

ENGI08038 Reliability & Maintenance (Part-time)

Full Title	Reliability & Maintenance (Part-time)		
Status	Uploaded to Banner	Start Term	2020
NFQ Level	08	ECTS Credits	05
Module Code	ENGI08038	Duration	18 weeks - (18 Weeks)
Grading Mode	Numeric	Department	Mechanical & Industrial Eng
Module Author	Martin Conneely		

Module Description

Learners will become familiar with:

- Statistical overview.
- Reliability and redundancy.
- Maintenance Theory.


The learner will be able to understand and use the following analysis techniques:

- Reliability Block Diagrams.
- Weibull analysis.
- Failure Mode Effects and Critical Analysis.
- Fault Tree Analysis.

The learner will comprehend the differences between the following maintenance systems:

- Predictive Maintenance
- Total Productive Maintenance
- Preventative Maintenance.
- Reliability Centred Maintenance

Total Productive Maintenance.

Learning Outcomes	
	<i>On completion of this module the learner will/should be able to:</i>
1.	Appraise maintenance management strategies including Preventative, Predictive, Reliability Centred and Total Productive Maintenance
2.	Evaluate statistical models to calculate reliabilities.
3.	Predict the reliability of systems using Reliability Block Diagrams for constant failure rates and the use of Weibull plotting to assess failure rate changes.
4.	Select and report on appropriate strategies for safety management, risk management and systems and product design.
5.	Support a maintenance management team in a useful and constructive role.
6.	Establish and measure maintenance costs.

Indicative Syllabus

- Course overview and assessment criteria
- Introduction; concepts terms and definitions.
- The history of reliability and maintenance development over the past 100 years
 - Preventative Maintenance
 - Predictive Maintenance
 - Reliability Centred Maintenance
 - Total Productive Maintenance
- Statistical review, Confidence intervals and Hypothesis testing
- The reliability function, MTTF, failure rate function and CDF. The Bathtub curve

- Constant failure rate models and RBDs.
- Reliabilities of systems including redundancies, MOON and stand-by systems
- Time Dependant failure models. Weibull distribution and plotting.
- Design for reliability. Failure analysis. System safety and Fault tree analysis.
- Breakdown, planned and preventive maintenance techniques including TPM
- Maintainability. Analysis of downtime. System repair times. Reliability under preventive maintenance. FMEA and FMECA.
- Reliability testing, product liability and warranties
- Assessment of costs of maintenance and reliability
- Performance measurements.
- Reliability of energy systems and energy monitoring systems

Teaching and Learning Strategy

The module requires 1 hour per week online and 2 hours practical/laboratory work in a computer laboratory

The teaching and learning strategy will include: online delivery; activity-based strategy (including practice); cooperative strategy (including group work); ICT-based strategy (including the use of a virtual learning environment: Moodle and specific software); independent learning strategy (including homework and independent study); thinking-skills strategy (including problem solving, graphing).

Assessment Strategy

The module is assessed as follows; 30% of the overall mark is assigned to continuous assessment and 70% for a terminal exam.

Final Exam: 70%

The module's theoretical concepts, statistical models and reliability tools will be assessed by terminal examination. The exam paper will comprise of 6 questions to do 4. All questions will carry equal marks.

Continuous Assessment: 30%

The lab-based activities will include statistical models to calculate reliabilities, reliability block diagrams and the use of Weibull plotting to assess failures. A written continuous assessment will be completed to assess this work.

A maintenance written report in conjunction with a presentation report will be used to appraise maintenance theory. Both of these reports will be uploaded to Moodle.

Repeat Assessment Strategies

Students who fail the module can repeat the final exam in autumn.

Indicative Coursework and Continuous Assessment:		30 %		
Form	Title	Percent	Week (Indicative)	Learning Outcomes
Assessment	Class Assessment	10 %	Week 18	2,3
Group Project	Written Report	10 %	Week 25	1,4
Practical Evaluation	Assessment	10 %	Week 22	2,3,6

End of Semester / Year Formal Exam:		70 %		
Form	Title	Percent	Week (Indicative)	Learning Outcomes
Closed Book Exam	Final Exam End of semester exam	70 %	End of Term	1,2,3,4,5,6

Blended Delivery Mode Average Weekly Workload:			3.00 Hours		
Type	Description	Location	Hours	Frequency	Weekly Avg
Online Learning	Online Delivery	Not Specified	1	Weekly	1.00
Practical	Practical	Computer Laboratory	2	Weekly	2.00

Recommended Reading Book List

O'Connor, P., (2011). *Practical Reliability Engineering*. Wiley.

Ebeling, E., (2009). *An Introduction to Reliability and Maintainability Engineering*. Waveland Pr Inc.
ISBN 1577666259 ISBN-13 9781577666257

Online Resources

www.artesis.com

www.predictivemaintenance.ie

www.eastwaytech.ie

<http://www.ebme.co.uk/arts/rcm/>

http://www-pub.iaea.org/MTCD/publications/PDF/te_1590_web.pdf

<http://www.mutualconsultants.co.uk/rcm.html>

[http://www.usa.skanska.com/Global/MissionCritical/Press Releases/MCM RCM A New Approach.pdf](http://www.usa.skanska.com/Global/MissionCritical/Press%20Releases/MCM%20RCM%20A%20New%20Approach.pdf)

Other Resources

Lecturers Moodle Page

Additional Information

None

Programme Membership

GA_EINDG_H08 202000 Bachelor of Engineering (Honours) in Industrial Engineering