Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	ENG6AH
Module Title	Maintenance and Safety Systems
Level	6
Credit value	20
Faculty	FACE
HECoS Code	100188
Cost Code	GAME
Pre-requisite module	None

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
BEng (Hons) Mechatronics Engineering	Optional

Breakdown of module hours

Learning and teaching hours	60 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	0 hrs
Project supervision hours	0 hrs
Active learning and teaching hours total	**0** hrs
Placement hours	0 hrs
Guided independent study hours	140 hrs
Module duration (Total hours)	200 hrs

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	Critically 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	Critically 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

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.

A portfolio to cover all learning outcomes. 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	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1, 2, 3, 4	Portfolio	4500	100%	

Derogations

None

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.

Welsh Elements

Programme is delivered in English and Chinese, however students can submit assessments in Welsh.

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

Administrative Information

For office use only	
Initial approval date	24/09/2020
With effect from date	24/09/2020
Date and details of revision	22/07/2025 re-validated, LO's 1 and 3 reworded not changed, updated template, derogation removed
Version number	2