

CVEN4104

Sustainability in Construction

Term 2, 2022



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Dr Ali Kashani	ali.kashani@unsw.edu.au			

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

This course will provide fundamental knowledge and experience for practising sustainability in construction. The aim is teaching the environmental, social and economic impacts of buildings and built environment and demonstrating how sustainable construction design and materials can avoid global warming and resource depletion issues. The contents of this course are designed to provide experience in analytical thinking and decision making with regards to the application of sustainability in construction projects. This course explains history and drivers of sustainability in construction and review sustainability policies and programs in Australia. Principles of life cycle assessment (LCA) and life cycle costs (LCC) will be explained, and an experience of evaluating LCA and LCC will be offered in the workshop classes and the group assignment. This course also provides an overview of the current major green rating systems for buildings and built environment in Australia. Additionally, examples of sustainable construction design, materials and energy resources, as well as case studies of best sustainable practices and future trends of sustainable construction will be demonstrated. A number of alternative strategies available in design, procurement, construction, operation and end-of-life phases to reduce the overall environmental impact of a construction project are discussed. Students are expected to learn how the available strategies, standards and guidelines can be applied to analyse and improve sustainability in practice.

Course Aims

The aims of this course are to:

- Introduce the history and drivers of sustainability in construction, as well as sustainability policies and programs in Australia
- Teach how to use life cycle assessment tools based on an ISO standard to quantify sustainability for decision making
- Introduce major green rating schemes in Australia
- Provide insight into the sustainable construction design, materials and energy solutions with lower environmental impacts as well as the circular economy in construction
- Demonstrate high-impact case studies of practising sustainability and circular economy in construction

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Understand the history and drivers of sustainability in construction, as well as construction sustainability policies and programs in Australia	PE1.3, PE1.6, PE3.1
2. Demonstrate hands-on skills in evaluating life cycle assessment and life cycle cost assessment in a construction-related activity	PE1.1, PE1.2, PE1.6, PE2.1, PE2.2, PE3.2, PE3.3, PE3.4, PE3.6
3. Understand how green rating schemes in Australia work	PE1.6

Learning Outcome	EA Stage 1 Competencies
4. Distinguish sustainable construction design, materials and energy resources used in case studies of best sustainable practices and future trends in sustainable construction	PE1.3, PE1.4, PE1.5, PE1.6, PE2.4, PE3.3

Teaching Strategies

Private Study:

- Review lecture material and textbook
- Do set problems and assignments
- Join Moodle discussions of problems
- Reflect on class problems and assignments
- Download materials from Moodle
- Keep up with notices and find out marks via Moodle

Lectures:

- Find out what you must learn
- See methods that are not in the textbook
- Follow worked examples
- Hear announcements on course changes

Workshops:

- Be guided by Demonstrators
- Practice solving set problems
- Ask questions

Assessments:

- Demonstrate your knowledge and skills
- Demonstrate higher understanding and problem solving

Assignment:

- Practising the knowledge for sustainability assessment and decision making in groups

Additional Course Information

Prerequisites

Not applicable.

Assumed Knowledge

No background knowledge is required.

Platforms and Communication

This course will use Moodle as the method of communication. The primary communication channel will be the Moodle Q&A forum. Online lectures and workshops will be provided through Moodle (BB Ultra platform).

Class Times

Please refer to your class timetable for the learning activities you are enrolled in and attend only those classes.

	Day	Time	Location*
Lectures	Wednesday	11am - 2 pm	Hybrid: Online and In-person at Science Theatre (K-F13-G09) (Weeks 1-5,7-10)
Demonstrations	Thursday	9 am - 11 am	Quadrangle G040 (K-E15-G040) (Weeks:4-5,7-9)
	Thursday	11 am - 1 pm	Online (Weeks:4-5,7-9)

* Note: If you are unwell or have been asked to self-isolate - please do not attend campus or class and join online class for that week.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Quiz	10%	Week 4	1, 2
2. Group Assignment	30%	Week 10	2
3. Final Exam	60%	Not Applicable	1, 2, 3, 4

Assessment 1: Quiz

Due date: Week 4

Deadline for absolute fail: N/A

Marks returned: Week 4

Multiple choices

Assessment criteria

The quiz covers the lecture contents of Week 1, 2 and 3 (inclusive).

Assessment 2: Group Assignment

Due date: Week 10

Deadline for absolute fail: before the final exam

Marks returned: before the final exam

A report submitted via Turnitin (approx. 15 pages for groups of 3 students)

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

Assessment criteria

Group assignment is based on the lecture and demonstration contents of Week 2 to 5 (inclusive).

Hurdle requirement

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

Assessment 3: Final Exam

Deadline for absolute fail: TBA

Marks returned: TBA

Calculations, and analytical questions

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

Assessment criteria

The exam covers the entire contents of the course.

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: 30 May - 3 June	Lecture	<ul style="list-style-type: none">• Construction industry and its environmental impacts• Definition of sustainability in construction and its pillars• Sources of energy consumptions in building construction• Demand versus supply and its impacts on sustainability• A brief history of sustainability in construction <p>**No Workshop**</p>
Week 2: 6 June - 10 June	Lecture	<ul style="list-style-type: none">• Sustainability stakeholders, risks & rewards and implement-ability of sustainability policies• General knowledge of sustainability policies and programs in Australia• Sustainability in construction from the corporate perspective and engineering challenges• Decision-making based on sustainability pillars, goals and objectives• Introduction to life-cycle assessment <p>**No Workshop**</p>
Week 3: 13 June - 17 June	Lecture	Principles of life cycle assessments (LCA) – part 1: LCA goal and scope definition and life cycle inventory analysis **No Workshop**
Week 4: 20 June - 24 June	Lecture	Principles of LCA – part 2: Life cycle inventory diagram & Life cycle impact assessment
	Workshop	<ul style="list-style-type: none">• Case studies of sustainable projects (three pillars, risks and rewards)• Sustainability objectives in construction (three pillars, SMART)

		<ul style="list-style-type: none"> • Assessment questions from last year
	Assessment	Quiz
Week 5: 27 June - 1 July	Lecture	<ul style="list-style-type: none"> • An Introduction to life cycle costing (LCC) for decision-making • Description of several approaches and terms, fundamental principles and different types of costs
	Workshop	<ul style="list-style-type: none"> • Group Assignment Introduction • Recap on LCA Goal and Scope definition • Practising the use of decision context mapping in Goal Definition • Practising on drawing a simple LCA diagram • Assessment questions
Week 7: 11 July - 15 July	Lecture	Sustainable construction design, materials, energy and case studies – part 1
	Workshop	<ul style="list-style-type: none"> • A quick recap of Unit Process, Flows, Boundaries, and Process Levels • Practising on drawing a more detailed LCI according to ISO14040/14044 • Assessment questions from last year
Week 8: 18 July - 22 July	Lecture	Sustainable construction design, materials, energy and case studies – part 2
	Workshop	<ul style="list-style-type: none"> • Evaluation practice of LCC • Assessment questions from last year
Week 9: 25 July - 29 July	Lecture	Sustainable construction design, materials, energy and case studies – part 3
	Workshop	<ul style="list-style-type: none"> • Recap on mandatory items of LCA and LCC for the group assignment, Q&A, and troubleshooting • Assessment questions from last year
Week 10: 1 August - 5 August	Lecture	<p>Introduction to major voluntarily and mandatory green rating systems in Australia</p> <p>**No Workshop**</p>
	Assessment	Group Assignment

Resources

Recommended Resources

- Book: Life Cycle Assessment: Theory and Practice (2018) by Hauschild, Michael, Rosenbaum, Ralph K., Olsen, Stig. (ebook is available in UNSW library)
- Book: Sustainable Buildings and Infrastructure: Paths to the Future by Annie R. Pearce , Yong Han Ahn, and HanmiGlobal Co Ltd (ebook is available in UNSW library)
- Recommended websites in the lecture contents.

Course Evaluation and Development

Feedback on the course is gathered periodically using various means, including the UNSW myExperience process, informal discussions with students inside and outside of class, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such 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 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

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	✓