Course Outline

MATS6006

Recycling of Wastes

Materials Science and Engineering

Science

T2, 2020

1. Staff

Position	Name	Email	Consultation times and locations	Contact Details
Course Convenor	Samane Maroufi	s.maroufi@unsw.edu.au	Room 439, School of Materials Science and Engineering (Building E10), by appointment	Phone: 9385
Lecturer	Samane Maroufi	s.maroufi@unsw.edu.au	Room 439, School of Materials Science and Engineering (Building E10), by appointment	Phone: 9385

Provide information about tutors involved in the course.

2. Course information

Teaching times and locations:

	Wednesday	Friday
	Lecture	Lecture
Location	G23-LAW TH G23	LAW TH G02
Time	11-1 PM	9-11 AM
Weeks	1-3,5,7-10	1-3,5,7-10

	Wednesday	Friday	Friday
	Lecture (Group 1)	Lecture (Group 2)	Lecture (Group 3)
Location	CompLabMSE	CompLabMSE	CompLabMSE
Time	11 AM-1 PM	9-11 AM	11-1 PM
Weeks	4	4	4

Provide a link to the relevant course information on the online timetable site:
http://www.timetable.unsw.edu.au

2.1 Course summary

The course will give an overview of a range of challenging and complex wastes arising from rapid urbanization and growing populations and will explain the impacts of these wastes on environment if not treated properly. The focus will be on introducing a range of conventional approaches and new emerging techniques to recycle and reform wastes. In this course, different methods and approaches for treatment, management and recycling of wastes will be explained in detail and students will have

chance to gain knowledge on the latest science and technology related to the recycling of wastes, and will be familiar with life cycle assessment and the concept of circular economy.

2.2 Course aims

This course will aim to enable students to have a comprehensive understanding of wastes of different categories (from daily wastes such as food packaging, textile and plastic to electronic waste, automotive and biomass wastes) and their impacts on environment. The course will allow students to fully understand the principles of recycling and assess various recycling approaches including mechanical, electrical, chemical and thermal processing. Through this course, students will be able to evaluate the limitation of the conventional approaches in regard with recycling of new generation of waste as these wastes are highly complex, being a mixture of metals, non-metals and plastic and will gain knowledge on how to address this challenge.

This course will aim to teach students, the concept of circular economy and enable them to apply life cycle assessment (LCA) to evaluate the impact of new recycling approaches on environment and compare it with conventional techniques. This course will also help student to build their research capability and presentation and communication skill.

2.3 Course learning outcomes (CLO)

At the successful completion of this course you (the student) should be able to:

1. categorise different waste streams and evaluate their environmental impacts if not treated properly;
2. assess different conventional recycling approaches and their limitation in regard with new generation of complex waste and categorise new emerging recycling techniques such as micro recycling and waste reforming;
3. apply the life cycle assessment framework to evaluate the impact of different recycling methods on environmental and circular economy;
4. build professional written and oral presentation skills and critical thinking.

2.4 Relationship between course and program learning outcomes and assessments

Course Learning Outcome (CLO)	LO Statement	Program Learning Outcome (PLO)	Related Tasks & Assessment
CLO 1	Categorise…	1, 3, 4, 5	Assignment 1,
CLO 2	Assess…	1, 2, 3, 4, 5	Assignments 2&3, and Mid-term exam
CLO 4	Apply…	1, 3, 4, 5	Assignment 4
CLO	Build…	5	All assignments

3. Strategies and approaches to learning

3.1 Learning and teaching activities

(based on UNSW Learning Guidelines)

- Students are actively engaged in the learning process.

It is expected that, in addition to attending classes, students read, write, discuss, and be engaged in analysing the course content.

- Effective learning is supported by a climate of inquiry where students feel appropriately challenged.

Students are expected to be challenged by the course content and to challenge their own preconceptions, knowledge, and understanding by questioning information, concepts, and approaches during class and study.

- Learning is more effective when students' prior experience and knowledge are recognised and built on.

  Coursework, assignments, laboratories, examinations, and other forms of learning and assessment are intended to provide students with the opportunity to cross-reference these activities in a meaningful way with their own experience and knowledge.

- Students become more engaged in the learning process if they can see the relevance of their studies to professional and disciplinary context.

The course content is designed to incorporate both theoretical and practical concepts, where the latter is intended to be applicable to real-world situations and contexts.

3.2 Expectations of students

- Students must attend at least 80% of all classes with the expectation that students only miss classes due to illness or unforeseen circumstances
- Students must read through lecture notes and lab sheets prior to class
- During class, students are expected to engage actively in class discussions
- Students should work through lecture, tutorial and textbook questions
- Students should read through the relevant chapters of the prescribed textbook.
- Students should complete all assessment tasks and submit them on time.
- Students are expected to participate in online discussions through the Moodle page

4. Course schedule and structure

This course consists of x hours of class contact hours. You are expected to take an additional y hours of non class contact hours to complete assessments, readings and exam preparation.

Week	Topics	Activity	Related CLO
1	Waste generation, current situation with different categories of waste, the complexity of the new generation of waste Characterisation of wastes-first step to recycling (how characterisation helps to select the right recycling approach)	Assignment 1	1 & 5
2	Different Techniques of waste treatment (i.e., Mechanical, Electrical, Chemical and Thermal processing)	Assignment 2:	1, 2, 3 & 5
3	Daily waste (i.e., food packaging, textile, glass and plastic) recycling		
4	• Life Cycle Assessment (LCA) • Circular Economy	Assessment 3	1, 2, 3, 5
5	Electronic waste recycling		
6			
7	Mid-term exam		1, 2, 3 & 5
8	Automotive waste recycling (Tyre, automotive shredder residue and Windscreen glass)		
9	Biomass recycling		
10	Converting waste to value-added products	Assignment 4 (during exam period)	1, 2, 3, 4 &5

5. Assessment

5.1 Assessment tasks

Assessment task	Description	Weight	Due date
Assessment 1: Formative: Moodle group discussion	Students will be asked to participate in the group discussion on a topic which will be introduced in Moodle Forum related to waste. Students are expected to be actively engaged in sharing their idea and communicating with their classmates. (Students will get feedback during the class)	0	Week 2
Assessment 2: Assignment 2: Site visit report	Student will need to search for a scientific paper and discuss their finding and summary of the paper.	10%	Week 4
Assessment 3: Assignment 3: Short	Students will need to undertake a research on a particular waste which has been successfully	15%	Week 7

Essay (1000 word)	recycled or reformed and technology has been already commercialised. Students are expected to discuss the impact of the developed technology on environment.		
Assessment 4: Mid-term exam	The aim of this exam is to assess student's skills in solving problems and their understanding of the wastes, their challenge, limitation and opportunities. In-class exam covering the content taught in lectures 1-6.	30%	Week 7
Assessment 5 Assignment 4: Final presentation Oral and written Individual work	Students are expected to select one type of the problematic waste of their own interest. They are required to: i. categorise the waste, ii. discuss their environmental impacts and the issue/challenge associated with their recycling , iii. identify and justify a suitable approach and methods to recycle the waste, iv. apply the life cycle assessment framework to evaluate the environmental impacts of using the recycling method (s) compare it to non-treated disposal of the waste and their impact on circular economy, and v. propose strategies to policy makers to introduce and/or reinforce the implementation of the recycling methods in a national or an Australian state or a local context of their choice.	45%	Exam period

Further information

UNSW grading system: https://student.unsw.edu.au/grades

UNSW assessment policy: https://student.unsw.edu.au/assessment

5.2 Assessment criteria and standards

Assessment criteria and standards for each assessment tasks are available on the course Moodle page.

Students who fail to achieve a score of at least 40% for the overall exam component (i.e., mid-session exam and final exam marks combined), but achieve a final mark >50% for the course, will be awarded a UF (Unsatisfactory Fail) for the course.

Please refer to the UNSW guide to grades: https://student.unsw.edu.au/grades

Rules governing conduct during exams are given at: https://student.unsw.edu.au/exam-rules

5.3 Submission of assessment tasks

- UNSW operates under a Fit to Sit/ Submit rule for all assessments. If a student wishes to submit an application for special consideration for an exam or assessment, the

application must be submitted prior to the start of the exam or before an assessment is submitted. If a student sits the exam/ submits an assignment, they are declaring themselves well enough to do so. Information on this process can be found here: https://student.unsw.edu.au/special-consideration. Medical certificates or other appropriate documents must be included. Students should also advise the lecturer of the situation.

- Unless otherwise specified in the task criteria, all assignments must be uploaded via Moodle prior to the due date for submission.
- Assignments/lab reports submitted after the due date for submission will receive a 10% of maximum grade penalty for every day late, or part thereof.
- Students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course coordinator prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit: https://student.unsw.edu.au/disability. Early notification is essential to enable any necessary adjustments to be made.

5.4. Feedback on assessment

Assignments: Feedback will be given two weeks after submission of the assignment and take the form of the mark for the assignment, overall comments on how the class performed, any common areas that were not answered correctly. Additionally, personal feedback and how each student performed may be given.

Mid-term exam: As the mid-term exam is the formal exam for Part 1 of the course, with the content not examinable in Part 2, students will receive their final mark.

Final exam: Students will receive their final mark

6. Academic integrity, referencing and plagiarism

Indicate the preferred referencing style with links to resources on how to use it.

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at https://student.unsw.edu.au/referencing

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits**:** honesty, trust, fairness, respect, responsibility and courage.[1] At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and **plagiarism** can be located at:

- The *Current Students* site https://student.unsw.edu.au/plagiarism**,** and
- The *ELISE* training site http://subjectguides.library.unsw.edu.au/elise/presenting

[1] International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

The *Conduct and Integrity Unit* provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct.

7. Readings and resources

Provide a list of required and/or useful resources.

8. Administrative matters

School Office: Room 137, Building E10 School of Materials Science and Engineering
School Website: http://www.materials.unsw.edu.au/
Faculty Office: Robert Webster Building, Room 128
Faculty Website: http://www.science.unsw.edu.au/

9. Additional support for students

- The Current Students Gateway: https://student.unsw.edu.au/
- Academic Skills and Support: https://student.unsw.edu.au/academic-skills
- Student Wellbeing, Health and Safety: https://student.unsw.edu.au/wellbeing
- Disability Support Services: https://student.unsw.edu.au/disability-services
- UNSW IT Service Centre: https://www.it.unsw.edu.au/students/index.html