Module specification

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Refer to the module guidance notes for completion of each section of the specification.

Module code	ENG6AH
Module title	Maintenance and Safety Systems
Level	6
Credit value	20
Faculty	FAST
Module Leader	Dr Ling Sun
HECoS Code	100188
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Mechatronics Engineering	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	60 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	**0** hrs
Placement / work based learning	0 hrs
Guided independent study	140 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	24/09/2020
With effect from date	24/09/2020
Date and details of revision	
Version number	1

Module aims

Upon completion of the module, students should be able to analyse existing plant, operations and maintenance procedures and produce a critical appraisal of the system in respect to efficiency, inherent safety, environmental considerations (including carbon footprint), and controllability. Also the student should acquire the ability to develop the design of plant equipment and associated maintenance strategies for given process requirements.

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

1	Analyse data relating to throughput/production and determine factors effecting efficiency.
2	Scrutinise associated performance and safety standards of a plant asset in its normal operating environment, whilst considering the impact on the overall system and safety should failure occur. (may include IEC 61508, IEC 61511 and relevant HSE guidelines).
3	Evaluate a number of plant monitoring technologies in the context of improving reliability.
4	Through analysis and reasoning be able to justify a particular maintenance methodology for a given set of circumstances.

Assessment

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.

Indicative Assessment Tasks:

Case studies and assignments totalling 100%. A typical assignment may be; devise methodologies to collect and assimilate data relating to plant/device failure over a period of time information required would include; device, make, model, location normal operating parameters, parameters at time of failure, symptoms of failure, effects on process, down time whilst failed and repaired, failure mode and classification, estimated costs (not just components). Upon completion of the data collection period the student should analyse the data and draw conclusions and recommendations relating to the rate of failure and current maintenance strategies. The student would hand in a series of tables (data) and a report explaining the reasoning and purpose behind the type of data collected and table construction, a thorough analysis of the information along with conclusions.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 2, 3, 4	Portfolio	100%

Derogations

A derogation from regulations has been approved for this programme which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

Learning and Teaching Strategies

Presentation will be through a series of lectures, tutorials, visits to local industries, and assignments using suitable computer packages where appropriate. Case Studies will be used to promote student's research and investigative skills. Identifying critical aspects of system and analysing good/weak aspects of system design Problem Based Learning – Part of this module will be dedicated to PBL. The problem will be based upon certain aspects of a system design, whereby the students, in small groups, will provide a solution to a design problem. This learning process will be facilitated by the module leader.

Indicative Syllabus Outline

Examine the structure, management and operational implications of a number of maintenance strategies, such as; preventative, predictive, reactive and reliability centred maintenance (RCM)

Complete case studies of failure rates, failure modes, circumstances and conditions, symptoms of failure prior to and after the event, impact on the plant/process.

Investigate system risk tolerance and produce probabilistic and quantitative system risk assessments, apply an analysis of risks with respect to IEC 61508, IEC 61511 and relevant HSE guidelines.

Damage limitation and redundant systems, to include an analysis on the effects of system/component redundancy on the overall reliability, maintainability, robustness environmental issues and economics of the process.

Assess methods of engineering condition monitoring in terms of theory, practice and implementation when applied to a number of given scenarios. To include evaluations of intrusive and non-intrusive methods such as; thermometry, vibration analysis, fibre-scope, endoscope, radiography, fluorescent penetrant, potentiometric titration, UV and IR Spectroscopy, flux density for air gap eccentricity, automatic analysis of diagnostic and historical data.

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads

Kelly, A. (2006) Maintenance Systems and Documentation; Butterworth-Heinemann.

Other indicative reading

Narayan, V. (2004) Risk and Reliability Strategies for Optimizing Performance; Industrial Press Inc.,U.S.Mobley, R.K. (2004) Maintenance Fundamentals of Plant Engineering, Butterworth- Heinemann.

Helmus, F (2008) Process Plant Design; Wiley VCH

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. Click here to read more about the Glyndwr Graduate attributes

Core Attributes
Enterprising
Ethical

Key Attitudes
Adaptability

Practical Skillsets
Organisation
Communication