CVEN4703

Advanced Water Quality Principles

Term 2, 2022

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
David Waite	d.waite@unsw.edu.au	By appointment only	Room 114 (H22 – Vallentine Annexe)	9385 5060

Lecturers

Name	Email	Availability	Location	Phone
An Ninh Pham	anninh.pham@unsw.edu.au	By appointment only	Room 108 (H22 – Vallentine Annexe)	9385 5102

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

Units of Credit 6

Summary of the Course

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 treatment technologies.

Course Aims

To re-familiarise the student with the fundamental principles of water physics, chemistry and biology and to apply these principles to the understanding of, and development of solutions to, water quality problems typical of those encountered by
Environmental Engineers and Public Health and Waste Management specialists. 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. The 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.

Course Learning Outcomes

1. Understand the chemical processes that operate within natural and engineered aquatic systems and how these processes influence water quality.
2. Have some appreciation of the challenges that exist with regard to maintaining acceptable water quality and the knowledge gaps that remain with regard to understanding and mitigating particular water quality problems.
3. Obtain an understanding of both conventional and advanced methods of treating waters and wastewaters such that desired water quality is achieved.
4. Carry out a literature review, work in a group, and present findings effectively.

Teaching Strategies

The course will involve a mix of lectures by teaching staff and guest lecturers, individual research, class room presentation and discussion.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Quizzes	25%	Not Applicable	1, 2, 3
2. Final Exam	50%	Not Applicable	1, 2, 3
3. Group work assessment	25%	Not Applicable	1, 2, 3

Assessment 1: Quizzes

Submission notes: All quizzes are online submission.

Three online Moodle quizzes

Quiz 1 (5%)

Quiz 2 (10%)

Quiz 3 (10.5%)

Assessment 2: Final Exam

Assessment length: 2 hr
Submission notes: Exam are online, open book

All lecture materials given by Waite/Pham to be assessed

Assessment criteria

The Final Examination is worth 50% of the Final Mark and the class work is worth 50% of the Final Mark. Your marks for the class work component of this course will only be included in your Final Mark if you obtain > 40% in the Final Examination.

Assessment 3: Group work assessment

Literature Review (10%)

Presentation (11%)

Participation (3.5%)

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

Assessment criteria

The Final Examination is worth 50% of the Final Mark and the class work is worth 50% of the Final Mark. Your marks for the class work component of this course will only be included in your Final Mark if you obtain > 40% in the Final Examination.

Attendance Requirements

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

Course Schedule

View class timetable

Timetable

Date	Type	Content
O-Week: 23 May - 27 May		
Week 1: 30 May - 3 June	Lecture	Physical, chemical and biological quality of water: • Concentration units • Physical aggregate characteristics of water • Inorganic and organic chemical constituents • Taste and odours • Gases and organisms in water No guest lecture in this week.
Week 2: 6 June - 10 June	Lecture	Principles of chemical reactions: • Chemical reactions and thermodynamics of chemical reactions • Reaction kinetics and rate laws • Reactions used in water treatment No guest lecture this week.
Week 3: 13 June - 17 June	Lecture	Radionuclides: Extraction and management: • Radiation basis, radioactivity and sources • Uranium mining in Australia • Biogeochemistry of Uranium • Removal of radionuclides in water treatment Guest lecture presented Dr. Tim Payne.
Week 4: 20 June - 24 June	Lecture	N and P contaminants: Occurrence and removal: • Overview of N and P cycles • N and P removal from wastewaters • N and P removal from dinking waters

		Guest lecture presented by Dr Yuan Wang
Week 5: 27 June - 1 July	Lecture	Blue green algae: Water quality issues & management: • Occurrence of BGA & associated water quality issues • Basic properties of BGA, growth dynamic and toxin production • Algal management strategies Guest lecture presented by Dr Bojan Tamburic
Week 6: 4 July - 8 July		
Week 7: 11 July - 15 July	Lecture	Salinity: Market failure and management: • Introduction to salinity, thresholds and types of salinity • Inadequate knowledge & causes of market failure • Salinity management Guest lecture presented by Ms Clare Bales
Week 8: 18 July - 22 July	Lecture	Air pollutants and Their Impacts on Human Health: • Particles in the atmosphere • Gaseous inorganic pollutants • Organic air pollutants Guest lecture presented by Dr Yingying Sun
Week 9: 25 July - 29 July	Lecture	Emerging organic contaminants: • Issues with and classification of emerging contaminants • Removal of emerging contaminants in drinking water: conventional, adsorption, RO and AOPs Guest lecture presented by Prof. Stuart Khan
Week 10: 1 August - 5 August	Lecture	Acid sulfate soils and associated water quality implications: • Introduction to acid sulfate soils: formation, generation of acid and location • Environmental impacts of ASS • Management of ASS

		Guest lecture presented by Dr Andrew Kinsela

Resources

Recommended Resources

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

Laboratory Workshop Information

Workshop is via Q&A Moodle Forum.

Submission of Assessment Tasks

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

UNSW has a standard late submission penalty of:

- 5% per day, for all assessments where a penalty applies, capped at five days (120 hours), after which a student cannot submit an assessment, and no permitted variation.

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

Final Examinations:

Final exams in T2 2022 will be held online between 12th - 25th August 2022 inclusive, and supplementary exams between 5th - 9th September 2022 inclusive. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

ACADEMIC ADVICE

- Key Staff to Contact for Academic Advice (log in with your zID and password): https://intranet.civeng.unsw.edu.au/key-staff-to-contact-during-your-studies-at-unsw
- Key UNSW Dates - eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.
- CVEN Student Intranet (log in with your zID and password): https://intranet.civeng.unsw.edu.au/student-intranet
- Student Life at CVEN, including Student Societies: https://www.unsw.edu.au/engineering/civil-and-environmental-engineering/student-life
- Special Consideration: https://student.unsw.edu.au/special-consideration
- General and Program-Specific Questions: The Nucleus: Student Hub
- Book an Academic Advising session: https://app.acuityscheduling.com/schedule.php?owner=19024765

Disclaimer

This course outline sets out 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 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 (as updated in Moodle), the description in the Course Outline/Moodle applies.

Image Credit

Mike Gal.

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.