



School of Civil and Environmental Engineering

Term 3, 2021

**CVEN4705**

**ENVIRONMENTAL SUSTAINABILITY  
- METHODS, TOOLS, MANAGEMENT**

#### COURSE DETAILS

<b>Units of Credit</b>	<b>6</b>		
<b>Contact hours</b>	~4 hours per week		
<b>Class</b>	Wednesday, 9:00 – 11:00	online	
<b>Workshop</b>	Wednesday, 11:00 – 13:00	online	
<b>Course Coordinator and Lecturer</b>	Dr Ademir Prata		
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	office: Room 137, Water Research Centre, Level 1, Vallentine Annexe (H22)		

#### INFORMATION ABOUT THE COURSE

This course provides an introduction to principles of Ecologically Sustainable Development (ESD) and their social, economic and political context. It introduces methods, techniques and tools used by regional and corporate environmental managers to implement ESD principles in organisations and regions.

These methods and tools include a range of environmental assessment techniques that can be applied at a product level (Life Cycle Assessment), at a corporate and regional level (Materials Flow Analysis) and at a regional and national level (Environmental Footprint and Input-Output Analysis). The social, economic and political constraints on use of information from these tools to develop improved environmental management at different economic scales will be addressed through case studies and assignment projects.

The course will introduce principles and methods of Industrial Ecology (IE) and the preparation of Environmental Impact Statements (EIS), Environmental Management Systems (EMS) and Environmental Reports (ER).

**Note: CVEN1702, CVEN9892 and CVEN9888 are excluded courses for CVEN4705**

#### HANDBOOK DESCRIPTION

See link to virtual handbook -

<https://www.handbook.unsw.edu.au/undergraduate/courses/2021/CVEN4705/>

#### OBJECTIVES

To introduce students to principles of Ecologically Sustainable Development (ESD) and the contexts in which they have arisen and in which they are implemented. To develop students' understanding of the various methods and techniques (analytical tools) of Industrial Ecology used by regional and corporate

environmental managers to implement ESD principles in organisations and regions. To expose students to the practice of real-world sustainability projects and initiatives in the region.

List of programme attributes:

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

<b>TEACHING STRATEGIES</b>
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The following teaching strategies will be used in this course. Students are encouraged to direct their own learning to get the most out of their participation in this course.

<b>Private Study</b>	<ul style="list-style-type: none"> <li>• Review lecture material, reference books, and resources on UNSW Moodle.</li> <li>• Work in groups on class assignments.</li> <li>• Reflect on class problems and assignments.</li> <li>• Download materials from UNSW Moodle and work through additional readings provided.</li> <li>• Keep up with notices, join the discussion and find out marks via UNSW Moodle.</li> </ul>
<b>Lectures</b>	<ul style="list-style-type: none"> <li>• Find out what you must learn.</li> <li>• Participate in class discussions and work out example problems in class.</li> <li>• Ask questions on how the content of lectures applies to assignment questions.</li> <li>• Hear announcements on course changes.</li> </ul>
<b>Workshops</b>	<ul style="list-style-type: none"> <li>• Work actively in small ad hoc groups on problems set in class.</li> <li>• Be guided by discussion questions and additional reading.</li> <li>• Participate and attempt all workshop questions.</li> <li>• Ask questions.</li> </ul>
<b>Assessments</b>	<ul style="list-style-type: none"> <li>• Answers quiz questions.</li> <li>• Demonstrate your knowledge and skills.</li> <li>• Demonstrate ability to work effectively in a group by completing the group assignment.</li> <li>• Demonstrate higher understanding and problem solving on real world problems in hypothetical, but realistic problem settings.</li> <li>• Demonstrate information literacy in the review of scholarly articles and the effective communication of key concepts.</li> </ul>

## EXPECTED LEARNING OUTCOMES

*This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.*

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

Learning Outcome	EA Stage 1 Competencies
1. Provide a definition of sustainability; list the principles of Ecologically Sustainable Development (ESD), and describe the context in which they have arisen and in which they are implemented.	<i>PE1.1, PE1.2; PE1.6</i>
2. Describe the typical structure and format of an EIS, EMS and Environmental Report.	<i>PE1.1, PE1.3, PE1.6</i>
3. Use provided data to conduct an analysis of simple facilities and systems using material flow analysis, environmental life cycle assessment, environmental input-output and footprint analysis.	<i>PE2.2, PE1.6</i>
4. Evaluate sources of information that can be used in assessing progress towards ecological sustainability and effectively communicate conclusions	<i>PE1.4, PE1.6, PE3.2</i>
5. Work together in interdisciplinary groups to evaluate the environmental sustainability of households, companies and/or projects.	<i>PE3.6, PE2.2, PE1.6</i>
6. Assess a problem to know which tool(s) are appropriate in quantitatively understanding it, and describe how information from the application of these tools can be used to improve ecological sustainability outcomes in households, corporations and regions.	<i>PE1.6, PE1.4, PE2.2</i>

As well as the scheduled contact hours, students are expected to complete set readings and activities. For each hour of contact it is expected that you will put in at least 2 hours of private study.

<b>COURSE PROGRAM</b>
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**Term 3 2021**

<b>Date Wednesdays</b>	<b>Topic</b>	<b>Lecture Content 9 am – 11 am</b>	<b>Demonstration Content 11 am – 1 pm</b>
15/09/2021 (Week 1)	ESD and sustainability concepts	Introduction to course; ESD and sustainability concepts	Sustainability Workshop
22/09/2021 (Week 2)	Ecological Footprints (EF)	Ecological Footprints (EF)	Introduction to Assessment 2; EF Workshop
29/09/2021 (Week 3)	National Material Accounts (NMA)	National Material Accounts (NMA) <u>Quiz on EF and ESD</u>	NMA Workshop
06/10/2021 (Week 4)	Carbon Footprint (CF)	Carbon Footprint (CF)	CF Workshop
13/10/2021 (Week 5)	Life cycle assessment (LCA)	Life cycle assessment (LCA) <u>Quiz on CF and NMA</u>	LCA Workshop
20/10/2021 (Week 6)		<b><i>Flexibility week for all courses (non-teaching)</i></b>	
27/10/2021 (Week 7)	Material Flow Analysis (MFA)	Material Flow Analysis (MFA)	MFA Workshop
03/11/2021 (Week 8)	Environmental Impact Statement (EIS)	Environmental Impact Statement (EIS) <u>Quiz on LCA and MFA</u>	Introduction to Assessment 3; EIS Workshop
10/11/2021 (Week 9)	EMS and Sustainability reporting	Environmental Management Systems (EMS) and Sustainability reporting	EMS and Sustainability Reporting Workshop
17/11/2021 (Week 10)	Wrapping up	Course Overview <u>Quiz on EIS and EMS</u>	Peer review and practice presentations for Assessment 3

All times and dates in this course profile refer to Sydney time.

## **ASSESSMENT**

This course will be fully assessable by weekly quizzes and two assignments; there is no exam.

Assessment 1 consists of a series of quizzes which are online, open-book and cover the content of the previous weeks' lectures; they may be only multiple choice or a combination of multiple choice and short answer or calculation.

Assessment 2 is a group report where students will conduct an environmental sustainability assessment (using some of the tools learned in the course) to analyse and evaluate their own household's consumption and action changes to be applied to a case study. Students will prepare one group report to be submitted via Turnitin, where feedback will be provided.

For Assessment 3 students need to prepare an individual presentation on a topic relating to sustainability assessment tools learnt in class. Presentations will be 5 minutes long (and maximum 20 slides). Formative feedback will be provided by peers during class, final submission will be online. Further details can be found on the course Moodle page.

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

## **PENALTIES**

*For Assessments 2 and 3, late work will be penalised at the rate of 10% (of the assessment full marks) per day after the due time and date have expired.*

**ASSESSMENT OVERVIEW**

Item	Length	Weighting	Learning outcomes assessed	Assessment Criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
1. Online Quizzes (Individual)	4x15 minute quizzes	40%	CLO1, CLO2	Online quizzes will test the students' ability to synthesise content of the course, demonstrate understanding of main principles and implement them in given situations. They may include calculations and short answer questions.	For weeks when quizzes are scheduled (see Course Program), the quiz opens at 1 pm on Wed and closes at 1 pm on Thu; any open attempts will be automatically submitted when the quiz closes.	When quiz closes	After all students have done the quiz (including special consideration cases). Typically, 3-4 days after the quiz is closed
2. Sustainability Assessment Assignment (Group)	10 pages	30%	CLO3, CLO5, CLO6	This assignment will assess the following: <ul style="list-style-type: none"> <li>• Thorough and in-depth understanding of environmental sustainability assessment (using some of the tools learned in the course) applied to a case study, to analyse and evaluate households' consumption and action changes.</li> <li>• A comprehensive and critical analysis of relevant concepts/theories/literature and of own ideas, as well as clear positioning/argument.</li> <li>• Overall context, clarity and quality of written report.</li> </ul>	29/10/2021 by 11:59 PM (Week 7)	1 week after submission due date	Within 2 weeks after submission due date
3. Presentation (Individual)	5 min (and maximum 20 slides)	30%	CLO4, CLO6	This assignment will assess the following: <ul style="list-style-type: none"> <li>• A comprehensive and critical analysis of relevant literature and its relation to contents studied in the course and students' own ideas, as well as clear positioning/argument.</li> <li>• Overall context, clarity and quality of presentation.</li> </ul>	26/11/2021 by 11:59 PM (Week 11)	1 week after submission due date	Within 2 weeks after submission due date

## RELEVANT RESOURCES

There is no specific textbook set for this subject. Support resources for this course (e.g., class slides, recommended internet websites, scientific papers and other publications) are provided on Moodle.

## DATES TO NOTE

Refer to MyUNSW for Important Dates available at: <https://student.unsw.edu.au/dates>

## 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 ADVICE

For information about:

- Notes on assessments and plagiarism;
- Special Considerations: [student.unsw.edu.au/special-consideration](https://student.unsw.edu.au/special-consideration);
- General and Program-specific questions: [The Nucleus: Student Hub](#)
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC/SURVSOC/CEPCA

Refer to Academic Advice on the School website available at:

<https://intranet.civeng.unsw.edu.au/key-staff-to-contact-during-your-studies-at-unsw>

## Appendix A: Engineers Australia (EA) Competencies

### Stage 1 Competencies for Professional Engineers

	<b>Program Intended Learning Outcomes</b>
<b>PE1: Knowledge and Skill Base</b>	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
<b>PE2: Engineering Application Ability</b>	PE2.1 Application of established engineering methods to complex 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
<b>PE3: Professional and Personal Attributes</b>	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (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