

Unit Outline (Higher Education)

Institute / School:	Institute of Innovation, Science & Sustainability
Unit Title:	Basic Quantitative Skills for Reliability Engineering
Unit ID:	MREGC5101
Credit Points:	15.00
Prerequisite(s):	Nil
Co-requisite(s):	Nil
Exclusion(s):	Nil
ASCED:	030799

Description of the Unit:

This unit provides an introduction to reliability mathematics for a conceptual and quantitative understanding of reliability theories. It covers reliability data analysis using distributions such as Weibull analysis, Mean time to failures, Mean time between failures, Mean time to repair and their impacts on reliability, availability and maintainability. Topics will also include the analysis of failure data for reliability assessment and improvement, introduction to reliability software packages and its applications in reliability engineering for asset management and maintenance decisions. This is an important foundational unit for students interested in practicing reliability engineering.

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Work Experience:

No work experience

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment.

Course Level:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Learning Outcomes:

Knowledge:

- K1.** Associate various mathematical concepts to calculation techniques for reliability problems.
- K2.** Distinguish where computer software can be used for studying problems in reliability.
- K3.** Outline the study of mathematical techniques for preventive replacement analysis.

Skills:

- S1.** Analyse reliability data, including burn-in, random and wear out failures, and how to take into account those items which have not failed.
- S2.** Estimate key parameters such as Mean Time Between Failures (MTBF) and the estimation of confidence limits.
- S3.** Determine preventive replacement policy.
- S4.** Evaluate reliability, availability and maintainability intervention options.

Application of knowledge and skills:

- A1.** Select and apply appropriate quantitative tools for analysing reliability problems.
- A2.** Evaluate the tools and techniques available for analysing failure data in reducing downtimes.
- A3.** Decide on interventions using underlying principles for maintenance planning and risk based decision-making.

Unit Content:

This unit covers failure data analysis for reliability, availability and maintainability.

Introduction to Reliability Statistics.

Weibull Analysis and computer based models.

Random Failures and confidence Limits.

Preventive replacements and financial analysis of capital equipment.

Reliability, maintainability, availability and repair pools.

FEDTASKS

Federation University Federation recognises that students require key transferable employability skills to prepare them for their future workplace and society. FEDTASKS (**T**ransferable **A**tttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are embedded within curriculum, developed gradually towards successful measures and interlinked with cross-discipline and Co-operative Learning opportunities. *One or more FEDTASK, transferable Attributes, Skills or Knowledge must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all must be directly assessed in each Course.*

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 1 Interpersonal	Students will demonstrate high-level skills to effectively communicate, interact and work with others both individually and in groups Students will be required to display (in person and/or online) high-level skills in-person and/or online in: <ul style="list-style-type: none"> • Effective verbal and non-verbal communication via a range of synchronous and asynchronous methods • Active listening for meaning and influencing • High-level empathy for others • Negotiating and demonstrating extended conflict resolution skills • Working respectfully in cross-cultural and diverse teams 	Not applicable	Not applicable
FEDTASK 2 Leadership	Students will demonstrate the ability to apply leadership skills and behaviours Students will be required to display skills in: <ul style="list-style-type: none"> • Creating, contributing to, and enabling collegial environments • Showing self-awareness and the ability to self-reflect for personal growth • Inspiring and enabling others • Making informed and evidence-based decisions through consultation with others • Displaying initiative and ability to solve problems 	Not applicable	Not applicable
FEDTASK 3 Critical Thinking and Creativity	Students will demonstrate an ability to work in complex and ambiguous environments, using their imagination to create new ideas Students will be required to display skills in: <ul style="list-style-type: none"> • Reflecting critically on complex problems • Synthesising, evaluating ideas, concepts and information • Proposing alternative perspectives to refine ideas • Challenging conventional thinking to clarify concepts through deep inquiry • Proposing creative solutions in problem solving 	Not applicable	Not applicable
FEDTASK 4 Digital Literacy	Students will demonstrate the ability to work proficiently across a range of tools, platforms and applications to achieve a range of tasks Students will be required to display high-level skills in: <ul style="list-style-type: none"> • Finding, accessing, collating, evaluating, managing, curating, organising and appropriately and securely sharing complex digital information at a high-level • Receiving and responding to messages in a range of digital media • Using digital tools appropriately to conduct research • Contributing proficiently to digital teams and working groups • Participating in and utilising digital learning opportunities 	Not applicable	Not applicable
FEDTASK 5 Sustainable and Ethical Mindset	Students will demonstrate the ability to think ethically and sustainably. Students will be required to display skills in: <ul style="list-style-type: none"> • The responsible conduct of research • Making informed judgments that consider the impact of devising solutions in multiple global economic environmental and societal contexts • Demonstrating commitment to social responsibility as a professional and a citizen • Generating research solutions which are sustainable, ethical, socially responsible and/or sustainable • Extending lifelong, life-wide and life-deep learning to be open to diverse others • Demonstrate extended actions to foster sustainability in their professional and personal life. 	Not applicable	Not applicable

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, K3, S1, S2, S3, S4, A1, A2, A3	Analysis of failure data and report on preventive replacement policies.	Analysis and report.	10% - 40%
K1, S4, A1, A2, A3	Analysis of financial aspects and report on replacements of capital equipment.	Analysis and report.	10% - 40%
K1, K2, K3, S1, S2, S3, S4, A1, A2, A3	Examination or online test	Examination or online test.	60% - 40%

Adopted Reference Style:

Other (IEEE)

Refer to the [library website](#) for more information

Fed Cite - [referencing tool](#)