

Full Title	Lean Manufacturing (Apprenticeship)		
Status	Uploaded to Banner	Start Term	2017
NFQ Level	06	ECTS Credits	05
Module Code	MANU06010	Duration	Stage - (26 Weeks)
Grading Mode		Department	Mechanical & Industrial Eng
Module Author	Paul ODowd		
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Module Description

This module gives an introduction to Lean Engineering Concepts and Tools (including Lean Manufacturing and Lean Services), and to the Principles of Change Management. Lean manufacturing, originally developed by Toyota, is widely practiced in Irish industry and is vital for its continued competitiveness.

Learning Outcomes

☰ *On completion of this module the learner will/should be able to:*

1. Explain the principles of lean engineering and change management and their applicability to manufacturing, services and to the interaction with customers.
2. Perform data analysis in MS Excel to solve Lean Engineering problems.
3. Review and comment on lean case studies
4. Perform lean manufacturing analysis (Value Stream mapping, Overall Equipment Effectiveness, Takt Time Calculation, Process Throughput measurement, 5S) to identify areas for improvement, and solve problems
5. Evaluate problems and select optimisation solutions appropriately, in order to ensure that an ethical engineering approach is taken.

Indicative Syllabus

Lean Fundamentals: Cells, 5S, Total Productive Maintenance, Team work, Kaizen, Toyota Production System

Lean Manufacturing Principles

Lean Service Principles and Lean Healthcare

Lean Consumption

Lean manufacturing Techniques:

- Takt time
- Value Stream Mapping
 - One-piece flow
- Overall equipment effectiveness (OEE)
- Rapid Plant assessment
- Jikoda (autonomation) - machines
- Poka-yoke
- Waste analysis
- Set-up reduction
- Lean manufacturing analysis using spreadsheets (Using MS Excel)

- Sustaining lean manufacturing

Lean case studies

Change management

- Human and resource issues
- Driving change in organisations

Engineering Ethics

Obligations to customers, society and the environment. Codes of Engineering Ethics. Responses to ethical dilemmas. Case studies.

Teaching and Learning Strategy

Within the GMIT block, Lean Manufacturing will be delivered through lab-based and lecture-based learning, using computer-based exercises, learning games and videos. During the Industry block, the students will continue to get support from the lecturer to facilitate the experiential learning in the company.

Assessment Strategy

Lean Manufacturing is a "Type 3" apprenticeship module. It is 25% assessed during the Academic Block. Another 25% of the marks are for work done in the Industry Block. The Industry Block assessment is integrated with the Technical Project (which is about solving a problem using a Lean Manufacturing approach). A further 50% of the marks are for an "exam-format" assessment that takes place towards the end of the Industry Block. This "exam-format" assessment, includes questions which are based on learning gained in the workplace. For example, questions may refer to learning gained through the Technical Project. Students are asked to refer to examples of theory, tools and techniques used in their own company.

The assessment strategy of this module will be a combination of:

- in class/lab assessments,
- exam type assessments.
- Industry project

Repeat Assessment Strategies

Students will be given the opportunity to take a repeat examination.

Indicative Coursework and Continuous Assessment:

100 %

<i>Form</i>	<i>Title</i>	<i>Percent</i>	<i>Week (Indicative)</i>	<i>Learning Outcomes</i>
Assignment	Class Assessment Laboratory work	25 %	OnGoing	2,3,4,5
Assessment	Exam type assessment	50 %	End of Term	1,3,4,5
Project	Industry project	25 %	OnGoing	2,4,5

Full Time Delivery Mode Average Weekly Workload:

3.00 Hours

<i>Type</i>	<i>Description</i>	<i>Location</i>	<i>Hours</i>	<i>Frequency</i>	<i>Weekly Avg</i>
Lecture	Lecture	Flat Classroom	1	Weekly	1.00
Practical	Lab	Computer Laboratory	2	Weekly	2.00

Part Time Delivery Mode Average Weekly Workload:

1.50 Hours

<i>Type</i>	<i>Description</i>	<i>Location</i>	<i>Hours</i>	<i>Frequency</i>	<i>Weekly Avg</i>
Supervision	Lecture	Not Specified	0.5	Weekly	0.50
Practical	Practical	Computer Laboratory	1	Weekly	1.00

Recommended Reading Book List

Womack, P., (2007). *The Machine That Changed the World*. Simon & Schuster Ltd.
ISBN 1847370551 ISBN-13 9781847370556

Miller, J., (2013). *Creating a Kaizen Culture: Align the Organization, Achieve Breakthrough Results, and Sustain the Gains*. McGraw-Hill Education.

Rother, M., (2009). *Toyota Kata: Managing People for Improvement, Adaptiveness and Superior Results*. McGraw-Hill Education.

Bicheno, J., (2016). *The Lean Toolbox*. Picsie Books.

Bicheno, R., (2016). *The Lean Toolbox 5th Edition*. Picsie Books.
ISBN 0956830757 ISBN-13 9780956830753

Harris, C., (2013). *Engineering Ethics: Concepts and Cases*. Cengage Learning.

Literary Resources

None

Online Resources

moodle lecture notes

Other Resources

2 x 2-hour sessions Training game - Kando Lean kit by MTA international.
Simple 15 min training demo- The Pegboard Game by www.GBMP.org
Simple 15 min training demo - The Nuts and Bolts Game by www.GBMP.org
Simple 15 min training demo - The Dice Game by www.GBMP.org
DVD Toast Kaizen - Society of Manufacturing Engineers
DVD What Lean Means - Society of Manufacturing Engineers
DVD Lean Manufacturing in a Small Shop - Society of Manufacturing Engineers
Microsoft Excel

Additional Information

None

Programme Membership

GA_EMAJG_C06 201900 Higher Certificate in Engineering in Manufacturing Engineering (Apprenticeship)
GA_EMAJG_B07 201900 Bachelor of Engineering in Manufacturing Engineering (Apprenticeship)
GA_EMAPG_C06 201900 Higher Certificate in Engineering in Manufacturing Engineering (Apprenticeship)
GA_EMAPG_B07 201900 Bachelor of Engineering in Manufacturing Engineering (Apprenticeship)