CVEN9885

Transport and Transformation of Contaminants

Term 2, 2023

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Denis O'Carroll O'Carroll	d.ocarroll@unsw.edu.au	Upon Request	Water Research Laboratory	

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

Processes controlling transformation and fate of chemicals in the environment. Measurement and prediction of contaminant behaviour in natural and engineered systems. Fundamentals of dispersion common to all environmental media (air, water, soil). Air chemistry; interaction and degradation of gaseous pollutants in the atmosphere. Dispersion processes; nature of dispersion processes, advection and diffusion. Modelling of dispersion in the atmosphere water bodies and soils.

Course Aims

To familiarise you with the fundamental processes of (a) transport, diffusion and dispersion of solutes and solids common to all environmental media and (b) transformation and fate of various pollutants. Additionally, this course aims to enable you to develop critical skills for assessing environmental literature and data.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Understand and quantify transport, dispersion, transformation and fate of solutes and solids pollutants in the environment.	PE1.1, PE1.2
2. Have critical skills for assessing environmental literature and data	

Teaching Strategies

Across the term, the 1 x 3-hour face-to-face lectures per week will give students an understanding of the theory and practice of contaminant transport. The 1 hour face-to-face workshop (Weeks 1-5; 7-10) will focus on two assessments and will give students an opportunity to reflect on relevant material and solve practice problems.

Additional Course Information

Prerequisites: Students are expected to have a basic understanding of chemistry. It is recommended that students have successfully completed CVEN9886 Environmental Microbial Processes and CVEN9887 Environmental Chemical Processes (previously CVEN9884 Environmental Engineering 1).

Assessment

Students who perform poorly during the class work are recommended to discuss progress with the lecturer. The formal exam scripts will not be returned. Note: The lecturer reserves the right to adjust the final scores by scaling if agreed by the Head of School.

Please note that all assessments are individual tasks.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Quiz	5%	16/06/2023 11:59 PM	
2. Solute transport and diffusion	15%	30/06/2023 11:59 PM	1
3. Literature research of contaminant behaviour	20%	28/07/2023 11:59 PM	1, 2
4. Final Exam	60%	Not Applicable	1, 2

Assessment 1: Quiz

Due date: 16/06/2023 11:59 PM

The Quiz is designed to gauge how well the student understands the early material in the course delivered during Weeks1-3. Marks are given for correct answers and summed to form an integrated measure.

Assessment 2: Solute transport and diffusion

Due date: 30/06/2023 11:59 PM

This assignment tests the understanding of the principles of advective, diffusive and dispersive contaminant transport. Calculations of contaminant concentrations in the environment are based on given parameters.

Assessment 3: Literature research of contaminant behaviour

Due date: 28/07/2023 11:59 PM

This assignment test the students ability to identify transport and transformation mechanisms for select contaminants in a specific environment (air, water soil).

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Assessment 4: Final Exam

Exam, testing understanding of the entire course content

Hurdle requirement

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

Attendance Requirements

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

Course Schedule

View class timetable

Timetable

Date	Type	Content
Week 1: 29 May - 2 June	Lecture	Introduction–real world examples.
	Workshop	Discussion of examples.
Week 2: 5 June - 9 June	Lecture	Processes of contaminant transport (e.g., advection, dispersion, diffusion, reaction)
	Workshop	Solution of select contaminant transport examples.
Week 3: 12 June - 16 June	Lecture	Processes of contaminant transport continued. Colloid (e.g., bacteria and virus) fate and transport. Microplastic fate and transport.
	Workshop	**Solution of select colloid transport examples**
	Assessment	Quiz
Week 4: 19 June - 23 June	Lecture	Contaminant sorption and reaction
	Workshop	Solution of select contaminant reaction examples.
Week 5: 26 June - 30 June	Lecture	Fugacity
	Workshop	Solution of select fugacity examples.
	Assessment	Solute transport and diffusion
Week 6: 3 July - 7 July	Homework	Flexibility Week - no lectures or workshops
Week 7: 10 July - 14 July	Lecture	PFAS fate and transport, including a guest lecture
	Workshop	Solution of select PFAS fate and transport examples
Week 8: 17 July - 21 July	Lecture	Contaminant transport and dispersion in the atmosphere
	Workshop	Solution of select airborne contaminant transport examples.

Week 9: 24 July - 28 July	Lecture	Contaminants in enclosed systems
	Workshop	Solution of contaminants in enclosed systems examples
	Assessment	Literature research of contaminant behaviour
Week 10: 31 July - 4 August	Lecture	Contaminants in enclosed systems Antimicrobial resistance
	Workshop	Solution of contaminants in enclosed systems examples. Discussion of antimicrobial resistance.

Resources

Prescribed Resources

Textbook: There is no particular textbook for this course. The Lecture Notes are reasonably detailed and numerous references are cited in them which can be sought from UNSW library.

Recommended Resources

Moodle: Lectures and other material will be made available on the UNSW eLearning website: https://moodle.telt.unsw.edu.au/login/index.php

Library: You will be required to independently seek literature for Assignment 2 in this course. To obtain materials, external students may request books and articles from the UNSW Library and/or other libraries through interlibrary loans. For off-campus students wishing to use the Inter Library Loan (ILL) service for books, journal articles, conference papers and other resources which are not available electronically, you need to go to: http://www.library.unsw.edu.au/borrowing/offcampus.html

If you are unsure which databases to use to find articles, a good place to start is the UNSW Library Subject guides. If you are unsure whether you have found everything on a topic, you can obtain personal support by booking a **research consultation**. This provides a one to one session with a subject librarian. To book, complete the online Research Consultation form.

For help with any other library matter send an email and Ask a Question or Contact the library by phone. If you are at Kensington, library staff in the Help Zone on level 2 are available to assist you personally.

Course Evaluation and Development

Students will be emailed by the University during the term to complete a myExperience survey regarding their experience in the course. Feedback will be provided to the coordinator to further develop the course for future terms.

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 2023 will be held on campus between Friday 11th and Thursday 24th August (inclusive), and Supplementary Exams between Monday 4th and Friday 8th September (inclusive). You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

For students enrolled in the distance offering of a postgraduate course, and who reside further than 100km from UNSW Kensington campus, will be contacted regarding sitting an external exam. The school's External Exam Policy can be found on the Intranet.

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://unswengacademicadvising.as.me/schedule.php

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

CRICOS Provider Code: 00098G

Acknowledgement of Country

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

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	✓
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	
PE2.2 Fluent application of engineering techniques, tools and resources	
PE2.3 Application of systematic engineering synthesis and design processes	
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in professional and lay domains	
PE3.3 Creative, innovative and pro-active demeanour	
PE3.4 Professional use and management of information	
PE3.5 Orderly management of self, and professional conduct	
PE3.6 Effective team membership and team leadership	