Course Outline (Higher Education)

School: School of Engineering, Information Technology and Physical Sciences

Course Title: QUANTITATIVE TECHNIQUES FOR ASSET MANAGEMENT

Course ID: MREGC5005

Credit Points: 15.00

Prerequisite(s): Nil

Co-requisite(s): Nil

Exclusion(s): (MREGC5101)

ASCED: 039999

Description of the Course :

This course covers quantitative techniques and tools applied to asset management and risk based asset management decisions. This course includes core topics of engineering systems, system diagrams, quantitative risk analysis techniques and reliability analysis methods (system and reliability block diagrams and hazard rate analysis for systems and components and active, parallel / standby redundancy). It also covers reliability statistics (Weibull analysis, reliability growth analysis, repairable and non-repairable systems) and maintenance optimisation models (replacement, inspections, maintenance resources requirement).

Grade Scheme: Graded (HD, D, C, etc.)

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the course but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

Program Level:

Level of course in Program	AQF Level of Program					
	5	6	7	8	9	10
Introductory						
Intermediate					✔	
Advanced						

Learning Outcomes:

On successful completion of the course the students are expected to be able to:

Knowledge:

K1. Interpret systems drawing, quantitative risk analysis, event trees and fault tree analysis.

K2. Detailed and critical explanations of reliability analysis methods including system diagram, reliability block diagram, hazard rates at system & component level, MooN system, active, parallel and stand-by redundancy.

K3. Provide comprehensive overviews of reliability related statistical processes.

K4. Classify and annotate maintenance decision models.

Skills:

S1. Analyse asset maintenance and asset performance data to conduct quantitative risk analyses.

S2. Develop models to analyse asset management options and recommend decisions based on maintenance optimisation techniques.

Application of knowledge and skills:

A1. Identify opportunities for improvement using reliability engineering techniques and analysing maintenance and asset performance data.

A2. Construct models and apply reliability engineering and statistical techniques to optimise maintenance decisions.

Course Content:

This course covers engineering systems, system diagrams, quantitative risk analysis techniques and reliability analysis methods (system and reliability block diagrams and hazard rate analysis for systems and components and active, parallel / standby redundancy).

Topics may include:

- Engineering Systems and Quantifiable Risk Analysis.
- Reliability Analysis for components and systems.
- Failure data and statistical analysis for reliability.
- Maintenance Optimisation Models.

Values:

V1. Be confident in applying quantitative techniques in making risk based asset management decisions.

V2. Be competent as asset management professional in quantitative analysis of maintenance needs of engineering assets.

Graduate Attributes

The Federation University FedUni graduate attributes (GA) are entrenched in the Higher Education Graduate Attributes Policy (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes**

and assessment for each FedUni course, and all attributes must be directly assessed in each program

Graduate attribute and descriptor		**Development and acquisition of GAs in the course**			
		Learning Outcomes (KSA)	**Code** A. Direct B. Indirect N/A Not addressed	**Assessment task (AT#)**	**Code** A. Certain B. Likely C. Possible N/A Not likely
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1, K2, K3,K4 S1, S2 A1, A2	A	AT1-AT2	A
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	K1, K2, K3, K4, S1, A1	B	AT1-AT2	B
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	K1, K2, S1, A1	B	AT2	C
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K1, K2, K3, K4, S1, S2, A1, A2	A	AT1-AT2	A
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	K1, K2, K3, K4, S2, A2	B	AT2	C

Learning Task and Assessment:

This 15 CP online course at postgraduate level requires a minimum time commitment of 150 hours of study. Assessments need to be submitted online in assessment submission area allocated for each assessment.

Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
K1-K2-K3-K4-S1-S2-A1-A2	Analysis and report of faults using failure data.	Analysis and report	10% - 30%
K1-K2-K3-S1-S2-A1-A2	Analysis of failure data for life prediction and improve reliability.	Analysis and report	20% - 40%
K1-K2-K3-k4-S1-S2-A1-A2	Examination or online test	Examination or online test	60% - 40%

Adopted Reference Style:

Other (IEEE)