Module specification

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Module Code	ENG792
Module Title	Process Improvement & Industry 4.0
Level	Level 7
Credit value	20 credits
Faculty	FAST
HECoS Code	100209
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
MSc Engineering (Management) MSc Engineering (Management) with Advanced Practice	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	30 hrs
Placement tutor support	0 hrs
Supervised learning e.g., practical classes, workshops	0 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	**30** hrs
Placement / work-based learning	0 hrs
Guided independent study	170 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	22nd Aug 2022
With effect from date	Sept 22
Date and details of revision	
Version number	1

Module aims

This module provides a grounding in modern industrial practices and the Engineering Management skills required to support manufacturing production and new product introduction, including quality, process improvement and maintenance.

Module Learning Outcomes - at the end of this module, students will be able to:

In addition to the module learning outcomes, students will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: **M1, M2** & **M3**

1	Critically evaluate the salient features of "The Toyota Way" or "Lean Six Sigma" and interpret them in the context of processes to be seen in any manufacturing or production plant.
2	Develop and analyse a Process Improvement plan, based on the principles of DMAIC. Prepare and present plan and implementation data using industry standard tools: e.g., Five Whys, Fish bone diagram, Workflow diagram, Pareto chart, and ANOVA statistics.
3	Explain the principles of Industry 4.0, and analyse production and/or SCADA data using a range of Statistical and Data Analytics methods.

Assessment

Indicative Assessment Tasks:

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Assessment One: A time constrained examination covering all learning outcomes. Analytical and descriptive problem-based questions proposed, the student will not have the choice in the questions to be answered to fully assess the whole learning outcomes. Assessment one is a written examination (3 hrs.) and represents 100% of the overall module mark.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1-3	Examination	100%

Derogations

A derogation from regulations has been approved for this programme which means that whilst the pass mark is 50% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 40%.

Learning and Teaching Strategies

A series of workshop style lectures with student-led seminars and small group activities. Directed learning using library and internet resources will be facilitated using Moodle and MS Teams. This module will also follow the ALF (Active Learning Framework) guidelines, which

will include alternative methods of assessment and a blended approach to delivery, with some theory and software sessions being delivered online (depending on requirements and student experience).

Indicative Syllabus Outline

- Standard project management tools: Gantt Charts, Milestones, the Critical Path, Risk Review and Mitigation planning, Quality Management, and Failure Modes and Effects Analysis.
- "The Toyota Way" and "Lean Six Sigma" and processes to be seen in a manufacturing or production plant.
- Process Improvement plan, the principles of DMAIC, industry standard tools: e.g., Five Whys, Fish bone diagram, Workflow diagram, Pareto chart, and ANOVA statistics.
- Logistics in the production environment: process or raw material requirements, location and timing within a process, and process change strategies.
- Industry 4.0, the use of production process monitoring e.g., Industrial Internet of Things (IoT) and Supervisory Control and Data Acquisition (SCADA) technology.
- Statistical and Data Analytics methods for the analysis of production and/or SCADA data. Constructing models in software (using for example: MATLAB, R, Python, SPSS, or Excel). The difference between production process stability and capability.

Indicative Bibliography:

Essential Reads

M. George, *The LEAN Six Sigma Pocket Toolbook.* New York: McGraw-Hill, 2004.

Other indicative reading

N. Patel*, Practical Project Management for Engineers.* Boston: Artech House, 2019.

C. Gygi, *Lean Six Sigma – Quick Study.* BarCharts Inc, 2016.

J.K. Liker, *The Toyota Way: 14 management principles form the world's greatest manufacturer.* New York: McGraw-Hill, 2004.

K. Schwab, *The fourth industrial revolution.* 4th ed. UK: Portfolio Penguin,2017.

D. Bailey, *Practical SCADA for industry.* Oxford: Elsevier Science & Technology, 2003.

D. Cowen, *The deadly life of logistics: mapping violence in global trade.* Minneapolis: University of Minnesota Press, 2014.

Plus, various others to be signposted on Moodle.

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the

content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas.

Core Attributes
Engaged
Creative
Ethical

Key Attitudes
Commitment
Curiosity
Resilience
Confidence
Adaptability

Practical Skillsets
Digital Fluency
Organisation
Critical Thinking
Emotional Intelligence
Communication