

Summary Information

Module Code	5572NCCG
Formal Module Title	Eco-friendly Manufacturing
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

Module Contacts**Module Leader**

Contact Name	Applies to all offerings	Offerings
Graham Sherwood	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings
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Partner Module Team

Contact Name	Applies to all offerings	Offerings
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Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
Nelson and Colne College Group

Learning Methods

Learning Method Type	Hours
Lecture	48

Module Offering(s)

Offering Code	Location	Start Month	Duration
SEP-PAR	PAR	September	28 Weeks

Aims and Outcomes

Aims	Concerns about how manufacturing and global supply chain industry are impacting the environment are on the rise. The main aim of this specialist module is to provide students with technological knowledge and practical awareness for addressing climate emergency via developing their understanding for improving sustainability in manufacturing operations. By analysing a number of case studies, students will develop their knowledge of various aspects of eco-friendly manufacturing principles including cellular manufacturing, smart factory (economics and operations), efficient industrial energy management and sustainable industrial waste management. Alongside this it will equip students with tools to quantifiably evaluate the materials and manufacturing choices made with respect to their environmental and sustainability impact.
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Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Evaluate and apply sustainable and greener solutions to manufacturing practice.
MLO2	Demonstrate ability to design and develop green manufacturing and principles for related factories.
MLO3	Undertake an analysis of decarbonisation and sustainability for manufacturing and product development.
MLO4	Demonstrate understanding of practical decarbonisation measures and strategies for smart manufacturing.
MLO5	Communicate conclusions (associated with eco-friendly manufacturing case studies) clearly in written and verbal form to specialist and non-specialist audiences.

Module Content

Outline Syllabus

• Introduction and evolution of Industry X.0 and previous industrial revolutions. • Environmentally benign manufacturing principles (manufacturing and net zero carbon future). • Principles of sustainable product development and green manufacturing. • Smart factory layouts. • Smart energy management (industrial energy efficiency) principles for future factories. • Industrial Internet of Things (IIOT). • Cellular manufacturing principles including lean manufacturing and Just-In-Time strategies. • Additive manufacturing (vs subtractive manufacturing) principles. • Minimum quantity lubrication in machining and cutting tool sustainability. • Sustainability assessment in manufacturing: perspectives, challenges and solutions. • Sustainable supply chain management (i.e. green logistics) in manufacturing industries. • Sustainable industrial waste management. • Economics of eco-friendly measures in manufacturing. • Eco-auditing principles. • Case studies in sustainable manufacturing (e.g., decarbonisation success stories, the Toyota production system, cryogenic cooling-based sustainable machining or the latest ones etc.).

Module Overview

Additional Information

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Report	Case Study Report	60	0	MLO2, MLO1, MLO3
Presentation	Presentation	40	0	MLO4, MLO5