

CVEN9872 SOLID WASTE MANAGEMENT

COURSE DETAILS

Units of Credit	6		
Contact hours	4 hours per week		
Lecture	Tue, 10:00 – 12:00	Online	
Lecture	Thu, 10:00 – 11:00	Online	
Workshop	Thu, 11:00 – 12:00	Online	

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INFORMATION ABOUT THE COURSE

These introductory notes provide information on the learning and assessment approach for this subject. Please take the time to read all these introductory notes, they have been prepared on the basis of common problems experienced by students in the past and should therefore save you wasted time during the session. Please note:

- No campus study period is available for this course for distance students.
- All material will be provided on Moodle. There will not be any photocopies provided.

Copies of the lecture presentation will be available on Moodle. Please refer to the News Forum, where announcements related to the course will be made. Please use the Q&A discussion to post questions. I will answer them, and they can then be an archive for people who may subsequently have the same question.

Please retain a copy of everything you send to the University.

HANDBOOK DESCRIPTION

Characterisation of municipal solid waste; collection; transfer stations; waste minimisation and recycling; waste treatment, including size reduction, composting, incineration, emerging technologies; landfill disposal, including preparation of landfill management plans and operational aspects; introduction to planning of waste management systems

See link to virtual handbook:

<https://www.handbook.unsw.edu.au/postgraduate/courses/2020/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 how to prepare a waste management strategy or plan.

Students will be provided with the basic tools by way of audio/video streaming/podcasts of this year's lectures, electronic copies of the lectures, and course notes and then will be expected to prepare workable solutions to assignment problems that have been drawn from a composite of real world problems.

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

- *An in-depth engagement with the relevant disciplinary knowledge in its inter-disciplinary context: the influence of socio-economic circumstances on waste generation will need to be included in waste generation predictions, and in the commentary on the implementation stages of waste facility establishment*, in the design of one of the facilities in a region.
- *The capacity for analytical and critical thinking and for creative problem solving:* Data will be incomplete, and an analysis of the fundamental influences on waste generation will need to be made to arrive at reasonable projections; then creative designs for facilities to suit the circumstances of the hypothetical region will need to be produced in the second assignment.
- *The ability to engage in independent and reflective learning:* lectures will give standard procedures for the design of waste facilities such as landfills and waste sorting facilities; you will then need to independently develop appropriate solutions for the hypothetical region and draw on the Principal Engineer (lecturer) for reactive advice after you have developed and reflected on their own designs – the Principal Engineer will not do creative design work for you.
- *Information literacy:* you will need to find appropriate web sites and use suggested texts and journals to find supplementary information to enable them to go into sufficient detail to produce workable concept designs for facilities – all details will not be given in lectures. **You must not directly contact by any means, private or public organisations. This can only be done by the Lecturer.**
- *The skills for collaborative and multi-disciplinary work:* you will work in group of up to 3 (for Assignment 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 assignment projects 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 IEAust's code of ethics as at (search code of ethics here): <http://www.engineersaustralia.org.au>
- *The skills of effective communication:* in this course, memo's and technical reports need to be appropriate for a technical audience i.e. for another engineer that works for a Council or a consulting engineer. They are not novels. They are technical reports, typically using an introductory sentence and point form, and provided with at least 2 levels of numbered headings. Appropriate referencing must be used.

TEACHING STRATEGIES

Lectures will provide an explanation of procedures to follow to quantify waste generation in a town / city / region and then to prepare conceptual designs of waste management facilities. Examples will be given in these lectures. You then need to learn these procedures by characterizing waste generation in a town / city / region and preparing conceptual designs for selected waste facilities to a standard typical in a consulting office.

All material will be provided on Moodle. Printed and photocopied notes, overheads etc. will not be provided.

The approaches to learning are:

Private Study	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Take notes – the slides do not contain all information• Refer to specified reference material for additional information• Participate in activities and example problems in class.• Check for announcements
Workshops	<ul style="list-style-type: none">• Be guided by Demonstrators• Practice solving set problems• Ask questions
Assessments	<ul style="list-style-type: none">• Formative and summative assessment of knowledge and skills in assignments, with students encouraged to seek formative informal assessment via consultation with the Principal Engineer/lecturer during preparation of assignments.• Demonstrate higher understanding and problem solving on real world problems in a hypothetical region/context.• Exams are summative assessments on knowledge gained in the course, particularly as indicated by the ability to quickly undertake exercises set in the Exercise problems
Emails	<ul style="list-style-type: none">• You are strongly advised to check your UNSW emails daily for course related messages that are sent via News forum in Moodle. Use Q&A in Moodle to ask questions, as this builds an archive for all students in the course.
Moodle	<ul style="list-style-type: none">• The Waste Management lectures can be found on MOODLE. From time to time, other information will be placed on MOODLE.

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 Outcomes		EA Stage 1 Competencies
1.	Describe a regional urban 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 design, construction and operational aspects of some waste management facilities including transfer station, material recovery facility, composting facility, waste to energy plant, and a landfill waste disposal site.	PE1.1, PE1.6,
5.	Prepare concept designs of some of the following waste facilities including transfer station, material recovery facility, composting facility, waste to energy plant, and a landfill waste disposal site.	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** 1.5 hours of private study.

COURSE PROGRAM

The lecture schedule for CVEN9872 is outlined in the table below. Please note that the lecture schedule and sequence of topics is a guide only and there may be some variation. Please check MOODLE News Forum for any changes, which will also be advised in class.

Term 3 2019

Date	Topic Lecture Content	Demonstration Content	Other
14/09/2019 (Week 1)	Introduction and course overview. Background, waste management policy and planning	DEMO: Introduction, demo structures (and assignment 1)	Assignment 1 Section 1 Due: Sunday 4 th Oct (11:59pm) Fail: Wednesday 8 th Oct (11:59pm)
21/09/2019 (Week 2)	Waste minimisation, recycling, and materials recovery	DEMO: Waste minimization	
28/09/2019 (Week 3)	Waste generation & characterisation	DEMO: Waste generation and characterization	

06/10/2019 (Week 4)	Waste collection and transfer	DEMO: waste transfer	Assignment 1 section 2 Due: Sunday 25 th Oct (11:59pm) Fail: Sunday 1 st Nov (11:59)
12/10/2019 (Week 5)	Composting	DEMO: composting	
19/10/2019 (Week 6)	<i>Flexibility week for all courses (non-teaching)</i>		
26/10/2019 (Week 7)	Landfill waste disposal (Stuart Dever)	Landfill leachate (Stuart Dever)	
02/11/2019 (Week 8)	Landfill gas	DEMO: Landfill gas	
09/11/2019 (Week 9)	Composting & MBT	DEMO: MBT and Landfill leachate	
16/11/2019 (Week 10)	Waste to Energy and course overview	DEMO: Waste to energy	Video presentation Due: Sunday 29 th Nov (11:59pm) Fail: Thursday 3 rd Dec (11:59pm)

ASSESSMENT

Notes:

There may be conflicts between the due dates for CVEN9872 assignments and other course assignments – only students know these conflicts. Please advise the course coordinator by the Week 2 lecture so that due dates can be adjusted if necessary. Due dates remain in place after Week 2.

Late Assignments:

Extensions of time will only be given in the case of medical problems or personal emergencies, **and only if requested prior to the due date via myUNSW Special Consideration**. Work and other extra-curricular activities are not valid reasons for extensions of time without penalty. If a personal emergency (not a peak in workload) arises that may cause a delay in completing or submitting the assignment, contact the Course Co-ordinator as soon as possible. You may be asked to complete a Special Consideration form.

A late penalty of 10% of the total assignment value may apply for assignments submitted late i.e. after 5:00pm on the due date (as per the Assignment Schedule). A further 10% penalty for each additional late week may apply.

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 below.

Supplementary Examinations for Term 3 2019 will be held on Monday 11th January to Friday 15th January

2021 (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

Penalties for late submissions should also be included here. For example, late work will be penalised at the rate of 10% per day after the due time and date have expired.

ASSESSMENT OVERVIEW

Item	Weighting (%)	Learning outcomes assessed	Length / Assessment Criteria	Due date	Deadline for absolute fail	Marks returned
Assignment 1 - section 1	15	1, 2, 3	Assess the understanding of the concepts, data collection, calculations and reporting. Section 1 is the data gathering and calculations Will be explained in detail during demonstration	Assignment 1 Section 1 Due date: Sunday 4 th Oct (11:59pm)	Wednesday 8 th Oct (11:59pm)	Sunday 11 th of October
Assignment 1 - section 2	20	1, 2, 3	Assess the understanding of the concepts, data collection, calculations and reporting. Will be explained in detail during demonstration	Assignment 1 Section 2 Due: Sunday 25 th Oct (11:59pm)	Sunday 1 st Nov (11:59pm)	Sunday 8 th of November
Video presentation	30	1, 2, 3, 4 & 5	summarise the content and highlight and analyse the underlying connections, contrast and problems. Critically analyse waste management approaches and mention limitations. make conclusions and suggest strategies toward the circular economy	Due: Sunday 29 th Nov (11:59pm)	Thursday 3 rd Dec (11:59pm)	Sunday 6 th of December
5 Bonus mark to video presentation	0		For the top three students who actively participate in class activities and workshops, 5 bonus marks will be added to their video presentation			
Final exam	35	1, 2, 3, 4 & 5	Assess the solid Waste management knowledge. 30min-60min duration available for 24 hours with one trial only	Final examination period		

RELEVANT RESOURCES

There is NO textbook for this Course.

Most of the reference material required will be provided on MOODLE or students will be directed to relevant resources.

The following references may be useful for assignments and to practitioners. They are available from the Library:

- Christensen, T., (Ed.), 2010. Solid Waste Technology & Management. Wiley.
 - Kreith & Tchobanoglous, 2002. The McGraw-Hill Handbook of solid waste management. 2nd Edition, (UNSW Library)
 - Christensen, T.H., Cossu, R., Stegmann, R., Sanitary Landfilling: Process, Technology and Environmental Impact, Academic Press, London, 1989.
 - Baccini, P. (Ed.), The Landfill, Reactor and Final Storage, Springer-Verlag, Berlin, 1989. Another useful reference, which is quite old but still a very good reference, but will be difficult to find:
 - Tchobanoglous, G et al, 1993; Integrated Solid Waste Management, McGraw-Hill
- Other reading material that students will be referred to includes that listed below:

1. Solid waste management policy, strategy, planning, legislation, regulation:

- Australian Environment Protection and Heritage Council (EPHC) National Waste Policy: Less waste, more resources, 2009 (<http://www.environment.gov.au/protection/national-waste-policy>)
- Australian Environment Protection and Heritage Council (EPHC), Waste Overview, 2009 (<http://www.environment.gov.au/protection/national-waste-policy/publications>)
- Waste Avoidance and Resource Recovery Act, 2001
- Protection of the Environment Operations (Waste) Regulation
- NSW Waste Avoidance and Resource Recovery Strategy 2014–21, 2014 (<http://www.epa.nsw.gov.au/wastestrategy/warr.htm>)
- NSW Government: Waste Less Recycle More Initiative (<http://www.epa.nsw.gov.au/wastestrategy/waste-less-recycle-more.htm>)
- NSW Waste Less, Recycle More, Initiative, Community benchmark study, 2015 (see <http://www.epa.nsw.gov.au/wastestrategy/waste-less-recycle-more.htm>)
- NSW Draft Waste Less Recycle More Education Strategy, 2015 (<http://www.epa.nsw.gov.au/wastestrategy/education.htm>)
- NSW Waste Education Programs (<http://www.epa.nsw.gov.au/wastestrategy/education-prog.htm>)
- NSW Product Stewardship Schemes (<http://www.epa.nsw.gov.au/wastestrategy/stewardship-schemes.htm>)
- NSW Container Deposit scheme (<http://www.epa.nsw.gov.au/waste/container-deposit-scheme.htm>)
- NSW Energy from Waste Policy Statement, 2014 (<http://www.epa.nsw.gov.au/wastestrategy/energy-from-waste.htm>)

<p>2. Waste generation:</p> <ul style="list-style-type: none"> - Blue Environment, 2016. Australian National Waste Report. Report prepared for the Department of Environment & Energy. - Australian Environment Protection and Heritage Council (EPHC), Waste Overview, 2009 - Australian Dept of Env & Energy Waste generation and resource recovery in Australia 2010-11 (http://www.environment.gov.au/protection/national-waste-policy/publications/waste-generation-and-resource-recovery-australia-report-and-data-workbooks) - NSW Waste data surveys (http://www.epa.nsw.gov.au/wastetools/surveys.htm) <p>NSW Local Government Waste and Resource Recovery Data Report 2012-13 (http://www.epa.nsw.gov.au/wastetools/surveys.htm)</p>
<p>3. Waste minimisation and recycling: Nil</p>
<p>4. Waste storage, collection and transfer: Nil</p>
<p>5. Waste processing, resource and energy recovery:</p> <ul style="list-style-type: none"> - NSW EPA Environmental Guidelines: Composting and Related Organics Processing Facilities (http://www.epa.nsw.gov.au/waste/organics-guidelines.htm)
<p>6. Landfill waste disposal:</p> <ul style="list-style-type: none"> - NSW EPA Environmental Guidelines: Solid Waste Landfills, 2016 (http://www.epa.nsw.gov.au/waste/landfill-sites.htm) - EPA Victoria, Siting, design, operation and rehabilitation of landfills, 2015 (http://www.epa.vic.gov.au/business-and-industry/guidelines/landfills-guidance) - Townsend, Powell, Jain, Xu, Tolaymat, Reinhart. Sustainable Practices for Landfill Design and Operation, 2015

Technical papers can be found in the following journals:

- Waste Management, International Journal of Integrated Waste Management, Science and Technology. Journal of the International Waste Working Group (IWWG).
- Waste Management & Research, Journal of the International Solid Waste Association (ISWA).

If you have strong interest in waste management you might like to join one of the following professional / industry organisations:

- Waste Management Association of Australia (WMAA): <https://www.wmaa.asn.au/>
- International Waste Working Group (IWWG): <https://www.tuhh.de/iue/iwwg/welcome.html>
- International Solid Waste Association (ISWA): <https://www.iswa.org/>

Each association offers a range of resources which may be of use. Notably, membership of the IWWG provides members access to past proceedings of the Sardinia International Waste Management & Landfill Symposium (see: <http://www.sardiniasymposium.it/>) which are particularly useful references.

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://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/academic-advice>

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