# ES3E4-15 Life Cycle Engineering of Manufacturing Systems

### 23/24

Department School of Engineering Level Undergraduate Level 3 Module leader Simoni Da Ros 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).(C2, M2, C4, M4, C16 (D), M16(D))
- 2. Understand the theory of life cycle analysis (LCA) including application, reporting requirements, impact assessment methods. (C7, M7)
- 3. Design and conduct a full LCA of a MS using appropriate software. (C7, M7, C5, M5, C6, M6, C16 (D), M16(D))
- 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. (C7, M7, C13, M13,
- 8. Interpret and optimise the life cycle of MS from an economic and/or environmental perspective. (C7, M7, C13, M13)

### 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 Lectures Seminars Supervised practical classes Private study Total

#### Required

10 sessions of 1 hour (7%) 20 sessions of 1 hour (13%) 3 sessions of 1 hour (2%) 117 hours (78%) 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 A5

	Weighting	Study time
Group Presentation	40%	
20 minutes. Including peer assessment		
Individual assignment	60%	
4500 word assignment		
Feedback on assessment		
Open feedback on group presentation		
Written comments on submitted assignment.		
Support through onice nours.		

## 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
- UESA-HH77 MEng Manufacturing and Mechanical Engineering with Intercalated Year
  Year 3 of HH77 Manufacturing and Mechanical Engineering MEng with Intercalated Year
  - Year 4 of HH77 Manufacturing and Mechanical Engineering MEng with Intercalated Year
- Year 3 of UESA-H11L Undergradaute 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 Undergradaute 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
- UESA-H112 BSc Engineering
  - Year 3 of H112 Engineering
  - Year 3 of H112 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