

CVEN9872 SOLID WASTE MANAGEMENT

COURSE DETAILS

Units of Credit	6	
Contact hours	4 hours per week	
Lectures	Monday, 11:00 – 13:00	Ritchie Theatre, K-G19-LG02/on-line
	Monday, 14:00 – 16:00	Ritchie Theatre, K-G19-LG02/on-line
Course Coordinator and Lecturer	Dr Richard Collins email: richard.collins@unsw.edu.au	
Lecturer	Dr Stuart Dever email: s.dever@unsw.edu.au	

INFORMATION ABOUT THE COURSE

This course examines the management of solid waste and includes municipal solid waste (MSW), commercial and industrial (C&I) and construction and demolition (C&D) waste. This course does not include aspects related to liquid or hazardous waste management. The latter is covered in CVEN9881 Hazardous Waste Management.

This course provides students with essential knowledge on, and useful skills in, solid waste management, both in general and from an Australian perspective. Concepts and information that are covered in the course include Australian waste policies, regulations and strategies, the circular economy, the waste hierarchy, waste minimisation, basic life cycle assessment and cost-benefit analysis in solid waste management, waste collection, transfer and segregation (i.e. Materials Recovery Facilities), recycling and landfill disposal.

No pre-requisites, other than a curious mind, are required for this course.

HANDBOOK DESCRIPTION

See link to virtual handbook:

<https://www.handbook.unsw.edu.au/postgraduate/courses/2021/CVEN9872/>

OBJECTIVES

The objectives of this course are to:

- Provide an appreciation of the management of solid waste in a systems context; i.e. to understand the nature of the various functional elements in waste management systems and the relationships among them, so that optimal systems can be designed;
- Provide an understanding of the characteristics of urban solid waste, and be able to predict the composition and quantities for a city / town / region;

- Be able to understand the data requirements for, and then be able to prepare concept designs of common functional elements e.g. transfer stations, recycling and resource recovery facilities, composting facilities, waste to energy plants, and landfills and;
- Provide an understanding of waste management policy and the elements of a solid waste management strategy or plan.

Students will be provided with the knowledge and skills of this course through lecture content, recommended textbook readings, electronic copies of relevant documents and learning required to prepare for and submit the assessable items of the course.

The course objectives, content and assessment concentrate on encouraging the development of the following attributes in students, with particular application to Solid Waste Management, as below:

- *An in-depth engagement with the relevant disciplinary knowledge in its inter-disciplinary context:* The application of circular economy and waste hierarchy principles in solid waste management, particular in respect to waste generation predictions, and the implementation of waste/recycling facilities and/or processes establishment in a particular NSW region.
- *The capacity for analytical and critical thinking and for creative problem solving:* Data will inevitably be incomplete, and an analysis of the fundamental influences on waste generation and recycling will need to be made to arrive at reasonable projections; then creative solutions will need to be produced in order to meet NSW government solid waste management targets.
- *The ability to engage in independent and reflective learning:* Lectures will provide the foundational knowledge for students to independently develop appropriate solid waste management solutions for the future needs of a particular NSW region.
- *Information literacy:* You will need to find appropriate web sites and use suggested texts and documents to find supplementary information to enable you to go into sufficient detail to produce workable future solid waste management plans for a particular NSW region – it is not possible to provide all possible details in the lectures.
- *The skills for collaborative and multi-disciplinary work:* You will work in group of up to 3 and will need to collaboratively manage time and inputs to meet deadlines; the inputs of other disciplines that would need to be included in real world situations will need to be recognized and commented upon. All students in each group get the same assignment marks.

In general, the course aims to facilitate:

- *A respect for ethical practice and social responsibility:* You will need to conduct the preparation and submission of your assignments in accordance with UNSW policies on academic conduct as described at: <http://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf> and in accordance with the IE Aust's code of ethics: <http://www.engineersaustralia.org.au>
- *The skills of effective communication:* In this course, technical reports need to be appropriate for a technical audience, i.e. for another engineer that works for a government council or a consulting engineer. Appropriate referencing must be used. Skills involved in presenting your own work will also be harnessed through the student seminars in week 10.

TEACHING STRATEGIES

Lectures are intended to provide foundational knowledge and skills that students can then build upon in private study to develop their awareness of the course concepts and apply them to relevant 'outside world' applications through the course assessment projects. The lectures are intended to be interesting and to excite students to consider that, today, solid waste management is in a particular dynamic situation, ripe for engineering innovation to further worldwide sustainability and circular economical goals.

Assessment tasks are designed to give students sufficient time to develop relevant industry skills that can be applied beyond the classroom.

Some of the approaches to learning in this course include:

Private Study	<ul style="list-style-type: none"> Review lecture materials, textbooks and documents posted on Moodle. Reflect upon and complete assignments. Collaborate with peers on the group assignment and presentation. On-line research of relevant materials beyond that provided on Moodle. Familiarise yourself with relevant software.
Lectures	<ul style="list-style-type: none"> Attend lectures to interact with the lecturer on challenging course content. Take notes – the lectures will not contain all the information (but the recordings will).
Assessments	<ul style="list-style-type: none"> Demonstration of higher understanding and problem solving related to real-world problems through written reports. Demonstration of effective communication skills in writing and presenting one's own work that is relevant to a corporate/government setting. The final exam is a summative assessment of being able to apply knowledge gained in the course to relevant real-world scenarios.

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.

Example:

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

Learning Outcome		EA Stage 1 Competencies
1.	Describe a solid waste management system, showing the flow of materials within the system.	PE1.1, PE1.6, PE2.4
2.	Understand waste management policy and how to prepare a waste management strategy or plan.	PE1.6
3.	Characterise waste generation in a town / city / region and make forecasts about future waste quantities and composition.	PE1.2, PE1.6, PE2.2
4.	Understand operational aspects of waste management facilities including transfer stations, material recovery and recycling facilities, composting facilities, waste to energy plants, and a landfill disposal sites.	PE1.1, PE1.6
5.	Conceptual design understanding of some of waste facilities including transfer stations, material recovery facilities, composting facilities, waste to energy plants, and a landfill disposal sites.	PE1.3, PE1.5, PE2.1, PE3.2, PE 3.6

For each hour of contact it is expected that you will put in at least 1-2 hours of private study.

COURSE PROGRAM

A table showing the topics to be covered in the course is provided below. Note that the final week (week 10) lecture times have been assigned to student seminars. These seminars will be presented by you where you will be reporting on the findings of your group assignment for the course.

A number of textbooks will be made available for download from the course Moodle pages (and which are also available for download from the UNSW library). Other relevant reference materials will also be posted to the Moodle pages and will be available for download.

Term 3 2021

Date	Lecture Topics	Lecturer	Notable Dates
13/09/2021 (Week 1)	Government solid waste management policies, regulations and strategies	Dr Richard Collins	World CleanUp Day: 18/09/2021
20/09/2021 (Week 2)	Waste characterisation and generation	Dr Richard Collins	
27/09/2021 (Week 3)	Waste minimisation and life cycle assessment	Dr Richard Collins	Individual Assignment Due: Friday 1 st Oct (11:59 pm) Fail: Thursday 7 th Oct (11:59 pm)
04/10/2021 (Week 4)	Waste collection, transfer, storage and separation	Dr Richard Collins (<i>the lectures will still run on-line this week despite the Labour Day Public Holiday on Monday 4 Oct., to avoid having to extend the course into week 11</i>)	Census Date: 10/10/2021
11/10/2021 (Week 5)	Resource recovery/recycling	Dr Richard Collins	International E-waste day: 14/10/2021
18/10/2021 (Week 6)	<i>Flexibility week for all courses (non-teaching)</i>		
25/10/2021 (Week 7)	Composting and anaerobic digestion	Dr Richard Collins	
01/11/2021 (Week 8)	Landfill waste disposal and leachate	Dr Stuart Dever	
08/11/2021 (Week 9)	Landfill gas and energy from waste (EfW)	Dr Richard Collins	National Recycling Week
15/11/2021 (Week 10)	Group student seminars during lecture times	Dr Richard Collins	Group Assignment Due: Friday 19 th Nov (11:59 pm) Fail: Thursday 25 th Nov (11:59 pm)

ASSESSMENT

The final grade for this course will normally be based upon the sum of the scores from each of the assessment items listed in the table below. In other words, the Final Exam is normally worth 50% of the Final Mark and the class work assessable items are worth the other 50%.

However, in the event that you obtain a mark of < 40% in the Final Exam, your class work marks WILL NOT be included in the Final Mark. If your class work is not included in your final mark (because you obtained < 40% in the Final Exam), then the Final Exam mark comprises 100 % of the Final Mark for the course (i.e. you will fail the course). It is, therefore, extremely important that you perform well in (or at least pass) the Final Exam. The formal exam scripts will not be returned but you are permitted to view the marked script. The lecturer reserves the right to adjust the final scores by scaling if agreed by the Head of School.

Details of each assessment component, the marks assigned to it, the criteria by which marks will be assigned, and the dates of submission are set out in the table below.

Supplementary Examinations for Term 3 2021 will be held on Monday 10 January – Friday 14 January 2022 (inclusive) should you be required to sit one. You are required to be available during these dates. Please do not to make any personal or travel arrangements during this period.

PENALTIES

Late submissions will be penalised at the rate of 10 % per day after the due time and date have expired. The deadline for absolute fail for a particular assessable item is listed in the table below. If you require an extension for any assessable item of this course, you must apply for special consideration (see links in Academic Advice below). The course coordinator cannot directly provide you with an extension, so, please do not ask me for one.

ASSESSMENT OVERVIEW

The table below provides an overview of the course assessment items. Items 1, 2a, 3 and 4 will be submitted on-line via Moodle. Item 2b will occur on-line during the week 10 lecture times.

Item	Length	Weighting	Learning outcomes assessed	Assessment Criteria	Due date	Deadline for absolute fail	Marks returned
1. Assignment 1 (individual)	Report to be <2,500 words, not including figures, tables, references and appendices	15 %	1, 3	<i>Demonstrated understanding, through effective communication, of course concepts in a given scenario involving solid waste management</i>	Fri. 1 st Oct (11:59 pm)	Thurs. 7 th Oct (11:59 pm)	Fri. 8 th Oct (11:59 pm)
2. Assignment 2 (group)	<p>a) Report to be < 7,000 words, not including figures, tables, references and appendices</p> <p>b) Presentation times to be announced once groups have been finalised (likely 10-15 minutes)</p>	<p>30% total</p> <p>a) Report: 25 %</p> <p>b) Presentation: 5 % (2.5% based on peer marks, see item 3, and 2.5% based on lecturer marks)</p>	1-5	<i>Demonstrated understanding, through effective communication, of course concepts in a given scenario involving solid waste management</i>	<p>a) Fri. 19th Nov (11:59 pm)</p> <p>b) Mon. 15th Nov (11am – 4 pm)</p>	<p>a) Thurs. 25th Nov (11:59 pm)</p> <p>b) Mon. 15th Nov (4 pm)</p>	<p>a) Fri. 3rd Dec (11:59 pm)</p> <p>b) Fri. 19th Nov (11:59 pm)</p>
3. Peer assessment (individual)	As required	5 %	1-5	<i>Demonstrated understanding of course concepts and effective peer assessment.</i>	Mon. 15 th Nov (5 pm)	Thurs. 18 th Nov (11:59 pm)	Fri. 19 th Nov (11:59 pm)
4. Final exam (individual)	2 hr + 0.5 hr for reading and downloading/uploading	50 %	1-5	<i>Demonstrated transferability of core course concepts to practical applications involving solid waste management.</i>	Final examination period		

RELEVANT RESOURCES

All textbooks, suggested additional readings, additional materials and recommended internet sites will be provided on Moodle at relevant times during the course.

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;
- 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

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	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
PE2: Engineering Application Ability	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
PE3: Professional and Personal Attributes	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