

ES3E4-15 Life Cycle Engineering of Manufacturing Systems

22/23

Department

School of Engineering

Level

Undergraduate Level 3

Module leader

Stuart Coles

Credit value

15

Module duration

10 weeks

Assessment

100% coursework

Study location

University of Warwick main campus, Coventry

Description

Introductory description

ES3E4-15 Life Cycle Engineering of Manufacturing Systems

Module aims

This module seeks to integrate and consolidate students' understanding of the full life cycle behaviour of manufacturing systems. By modelling in detail, a given manufacturing system, a greater understanding of goal and scope, inventory analysis, flows (such as materials, cash, process and information) and impact assessments will be developed within the module.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

1. Fundamentals of Life Cycle Engineering – definitions & principles
2. Fundamentals of Life Cycle Analysis – introduction to LCA & frameworks, benefits &

limitations of LCA, impact assessment methods, interpretation & reporting, tools and their capabilities

3. Optimisation of whole lifecycle of MS – decision making and trade-offs.

Learning outcomes

By the end of the module, students should be able to:

- 1. Identify different models, tools and data required for the different life phases of a manufacturing system (MS).
- 2. Understand the theory of life cycle analysis (LCA) including application, reporting requirements, impact assessment methods.
- 3. Design and conduct a full LCA of a MS using appropriate software.
- 5. Distinguish between life cycle engineering design paradigms such as 'cradle-to-gate' & 'cradle-to-cradle' in order to evaluate their applicability in a given MS.
- 8. Interpret and optimise the life cycle of MS from an economic and/or environmental perspective.

Indicative reading list

1. Hauschild, Michael Z.; Rosenbaum, Ralph K.; Olsen, Stig I., Life Cycle Assessment – Theory and Practice, Springer International Publishing AG, 2011.
2. Zio, Enrico; The Monte Carlo Simulation Method for System Reliability and Risk Analysis, Springer-Verlag London 2013
3. Yang, G., Life Cycle Reliability Engineering, Wiley, 2007
4. Hitomi, K., Manufacturing Systems Engineering, Taylor & Francis, 1996

Subject specific skills

Ability to conceive, make and realise a component, product, system or process

Ability to develop economically viable and ethically sound sustainable solutions

Ability to be pragmatic, taking a systematic approach and the logical and practical steps necessary for, often complex, concepts to become reality

Ability to seek to achieve sustainable solutions to problems and have strategies for being creative and innovative

Ability to be risk, cost and value-conscious, and aware of their ethical, social, cultural, environmental, health and safety, and wider professional engineering responsibilities

Transferable skills

Exercise initiative and personal responsibility, including time management, which may be as a team member or leader

Apply problem-solving skills, information retrieval, and the effective use of general IT facilities

Communicate (written and oral; to technical and non-technical audiences) and work with others

Be professional in their outlook, be capable of team working, be effective communicators, and be able to exercise responsibility and sound management approaches.

Study

Study time

Type	Required
Lectures	10 sessions of 1 hour (7%)
Seminars	20 sessions of 1 hour (13%)
Supervised practical classes	3 sessions of 1 hour (2%)
Private study	117 hours (78%)
Total	150 hours

Private study description

117 hours of self-study in order to complete assessments for the module.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A3

	Weighting	Study time	Eligible for self-certification
Assessment component			
Group Presentation	40%		No
20 minutes. Including peer assessment			
Reassessment component			
Assignment (2000 words)			No
Assignment to assess failed learning outcomes (2000 words)			

Assessment component

Individual assignment	60%	Yes (extension)
4500 word assignment		

Reassessment component is the same

Feedback on assessment

Open feedback on group presentation
Written comments on submitted assignment.
Support through office hours.

Availability

Courses

This module is Core for:

- Year 3 of UESA-HH75 BEng Manufacturing and Mechanical Engineering
- Year 4 of UESA-HH74 BEng Manufacturing and Mechanical Engineering with Intercalated Year
- Year 3 of UESA-HH76 MEng Manufacturing and Mechanical Engineering

This module is Core optional for:

- Year 3 of UESA-H115 MEng Engineering with Intercalated Year
- Year 3 of UESA-HH77 MEng Manufacturing and Mechanical Engineering with Intercalated Year

This module is Optional for:

- Year 3 of UESA-H113 BEng Engineering
- Year 3 of UESA-H114 MEng Engineering
- Year 4 of UESA-H115 MEng Engineering with Intercalated Year
- UESA-H11L Undergraduate Engineering (with Intercalated Year)
 - Year 3 of H11L Engineering (with Intercalated Year)
 - Year 4 of H11L Engineering (with Intercalated Year)

This module is Option list A for:

- Year 4 of UESA-H111 BEng Engineering with Intercalated Year

- Year 3 of UESA-H112 BSc Engineering

This module is Option list B for:

- Year 3 of UESA-HN15 BEng Engineering Business Management
- Year 4 of UESA-HN13 BEng Engineering Business Management with Intercalated Year