WM9G9-15 System Reliability and Diagnosis

27/28

Department
WMG
Level
Taught Postgraduate Level
Module leader
Jane Marshall
Credit value
15
Module duration
3 weeks
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

The module will investigate the way in which quality and reliability techniques can be used to improve the quality of manufacture. Conventional techniques associated with quality, reliability and maintenance will be introduced and used to quantify and diagnose common issues. Digital tools to aid quality, reliability and maintenance will also covered in the module. The role of embedded intelligence to capture, process and share factory events and the role of data analysis in supporting this will be introduced through class-based exploratory exercises.
When this module is delivered overseas, it is delivered in a 2-week block rather than over 4 weeks.

Module aims

To provide students with the means to evaluate technological risks associated with building and maintaining conventional and cyber-manufacturing systems and propose means to mitigate such risk to create high quality, reliable and available systems

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.

Quality Techniques for assessing process performance;
Six-Sigma;
Failure Mode Effect and Criticality Analysis, Fault Tree Analysis
Lifetime data analysis
Maintenance methods
Asset Management
All above in context of Industry 4.0 , cyber-manufacturing risk and digital technology

Learning outcomes

By the end of the module, students should be able to:

- Examine the digital-specific risks associated with the use of digital-manufacturing to enhance system quality, reliability and availability
- Evaluate techniques and methods that affect system reliability, maintenance and operational performance
- Critically evaluate the application of data-analysis methods to aid manufacturing systems maintenance planning
- Appraise the application of quality tools for process capability and process control.

Indicative reading list

Reading lists can be found in Talis

Subject specific skills

Use quality techniques such as SPC and Six-Sigma to diagnose process performance and capability.
Analyse the potential sources and effect of faults in manufacturing processes.
Perform analysis of fault data using a relevant data-science technique.

Transferable skills

Dealing with complex issues both systematically and creatively, make sound judgements in the absence of complete data, and communicate conclusions clearly to specialist and non-specialist audiences.
Demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional or equivalent level.
Advance knowledge and understanding, by developing new technical skills.
Independent learning ability required for continuing professional development.

Study

Study time

Type	Required
Lectures	6 sessions of 1 hour (5%)
Seminars	24 sessions of 1 hour (20%)
Demonstrations	(0%)
Practical classes	(0%)
Supervised practical classes	(0%)
Online learning (scheduled sessions)	(0%)
Online learning (independent)	20 sessions of 1 hour (16%)
Private study	12 hours (10%)
Assessment	60 hours (49%)
Total	122 hours

Private study description

Reviewing moodle material and reading list.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A2

	Weighting	Study time	Eligible for self-certification
Assessment component			
Identify and review cyber-specific technology solutions with respect to a given case study	30%	18 hours	Yes (extension)

Identify the causes of an incident from a case study and categorise faults relating to quality, reliability and maintenance issues. Highlight and justify relevant tools to avoid these causes. Research and discuss technological solutions that would help to prevent such causes.

	Weighting	Study time	Eligible for self-certification
Reassessment component			
Identify and review cyber-specific technology solutions			No

research and discuss digital technological solutions that can enhance the system availability and identify associated risks.

Assessment component			
Essay and problem	70%	42 hours	Yes (extension)

The question will be split into a problem and a critical review. The problem will focus on lifetime data analysis by fitting data to an appropriate distribution and interpreting the results with respect to the bath-tub curve and the context of the question. The subsequent question will focus on creating a plan by critically reviewing key tools and asset management within a specific context to ensure system availability. This will include reviewing how technological solutions could be introduced to enhance system reliability and diagnostics.

Reassessment component			
Essay and problem			No

The question will be split into a problem and a critical review. The problem will focus on lifetime data analysis by fitting data to an appropriate distribution and interpreting the results with respect to the bath-tub curve and the context of the question. The subsequent question will focus on creating a plan by critically reviewing key tools and asset management within a specific context to ensure system availability. This will include reviewing how technological solutions could be introduced to enhance system reliability and diagnostics.

Feedback on assessment

both assignments will have written feedback linked to learning outcomes.

Availability

There is currently no information about the courses for which this module is core or optional.