

CVEN9886

Environmental Microbial Processes

Term 3, 2022



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Bojan Tamburic	b.tamburic@unsw.edu.au		Building H20, Room 512	

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

CVEN9886 is a core postgraduate course in Environmental Engineering. There are no prerequisites beyond a basic curiosity about microbial processes and their applications in engineering. It is expected that students would take CVEN9886 in the first year of their postgraduate study.

Microbes are all around us. There are more microbial cells in one drop of water than there are stars in our galaxy! Some microbes cause harm, while others are extremely useful to society. As engineers, we need to understand **how** microbes affect natural and constructed systems, and **what we can do** to influence these processes.

Would you like to learn how to work with microbiologists and other specialists to **deliver multidisciplinary engineering projects**? CVEN9886 will equip you with the knowledge and the tools – critical analysis, teamwork and communication skills – to tackle real-world assignments. You will **address crucial global challenges**, including:

- How can we improve water quality and health outcomes around the world?
- Can we use microbial processes to increase prosperity and wellbeing?
- How do we protect vulnerable communities and ecosystems in a changing climate?

Course Aims

This course aims to equip students with the following attributes:

- Knowledge of the fundamentals of applied and environmental microbiology, as they may be encountered by environmental engineers
- Ability to assess reports and data presented by specialists in the areas of microbiology, molecular biology, microbial ecology and biochemistry
- Skills for effective communication, project-based teamwork and collaborative multidisciplinary work
- Capacity for analytical and critical thinking and for creative problem solving
- Ability to engage in independent and reflective learning

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Describe Environmental Microbial Processes, including latest advances in the field	PE1.1, PE1.2, PE1.3, PE1.4, PE1.6
2. Critically analyse publications, reports, articles and data relating to Environmental Microbial Processes	PE1.3, PE1.4, PE3.4, PE2.2

Learning Outcome	EA Stage 1 Competencies
3. Propose novel microbial solutions to environmental engineering challenges and evaluate their effectiveness via collaborative teamwork	PE2.1, PE2.2, PE3.2, PE3.3, PE3.4, PE3.5, PE3.6, PE1.3, PE1.4
4. Use written, visual and oral communication methods to share knowledge with engineers, clients and the public	PE1.3, PE1.4, PE3.2, PE3.3, PE3.4, PE3.1

Teaching Strategies

- 2 hour weekly lectures will be used to introduce the fundamentals of applied and environmental microbiology in an interactive learning environment with friendly quizzes and plenty of opportunity to ask questions
- 2 hour weekly seminars will be used by students to engage in team-based learning to research new concepts, develop projects for their assessments and practise exam-style questions
- Assessments have been designed to allow students to demonstrate their knowledge and skills while working towards developing their Engineers Australia professional attributes

Additional Course Information

- There are no pre-requisites for this course
- There are 4 contact hours per week in CVEN9886
- Students are expected to spend an additional 8 hours per week on private study, including preparing assessment projects for submission and exam revision

Assessment

CVEN9886 uses a combination of individual assessment (Assessment 1 & 2, Exam) and team-based assessment (Assessment 3) to address the course learning outcomes and Engineers Australia competencies. Key information about assessments is provided here – further details are available on Moodle.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Poster	10%	Week 3	1, 2, 4
2. Report	15%	Week 5	1, 2, 4
3. Presentation	25%	Week 9	1, 2, 3, 4
4. Final Exam	50%	Not Applicable	1

Assessment 1: Poster

Assessment length: 1 page

Due date: Week 3

Marks returned: Week 4

Format: Poster (1 page)

Task: Choose one microbial species of interest and design a poster to describe its taxonomy, structural features, environmental niche and key metabolic functions.

Target Audience: High school students

Criteria for Success: You should aim for a high degree of factual correctness, clear poster design, and the ability to engage and entertain your audience.

Assessment 2: Report

Assessment length: 1,500 words + 3 diagrams

Due date: Week 5

Marks returned: Week 7

Format: Report (1,500 words + 3 diagrams)

Task: For your chosen microbial species, prepare a detailed report to explain its importance to natural microbial systems and/or its value to engineered microbial processes.

Target Audience: Environmental engineering professionals

Criteria for Success: Your report should be complete and factually correct, concise, professionally presented, illustrated with relevant diagrams, and pitched to a knowledgeable audience.

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

Assessment 3: Presentation

Assessment length: 10 minutes, 20 slides for presentation; 500 words for reflection

Due date: Week 9

Marks returned: Study Week

Format: Team Presentation (10 minutes, 20 slides) [20%], Private Reflection (500 words) [5%]

Task: Working in teams of 4, choose one global challenge and explain how it can be addressed using microbial processes in novel and innovative ways.

Target Audience: Clients of an environmental engineering consultancy

Criteria for Success: Your team needs to work together effectively to deliver a highly professional presentation, based on novel cutting-edge research, which clearly targets the needs of your clients.

Private Reflection: Take time to reflect on how well your team functioned, and to consider your own role and contribution.

Assessment 4: Final Exam

Assessment length: 2 hours

The final exam will be 2 hour long and composed of short, written questions, which will allow you to demonstrate comprehensive mastery of the subject material covered in lectures, workshops and online resources.

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: 5 September - 9 September		
Week 1: 12 September - 16 September	Lecture	What is Life? <ul style="list-style-type: none">• From Genes to Cells• Life as Chemistry• Life as Information
Week 2: 19 September - 23 September	Lecture	Introduction to Microbiology <ul style="list-style-type: none">• Cell Structure• Microbial Groups• Macromolecular Building Blocks
Week 3: 26 September - 30 September	Lecture	Molecular Biology for Engineers <ul style="list-style-type: none">• DNA• (Meta)Genomics• Transcriptomics and Metabolomics
	Assessment	Poster
Week 4: 3 October - 7 October	Lecture	Health-Related Microbiology <ul style="list-style-type: none">• Pathogens• Toxins• Antibiotics and Resistance
Week 5: 10 October - 14 October	Lecture	<i>Microbial Risk Assessment</i> <ul style="list-style-type: none">• Indicator Organisms• Procedures and Guidelines• Risk Communication
	Assessment	Report
Week 6: 17 October - 21 October		
Week 7: 24 October -	Lecture	Natural Microbial Systems

28 October		<ul style="list-style-type: none"> • Carbon and Nitrogen Cycles • Microbes in Water and Soil • Microbial Biofilms
Week 8: 31 October - 4 November	Lecture	Engineered Microbial Processes (I) <ul style="list-style-type: none"> • Drinking Water Treatment • Wastewater Treatment • Constructed Waterbodies
Week 9: 7 November - 11 November	Lecture	Engineered Microbial Processes (II) <ul style="list-style-type: none"> • Organic Waste Management • Bioremediation of Water and Soil • Microbial Biofuels and (Bio)Geoengineering
	Assessment	Presentation
Week 10: 14 November - 18 November	Lecture	Summary, Conclusions and Future Perspectives
Study Week: 21 November - 24 November		

Resources

Prescribed Resources

There are no prescribed resources for CVEN9886 – all key information will be presented in lectures and on Moodle.

Recommended Resources

Students are encouraged to engage more deeply with subject matter that is of particular interest to them. Links to relevant academic publications, industry reports, news articles and videos will be provided in lectures. Students will have the opportunity to demonstrate their in-depth knowledge through seminars and assessments.

Course Evaluation and Development

CVEN9886 is a new course that ran for the first time in T3 2021. It was delivered in online mode due to COVID-19 restrictions.

Student feedback for this first iteration was very positive; therefore, no major changes to course structure, content or assessments have been made.

Several students expressed a wish for more in-person interaction, which will be available to everybody who can attend on campus this year.

This is a small and friendly class, so informal feedback to the lecturer is welcome and encouraged at any point during the course.

Formal feedback will be collected at the end of trimester via the myExperience survey.

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 T3 2022 will be held online between 25th November - 8th December 2022 inclusive, and supplementary exams between 9th - 13th January 2023 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

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	✓