

CVEN9898

Fundamentals of Sustainable Infrastructure

Term 1, 2023



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Ruth Fisher	ruth.fisher@unsw.edu.au	Please email to arrange a time or through the Moodle forum	H20 Rm 205	(02) 9385 5073
James Hayes	j.e.hayes@unsw.edu.au	Please contact through Moodle forum		

Lecturers

Name	Email	Availability	Location	Phone
Divya Jayakumar Nair	d.jayakumarnair@unsw.edu.au	Please contact through Moodle forum		
Baran Yildiz	baran.yildiz@unsw.edu.au	Please contact through Moodle forum		
Richard Stuetz	r.stuetz@unsw.edu.au	Please contact through Moodle forum		

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

The course provides a theoretical background to the sustainability aspects of water and waste management, transport services, energy supply and distribution. The theory will then be applied to the analysis and design of sustainable infrastructure case studies, involving economic, resource and population constraints.

It provides a regional planning context to the planning and design of infrastructure and provides a series of case studies to illustrate the principles of sustainable infrastructure design.

Course Aims

The course aims to have students gain the following attributes:

- A respect for ethical practice and social responsibility
- Skills for effective communication
- An in-depth engagement with the relevant civil and environmental engineering knowledge related to infrastructure design in its inter-disciplinary context
- Capacity for analytical and critical thinking and for creative problem solving
- Ability to engage independent and reflective learning
- Information literacy
- Skills for collaborative and multi-disciplinary work

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Outline the fundamental concepts underpinning the provision of Sustainable Infrastructure solutions	PE1.1, PE1.3, PE1.5, PE1.6
2. Analyse infrastructure provision requirements and issues at different scales (building, precinct, city, region)	PE2.1, PE2.2, PE2.4, PE1.5, PE1.6
3. Generate solution options and evaluate their feasibility in terms of function and sustainability outcomes	PE2.2, PE2.4, PE3.2, PE3.4

Teaching Strategies

Please refer to the information in Moodle

Additional Course Information

This course is designed to be attended in person, however lecture and workshop material will also be available online. **Some** lectures and workshops will be offered as hybrid (both online and face to face in

Central Lecture Block 1).

Lectures and online lessons will provide the foundational concepts of transport, water, waste and energy and sustainability that underpin the delivery of Sustainable Infrastructure solutions. Lectures will be supported by workshops, which will examine how this information can be used to analyse sustainable solutions for urban communities. Additional information relating to these key infrastructure systems will also be available on Openlearning to support students learning and build on what was delivered in the lectures and workshops. The first half of the course is focused on content delivery, while the second half is focused on applying the concepts to a major project. Attendance at workshops and consultation sessions in the second half of the course is highly encouraged to clarify and re-inforce concepts and refine students major work.

All announcements, assessments, grades etc will be available on Moodle which is the main page for the course. It is envisaged that for each hour of contact that you will put in at least 1.5 hrs of private study.

It is expected that students:


Private Study	<ul style="list-style-type: none">• Review lecture material and supporting references material on OpenLearning• Contribute to group discussions and assessments• Prepare for workshops• Keep up with notices and find out marks via Moodle
Lectures	<ul style="list-style-type: none">• Prepare for the lectures and workshops before attending• Hear announcements on course changes
Workshops	<ul style="list-style-type: none">• Be active in workshops and group activities• Ask questions on assessment tasks
Assessments	<ul style="list-style-type: none">• Demonstrate your knowledge and skills in assignments• Demonstrate higher understanding and problem solving in assignments• Demonstrate time management skills through group work and distribution of project tasks• Seek informal discussions via lecturers and guest lecturers

Assessment

Late submissions will be penalised at the rate of 5% per day after the due time and date have expired.

All assessment details and rubrics can be found in Moodle. The final grade for this course will be based on the sum of the scores from each of the assessment tasks. There is **no final exam** for this course.

Note: The lecturer reserves the right to adjust the final scores by scaling if agreed by the Head of School.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Quizzes	20%	Not Applicable	1
2. Background Report 	30%	28/03/2023 05:00 PM	1, 2
3. Final Report	50%	24/04/2023 05:00 PM	2, 3

Assessment 1: Quizzes

Submission notes: Quizzes will be run through Moodle.

Four online quizzes on Transport, Energy, Water and Waste will test the students' ability to synthesise specific parts of the course, demonstrate understanding of main principles and implement them in given situations. They may include calculations.

Assessment criteria

Four quizzes (5% each) will examine key information relating to the fundamentals of Transport, Energy, Water and Waste infrastructure systems in cities. They will be held the week following when the content is delivered. Quizzes may contain multiple choice, calculation or short style questions. The quizzes will be open book, but contain randomised and sequential questions. They must be completed within a specific timeframe and you will have 15 -20 minutes to complete. Please refer to Moodle for the up to date Quiz schedule for 2023.

Assessment 2: Background Report (Group)

Submission notes: Please submit one report per group. Label file with "GroupX_BackgroundReport"

Due date: 28/03/2023 05:00 PM

Marks returned: Within 2 weeks of submission

Group report detailing the project site context, project exemplars, targets and responsibilities.

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

Assessment criteria

Please see Moodle for the Rubric showing marking criteria and performance descriptors. This Report is designed to outline key elements of sustainable infrastructure that should be considered when applied to the specific project. While this will be completed as a group, individual marks will be allocated according

to effort distributions using the Group Workshop Tool on Moodle.

Assessment 3: Final Report

Assessment length: 10 - 15 pages

Submission notes: Through Turnitin, individual

Due date: 24/04/2023 05:00 PM

Individual concept design for an infrastructure system (one of the four components) for the case study.

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

Assessment criteria

Please refer to the Rubric provided on Moodle for marking criteria and performance descriptors.

Students are expected to clarify and confirm their understanding of the assessment requirements in the Week 8 and 9 consultation sessions.

Attendance Requirements

For courses with Workshops and/or Labs, attendance for those classes is a necessary part of the course. You must **attend at least 80% of the workshop/lab** in which you are enrolled for the duration of the session.

Face to face attendance at Workshops and Consultation sessions are expected, however online options can be provided for students not located in Australia. Lectures will be recorded, Workshops **may be** recorded at the lecturers discretion, Consultations will not be recorded.

Course Schedule

[View class timetable](#)

Timetable

Date	Type	Content
Week 1: 13 February - 17 February	Lecture	Introduction to course, Case study overview, Sustainability (Fisher)
	Workshop	Infrastructure Rating Systems & Workshop (Fisher)
Week 2: 20 February - 24 February	Lecture	Transport (Nair)
	Workshop	Transport (Nair)
Week 3: 27 February - 3 March	Lecture	Energy (Yildiz)
	Workshop	Energy (Yildiz)
	Assessment	Transport Quiz Due
Week 4: 6 March - 10 March	Lecture	Water (Stuetz)
	Workshop	Water (Stuetz)
	Assessment	Energy Quiz Due
Week 5: 13 March - 17 March	Lecture	Waste (Fisher)
	Workshop	Waste (Fisher)
	Assessment	Water Quiz Due
Week 6: 20 March - 24 March		Flexibility Week
Week 7: 27 March - 31 March	Lecture	Resilience and Systems (Fisher)
	Workshop	Resilience using Game of Floods (Fisher and Hayes)
	Assessment	Background Report due

	Assessment	Waste Quiz Due
	Assessment	Background Report: Please submit on report per group. Label file with "GroupX_BackgroundReport"
Week 8: 3 April - 7 April	Project	Feedback and Discussion sessions
Week 9: 10 April - 14 April	Project	Feedback and Discussion Sessions
Week 10: 17 April - 21 April	Lecture	No class - Work on your Final Reports
Stuvac: 22 April - 27 April	Assessment	Final Project Due
	Assessment	Final Report: Through Turnitin, individual

Resources

Prescribed Resources

- Additional materials provided on OpenLearning.
- Textbook (online version available at the UNSW library):
 - [Sarté, S. B. \(2010\). Sustainable infrastructure : the guide to green engineering and design. Hoboken, N.J.: Wiley.](#)

Course Evaluation and Development

This course has been optimised to cater for students online, around the world, as well as face to face. We have refined how we deliver information over different platforms and always welcome comments on useability and student feedback.

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 T1 2023 will be held on campus between the 28th of April and the 11th of May, and Supplementary Exams between the 22nd of May and the 26th of May. You are required to be available on these dates. Please do not 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://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	