



UNSW Course Outline

SOLA5051 Life Cycle Assessment - 2024

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General Course Information

Course Code : SOLA5051

Year : 2024

Term : Term 2

Teaching Period : T2

Is a multi-term course? : No

Faculty : Faculty of Engineering

Academic Unit : School of Photovoltaic and Renewable Engineering

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Postgraduate, Undergraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

Life Cycle Assessment, or LCA, is a methodological approach for assessing environmental impacts of products, processes, or systems from a life cycle perspective. This course will focus on the application of LCA on energy systems, but it will also explore other fields.

In this course, students will learn both the methodology and applications of LCA. Students will be exposed to a wide range of LCA case studies to demonstrate the process and overall role in environmental impact management, with a focus on applying LCA to assess renewable energy technologies and systems.

Course Aims

The broad aim of this course is to provide students with knowledge on the fundamentals of Life Cycle Assessment (LCA). More specifically the course aims to:

- Develop within students a solid understanding of the methodology and applications of LCA;
- Expose students to a range of examples and LCA case studies to demonstrate the process;
- Provide activities for students using software tools and techniques to conduct LCAs.

The development of theoretical and practical skills of LCA methods will help to make sustainable decisions and thus are relevant to the disciplines of photovoltaic and renewable energy engineering.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Describe the LCA methodology and recognise the role of LCA in the overall process of environmental management.
CLO2 : Apply LCA methodology framework by building LCA models using both primary and secondary data.
CLO3 : Assess environmental impacts of products, processes or systems from a life cycle perspective using a LCA software.
CLO4 : Assess renewable energy technologies and systems using LCA approach, compliant with international norms.
CLO5 : Interpret and make use of completed LCAs to make informed recommendations for environmental impacts of RE systems.

Course Learning Outcomes	Assessment Item
CLO1 : Describe the LCA methodology and recognise the role of LCA in the overall process of environmental management.	<ul style="list-style-type: none">• Online quizzes• Final Examination (Interview)
CLO2 : Apply LCA methodology framework by building LCA models using both primary and secondary data.	<ul style="list-style-type: none">• LCA Report 1• Online quizzes
CLO3 : Assess environmental impacts of products, processes or systems from a life cycle perspective using a LCA software.	<ul style="list-style-type: none">• LCA Report 1• Online quizzes
CLO4 : Assess renewable energy technologies and systems using LCA approach, compliant with international norms.	<ul style="list-style-type: none">• LCA Report 2
CLO5 : Interpret and make use of completed LCAs to make informed recommendations for environmental impacts of RE systems.	<ul style="list-style-type: none">• LCA Report 2• Final Examination (Interview)

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams | Echo 360

Learning and Teaching in this course

The teaching strategy for this course comprises a series of lectures and workshop activities. The lecture series will present theory related to the methodology and applications of LCA, including various case studies and activities throughout the course. The course also comprises three guest lectures by LCA experts from academia, the PV industry, the construction industry, and sustainability consulting firms to discuss using LCA as an effective assessment tool to solve

real-world sustainability problems.

A set of workshop questions or activities will be made available every week, and students will be expected to work through the assigned activities in the workshop session as directed by the demonstrator, sometimes working in small groups. In some cases, preparation such as reading prior to the workshop class will be required. Students can also use their allocated workshop session to ask tutors any questions they may have about the material taught in lectures.

The course contains a component of self-learning through the experience gained via using the life cycle assessment software OpenLCA. The software will be used in workshop sessions. Undergraduate and postgraduate students will attend the same lectures and workshop sessions.

Other Professional Outcomes

<https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Online quizzes Assessment Format: Individual	20%	
LCA Report 1 Assessment Format: Individual	25%	Due Date: Friday of Week 5 by 10pm Sydney time
LCA Report 2 Assessment Format: Group	30%	Due Date: Friday of Week 11 by 10pm Sydney time
Final Examination (Interview) Assessment Format: Individual	25%	Due Date: The oral exam be conducted in Week 12. Student can book their 20-minute slot after week 9.

Assessment Details

Online quizzes

Assessment Overview

You will have to complete 5 online quizzes throughout the term. The quizzes will assess what you have learned throughout the term. You only have 120 minutes and 1 attempt for each quiz. Special considerations will not apply to quizzes. Quizzes will be marked based on rubrics. Students will receive feedback online after results are released.

Course Learning Outcomes

- CL01 : Describe the LCA methodology and recognise the role of LCA in the overall process of environmental management.
- CL02 : Apply LCA methodology framework by building LCA models using both primary and secondary data.
- CL03 : Assess environmental impacts of products, processes or systems from a life cycle perspective using a LCA software.

Assessment Length

2-hour online quizzes due in Week 2, 4, 6, 7, 9

Assignment submission Turnitin type

This is not a Turnitin assignment

LCA Report 1

Assessment Overview

You will be required to conduct a LCA by following the four stages of the LCA framework. Given a set of constraints, you must individually run a comparative LCA of products of your choice. Output must show LCA steps taken and explain why your final decision is the best choice. You are expected to spend 25 hours on this report and will have time during the workshop sessions to prepare and ask questions. Students should submit a 10-page individual report including the drawing of the system diagram. The report will be graded based on a rubric within two weeks of the due date. Feedback will be provided via the learning management system.

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

Course Learning Outcomes

- CL02 : Apply LCA methodology framework by building LCA models using both primary and secondary data.
- CL03 : Assess environmental impacts of products, processes or systems from a life cycle perspective using a LCA software.

Assessment Length

10-page individual report. Due date: Friday of Week 5 by 10pm Sydney time

LCA Report 2

Assessment Overview

LCA Report 2 involves completing a LCA of a specific renewable energy system, according to ISO standards. You will work in a group of 4-5. Each student is expected to spend approximately 30

hours. This project will allow you to engage with the entire process of conducting a real LCA by following the four stages of the LCA framework while collaborating in a group. The final report must contain the main body of the LCA study, with all the sections adhering to the ISO standard. It will be graded within two weeks of the due date and will be marked based on a rubric. Feedback will be provided via the learning management system.

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

Course Learning Outcomes

- CLO4 : Assess renewable energy technologies and systems using LCA approach, compliant with international norms.
- CLO5 : Interpret and make use of completed LCAs to make informed recommendations for environmental impacts of RE systems.

Assessment Length

20-page group report. Due date: Friday of Week 11 by 10pm Sydney time

Final Examination (Interview)

Assessment Overview

The final exam will be conducted as an interview. It will assess course materials including the materials discussed in lectures and workshops. The 20-minute interview is comprised of 10-12 short answer questions related to the LCA methodology and applications in RE systems. Students are welcome to give answers in different formats including using examples or schematics. The interview will be graded based on a rubric. Feedback will be provided within a week of the interview.

Course Learning Outcomes

- CLO1 : Describe the LCA methodology and recognise the role of LCA in the overall process of environmental management.
- CLO5 : Interpret and make use of completed LCAs to make informed recommendations for environmental impacts of RE systems.

Assessment Length

20-minute oral exam (one on one). Due date: week 12.

General Assessment Information

Referencing: Please use IEEE Referencing or Havard Referencing in all your assessments.

UNSW guidance about IEEE Referencing: <https://libraryguides.vu.edu.au/ieeereferencing/gettingstarted>

UNSW guidance about Harvard Referencing: <https://www.student.unsw.edu.au/harvard-referencing>

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 27 May - 2 June	Lecture	Course outline, LCA introduction, Goal and Scope
Week 2 : 3 June - 9 June	Lecture	Life Cycle Inventory
Week 3 : 10 June - 16 June	Lecture	Life Cycle Impact Assessment
Week 4 : 17 June - 23 June	Lecture	LCA Interpretation
Week 5 : 24 June - 30 June	Activity	Guest Lecture: Life Cycle Assessment used for sustainability strategy, decision-making and communication
Week 7 : 8 July - 14 July	Activity	The Life Cycle of PV Systems
Week 8 : 15 July - 21 July	Lecture	LCA of Renewable Energy Systems
Week 9 : 22 July - 28 July	Lecture	Guest lecture: Uncertainty analysis in LCA / Introduction to uncertainty analysis in Python, Life Cycle Costing
Week 10 : 29 July - 4 August	Lecture	Guest lecture: Life Cycle Assessment in Buildings

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Resources

Prescribed Resources

The course will use "Life Cycle Assessment: Theory and Practice" by Michael Hauschild, Ralph Rosenbaum, and Stig Irving Olsen (Springer International Publishing: Imprint: Springer, 2018) as the course textbook. The eBook version can be accessed via the UNSW library at the following link: [https://primoa.library.unsw.edu.au/permalink/f/1gq3lal/UNSW_ALMA51226734490001731]

Students must use the software OpenLCA to complete the project. This free software can be downloaded on your personal computer.

The standard ISO 14040 Environmental management: Life cycle assessment Principles and framework is accessible via the UNSW Library.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Rong Deng		TETB 129	+61 2 9065 2099	MS Teams	Yes	Yes
Demonstrator	Wilfred Han					No	No
	Paolo Gonzal ez					No	No

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and policies. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

III. Equity and diversity

Those 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 convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

Note: This course outline sets out the 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 or your primary learning management system (LMS) 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/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific 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)

School-specific Information

SPREE Student Information Hub

Students are welcome to visit the [SPREE Student Information Hub](#) for information such as sample study plans, course outlines, thesis project, industrial training etc.

School Contact Information

For course-related matters, please contact course convenor directly via emails. Please email spreeteaching@unsw.edu.au for any other matters.