

Participation is due at the same date and time as the group presentations.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Final Exam

Assessment Overview

Final exam (50%): Assessment based on all lecture material.

Course Learning Outcomes

- CLO1 : Identify key biogeochemical processes that operate within natural and engineered aquatic systems, and examine how these processes influence water quality.
- CLO2 : Recognize the challenges that exist in maintaining acceptable water quality and the knowledge gaps that remain with regard to understanding and mitigating particular water quality problems.
- CLO3 : Apply knowledge of both conventional and advanced methods for treating water and wastewater to achieve desired water quality standard.

Assessment Length

2 hr

Submission notes

In-class, closed book exam

Assignment submission Turnitin type

This is not a Turnitin assignment

Hurdle rules

A mark of at least 40% in the final examination is required before the class work is included in the final mark.

General Assessment Information

*Online quizzes will be made available on UNSW Moodle one week before the aforementioned due date. Students can take these quizzes at their convenience within that one-week period, with only one attempt allowed. The online quizzes may include short-answer, multiple choice, true-false, and/or calculation-based questions. Please ensure that your computer is UNSW Moodle compatible before attempting the quizzes. Please check the following link for system requirement for UNSW Moodle and other information on UNSW Moodle.

<https://moodle.telt.unsw.edu.au/>

Please inform the course coordinator/lecturer in advance and/or immediately if you are not able to take the quizzes in the allotted weeks or regarding any computing problems.

**Students are expected to form their own groups (2 students per group unless otherwise specified) and select the available research topics on a first-come-first-served basis. Group members and research topics must be finalized prior to Thursday 6th June 2024. Research articles will be distributed to the groups two weeks prior to the groups' presentation dates (e.g., the first set of papers will be distributed on Thursday week 2 to groups that present on

Thursday week 4).

Both presentation and literature review should be based primarily on the assigned research article(s) with focus given to (if applicable): a) the core hypothesis/findings of the article(s), b) the key biogeochemical principles/processes and/or treatment technologies underpinning the work, c) environmental significance of the work, and d) current knowledge (by referring to previous publications), knowledge gaps and work required to fill these gaps. All students are expected to attend the group presentations and provide marks based on a given marking rubric. The final presentation mark is equally weighted from the average of the student mark and the average of the staff mark.

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 27 May - 2 June	Lecture	Physical, chemical and biological quality of water: <ul style="list-style-type: none">• Concentration units• Physical aggregate characteristics of water• Inorganic and organic chemical constituents• Taste and odours• Gases and organisms in water
Week 2 : 3 June - 9 June	Lecture	Principles of chemical reactions: <ul style="list-style-type: none">• Chemical reactions and thermodynamics of chemical reactions• Reaction kinetics and rate laws• Reactions used in water treatment
Week 3 : 10 June - 16 June	Lecture	Salinity: Market failure and management <ul style="list-style-type: none">• Introduction to salinity, thresholds and types of salinity• Inadequate knowledge & causes of market failure• Salinity management
Week 4 : 17 June - 23 June	Lecture	Blue green algae: Water quality issues & management <ul style="list-style-type: none">• Occurrence of BGA & associated water quality issues• Basic properties of BGA, growth dynamic and toxin production• Algal management strategies
Week 5 : 24 June - 30 June	Lecture	Acid sulfate soils and associated water quality implications: <ul style="list-style-type: none">• Introduction to acid sulfate soils: formation, generation of acid and location• Environmental impacts of ASS• Management of ASS
Week 6 : 1 July - 7 July	Other	Non-teaching week.
Week 7 : 8 July - 14 July	Lecture	N and P contaminants: Occurrence and removal <ul style="list-style-type: none">• Overview of N and P cycles• N and P removal from wastewaters• N and P removal from drinking waters
Week 8 : 15 July - 21 July	Lecture	Radionuclides: Extraction and management <ul style="list-style-type: none">• Radiation basis, radioactivity and sources• Uranium mining in Australia• Biogeochemistry of Uranium• Removal of radionuclides in water treatment
Week 9 : 22 July - 28 July	Lecture	Air pollutants and Their Impacts on Human Health <ul style="list-style-type: none">• Particles in the atmosphere• Gaseous inorganic pollutants• Organic air pollutants
Week 10 : 29 July - 4 August	Lecture	Emerging organic contaminants: <ul style="list-style-type: none">• Issues with and classification of emerging contaminants• Removal of emerging contaminants in drinking water: conventional, adsorption, RO and AOPs.

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

General Schedule Information

Lecture:

- Tue 9-11 am (VA 121)
- Thu 9-10 am (MAT 106)

Workshop:

- Thu 10-11 am (MAT 106)

Course Resources

Prescribed Resources

No prescribed texts.

Recommended Resources

- MWH (2012) Water Treatment: Principles and Design, 3rd edition, John Wiley and Sons, Inc.
- Additional materials provided on Moodle.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	David Waite		Room 114 (H22, Vallentine Annexe)	9385 5060	By appointment only	No	No
Lecturer	An Ninh Pham		Room 108 (H22, Vallentine Annexe)	9385 5102	By appointment only	No	Yes

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 T2 2024 will be held on campus between the 9th - 22nd August, and Supplementary Exams between the 2nd - 6th September 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.