

Graduate Certificate Life Cycle Assessment for Sustainable Materials & Energy

9 Months Part-Time (September Start)



Introduction

The Graduate Certificate in Life Cycle Assessment (LCA) for Sustainable Materials and Energy is designed to address the growing need for professionals capable of conducting holistic environmental impact assessments. As industries shift towards net-zero emissions, resource efficiency, and circular economy models, decision-makers must consider a broader range of sustainability indicators, including water consumption, resource depletion, energy demand, land use, biodiversity impacts, and social and economic sustainability metrics.

This programme provides a deeper, more comprehensive approach to sustainability assessment compared to traditional carbon footprinting. Participants will gain technical expertise in multi-criteria environmental impact assessments, using internationally recognised methodologies to evaluate trade-offs between climate impact, resource efficiency, pollution, ecosystem degradation, and socio-economic factors.

The program provides training in ISO standard methods for Life Cycle Assessment (ISO 14040/44), the EU Taxonomy for Sustainable Activities and the Corporate Sustainability Reporting Directive (CSRD). It integrates circularity metrics, life cycle-based sustainability strategies, and sustainable energy assessments, equipping graduates with the knowledge to support evidence-based decision-making.

Resources

This programme is delivered by a highly research-intensive school, with circa €5 million research funding awarded annually.

As part of the School of Biosystems and Food Engineering faculty there are four Highly Cited Researchers- Prof Paula Bourke, Prof Da-Wen Sun, Prof Colm O'Donnell and Prof Enda Cummins

Course Content/Structure

NFQ: Level 9

Credits:

30 credits, taught modules. 15 credits in the Autumn trimester and 15 in the Spring trimester
Online delivery of modules, with live calls in the afternoon and evening. Opportunity to follow programme through recordings.

Modules include

Life Cycle Assessment (BSEN30360):

This module provides a comprehensive introduction to Life Cycle Assessment (LCA), equipping students with the skills to evaluate the environmental impact of products, processes, and systems.

Sustainable Energy & Environment (BSEN40480):

This module explores the relationship between energy systems, environmental sustainability, and climate policy. Students will gain an understanding of renewable and non-renewable energy sources and the role of energy efficiency in achieving climate goals.

LCA Applications (BSEN40400):

Building on the foundational concepts of Life Cycle Assessment, this module focuses on the practical application in real-world scenarios. Students will conduct detailed life cycle assessments on products, processes, and systems, applying industry-leading LCA software tools.

Sustainable Development Goals:

SDG 7 & 9

This certification plays a key role in SDG 7 (Affordable and Clean Energy) and SDG 9 (Industry, Innovation, and Infrastructure) by covering Sustainable Energy & Environment (BSEN40480) and Green Technologies (BSEN40210). The Life Cycle Assessment (BSEN30360) and Circularity Metrics modules advance.

SDG 12 & 13

(Responsible Consumption and Production) and SDG 13 (Climate Action) by ensuring sustainable production and reducing environmental impacts

Why study at UCD?



Tradition

Established 1854, with 160 years of teaching & research excellence



Global profile

UCD is ranked in the top 1% of higher education institutions worldwide



Global community

Over 6,000 international students from over 120 countries study at UCD



Global careers

Degrees with high employability; dedicated careers support; 1 year stay-back visa





Programme Outcomes

Knowledge and understanding:

Explain and apply the theory of life cycle assessment (LCA).

Applying knowledge and understanding:

Collect data and conduct a multi-criteria LCA of an extant product, process or service using ISO 14040/44 standards, including inventory development, impact assessment (LCIA), and interpretation. Use LCA software tools to model and analyse life cycle impacts, compare alternatives, and support data-driven decision-making.

Quantify environmental impacts across at least four relevant impact categories, such as carbon footprint, resource depletion, water consumption, and land use, relevant to the company/sector.

Making judgements:

Evaluate the environmental performance of materials, energy systems, and technologies, including renewable energy sources and sustainable materials.

Communications and working skills; Learning skills:

Prepare a report summarising the methodologies used, the sustainability assessment, and recommendations for impact reduction, in line with relevant ISO standards and international best practices.

Career Opportunities

While carbon footprinting is widely recognised as a priority, industries increasingly require specialists who can assess broader environmental impacts, social responsibility, and economic viability.

It is particularly relevant for individuals pursuing careers in LCA consulting, sustainability management, environmental engineering, materials science, and corporate sustainability strategy. Additionally, professionals in manufacturing, energy, construction, and supply chain management will gain the skills necessary to evaluate and improve the sustainability of products, processes, and services.

Applicant Profile

- Applicants should hold a NFQ Level 8 (or International equivalent) Bachelor's Degree with minimum 2:1 award (NFQ level 8) or international equivalence in engineering, physical science or an environmental related degree programme.
- Minimum English language requirements will apply. The English language requirements for degree courses at UCD are listed at: www.ucd.ie/international/study-at-ucd-global/ucdenglishlanguagerequirements/

Graduate Profile

Miriam Keegan,
Sustainable Fashion Educator, Designer,
Business Strategist & Advocate.



Taking part in the Carbon Accounting and Life Cycle Assessment programme was a turning point in my career. I focused my work on the fashion industry, and this course really propelled me forward - deepening my understanding of the environmental impact of clothing and equipping me with the tools to make real change.

It helped me grow my expertise in the life cycle of garments and strengthened my ability to support more sustainable practices across the industry. The course gave me both the knowledge and the confidence to push further in my work and I'm incredibly grateful for that.



CONTACT US

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This programme receives significant interest so please apply early online at

www.ucd.ie/apply