Stellenbosch University Faculty of Engineering

Module Framework

This document should be read with the following documents:

- ***Stellenbosch University Calendar Parts 1 and 11.***
- ***Faculty of Engineering Assessment Rules[1]***
- ***Faculty of Engineering General Stipulations for Undergraduate Modules[1]***

Quality Management **59471-444** 2025	**Lecturers:** Prof Imke de Kock (Pr.Eng), Room 5011, imkedk@sun.ac.za Dr Wyhan Jooste (Pr.Eng), Room 5019, wyhan@sun.ac.za **Interne moderator:** Mr Meelan Roopa, Room 5010, meelanroopa@sun.ac.za	Approved by Programme Coordinator: JL Jooste Pr.Eng Date: 17 Jul 2025

1 Assessment Details

- Major assessment dates and venues are provided at firga.sun.ac.za and my.sun.ac.za
- Method of assessment as indicated in the Calendar Part 11

Calculation of final marks (according to formulas in the Faculty of Engineering's Assessment Rules): [1]

W_{AF} = 15%; w_{A1} = 35%; w_{A2} = 50%

AF = 0.15(Quizzes Average) + 0.85(Tutorial Average)

[Each quiz and tutorial will contribute the same weight to the 15% and 85% respectively. The lowest mark of the tutorials will be excluded from the calculation.]

Assessment format:

- Major assessments (A1, A2 and A3) will be invigilated sit-down examinations
- Quizzes contributing to AF will be online.
- Tutorial format and, where applicable, group allocations will be provided on SUNLearn at least a week in advance.
- Question papers for this module will be provided in English. Question papers for major assessments (A1, A2, A3) will be provided in Afrikaans too, if students timeously request the Afrikaans papers by the end of the third week of the semester, by e-mail to the lecturer offering the module. The following pedagogical and human resource considerations informed this language implementation decision: (a) students should develop technical competency in academic English as a professional graduate attribute (b) external moderation is a requirement for this module, and (c) not all lecturers are sufficiently proficient in Afrikaans to set final year question papers in Afrikaans.

2 Notional Hours

- You should spend 10 notional hours per credit on this module over the course of the semester.
- It is envisaged that these hours will be allocated as follows:

Activity	**Contact Hours**	**Self-study Hours**
Lectures	24 lectures x 0.83h (50 minutes each) = 20	26
Tutorials	36	33
Practicals	0	0
Assignments	0	0
Main assessments	5	30
Total (for this 15-credit module)	**150**	

[1] Available on SUNLearn for modules offered by Faculty of Engineering, in the block titled "General Programme Information" on the side of the screen

3 Language of Tuition

- The language of tuition in this module is according to the Faculty's approved Language Implementation Plan. Please refer to the website of the Engineering Faculty or the "General Information" block on SUNLearn for the particulars.

4 Module Objectives

Yearbook description: Definition of reliability and maintainability; reliability management; methods and techniques for reliability modelling, data analysis, prediction and maintainability assurance; quality management; methods and techniques for quality management; quality improvement; quality planning; quality control; leadership for quality management; cost of (poor) quality.

Aim: This module is aimed at enhancing industrial engineering students' understanding and knowledge of quality management and to develop the skills necessary to solve practical quality management problems with confidence. It will therefore be advantageous to study relevant reports and documentation outside the class environment and thus gain other insights into the real-world application of quality management.

A student who has successfully completed this module can:

- Comprehend the principles and best practices of quality management
- Comprehend the relationship between reliability engineering and quality management
- Model and interpret the reliability of systems
- Select appropriate lifetime models for analysing non-repairable and repairable systems
- Analysis the residual life of non-repairable and repairable systems
- Comprehend the various perspectives of the meaning of quality
- Comprehend the differences and relationships between quality improvement, quality planning and quality control, and understand when to use which approach
- Use structured approaches to quality management
- Understand and interpret the cost of quality and the cost of poor quality
- Understand the use of designed experiments

Prior knowledge required:

- This module has one prerequisite module, namely Engineering Statistics 314. More information on the nature of the corequisite requirement is given in the Faculty's Calendar (Part 11 of the SU Calendar).
- The BEng (Industrial) programme has seven specialist study components, namely Operations Management, Manufacturing, Human Factors, Finance, Operations Research, Information Technology, and Data Science. Quality Management forms part of the Operations Management specialist group.

Proceeding applications:

- Quality Management 444 contributes towards the development of proficiency in:
    - GA4 (Investigations, experiments and data analysis) – Students do reliability modelling, fault tree analysis, and failure mode analysis.
    - GA5 (Engineering methods, skills and tools, including Information Technology) -- Students study quality management, 6-sigma and quality audits.
- GA4 is formally assessed in the module Quality Assurance 344, while GA5 is formally assessed in Industrial Project 498.

5 Module Content and Schedule

Module Material:
[1] Jooste, JL, 2024. Quality Management 444 Lecture Notes: Reliability Engineering. Stellenbosch University
[2] Defeo, JA. 2017. Juran's Quality Handbook: The Complete Guide to Performance Excellence, Seventh Edition. McGraw Hill

Date (Mon - Fri)	Week	Lecture Date	Lecture number	Time from	Time to	Content	Reference	Lecture / Assignment / Test / Tutorial	ECSA Knowledge Area Covered
21 – 25 July	1	24 July	1	11:00	13:00	Introduction to Quality Management, Reliability Engineering and -Methods	[1]	Lecture	Engineering Science
			2	14:00	17:00	Reliability Methods		Tutorial 1: Group Presentation & Quiz 1 (Week 1)	
28 July – 1 August	2	31 July	3	11:00	13:00	Reliability Modelling and Component Importance		Lecture	Engineering Science
			4	14:00	17:00	Reliability Methods, Modelling and Component Importance		Tutorial 2: Group Presentation & Quiz 2 (Week 2)	
4 – 8 August	3	7 August	5	11:00	13:00	Data Analysis Modelling Approach and Non-Repairable Systems		Lecture	Engineering Science
			6	14:00	17:00	Analysing Non-Repairable Systems		Tutorial 3: Model Development	
11 - 15 August	4	14 August	7	11:00	13:00	Repairable Systems Analysis, Availability and Maintainability		Lecture	Engineering Science
			8	14:00	17:00	Analysing Repairable Systems		Tutorial 4: Model Development & Quiz 3 (Week 4)	
18 – 22 August	5	21 August	9	11:00	13:00	Introduction to Quality Management Chapter 1 & 25	[2]	Lecture	Complementary Studies
			10	14:00	17:00	Introduction to Quality Management Chapter 1 & 25		Tutorial 5 (Week 5)	
25 - 29 August	6	28 August	11	11:00	13:00	Chapter 5, 15 & 16		Lecture	Engineering Science
			12	14:00	17:00	Chapter 5, 15 & 16		Tutorial 6 (Week 6)	
30 August – 5 September	TEST WEEK								
6 - 14 September	RECESS								

Date (Mon - Fri)	Week	Lecture Date	Lecture number	Time from	Time to	Content	Reference	Lecture / Assignment / Test / Tutorial	ECSA Knowledge Area Covered
15 – 19 September	7	18 September	13	11:00	13:00	A1 Feedback	[2]	A1 Feedback	Chapter 4, 17 & 6: Engineering Science
			14	14:00	17:00	Chapter 4 & 17 Chapter 6		Tutorial 7 (Week 7)	
22 – 26 September	8	25 September	15	11:00	13:00	Chapter 4 & 17 Chapter 6		Lecture & Tutorial 7 presentations	Chapter 4, 17 & 6: Engineering Science Chapter 7 & 8: Complementary Studies
			16	14:00	17:00	Chapter 7 & 8		Lecture	
29 September – 3 October	9	2 October	17	11:00	13:00	Chapter 24		Lecture	Engineering Science
			18	14:00	17:00	Chapter 24		Tutorial 8 (Week 9)	
6 – 10 October	10	9 October	19	11:00	13:00	Chapter 20		Lecture	Engineering Science
			20	14:00	17:00	Chapter 20		Tutorial 9 (Week 10)	
13 – 17 October	11	16 October	21	11:00	13:00	All chapters		Q&A	Engineering Science & Complementary Studies
			22	14:00	17:00	All chapters		Tutorial 10 (Week 11)	
20 – 24 October	12	23 October	23	11:00	13:00	A2 & A3 brief	Q&A		Engineering Science & Complementary Studies
			24	14:00	17:00				
24 October	End of classes for fourth term								

6 ECSA Knowledge Area Credits

Mathematical Sciences	Natural Sciences	Engineering Sciences	Design and Synthesis	Complementary Studies
0	0	10 (66%)	0	5 (33%)
Engineering Science: Introduction to quality management and reliability engineering, reliability methods, analysing non-repairable and repairable systems, Chapters 4, 5, 6, 15, 16, 17, 20, 24 of textbook Complementary Studies: Chapters 1, 7, 8 and 25 of textbook				

7 ECSA Graduate Attributes

No ECSA Graduate Attributes will be assessed in this module.

8 Other Module Specific Information

8.1 Lecture format

(a) Lectures will be face to face in the classroom during the normal timetable times.

8.2 Format of quizzes and tutorials

(a) Tutorials will be provided one week ahead of the respective tutorial submission dates. Any special cases or deviation from the norm will be communicated to the class. Tutorials will be conducted in group format. Groups will be determined by the academic staff involved with this module and timeously communicated with students.

8.3 Tests and examinations

(a) This module is subject to the Assessment Rules of the Faculty of Engineering. The final performance mark comprises marks for semester work (AF) and two Assessments (A). Section 1 provides the weights for the semester mark and assessments.

(b) Refer to the Assessment Rules of the Faculty of Engineering for the formula and different permutations for calculating the final performance mark. There are various permutations for the calculation of the performance mark depending on whether students write A1, A2 or A3 and under what circumstances. Students should refer to the Assessment Rules of the Faculty of Engineering (available on the SUNLearn platform) for further details.

(c) Students are responsible for finding out the dates and times of all assessments on the official university timetable.

(d) Online quizzes (via the SUNLearn platform) and tutorials contribute towards a student's semester mark (AF). Section 1 provides the contribution and calculation of the quizzes and tutorials towards the semester mark. All quizzes and tutorials are compulsory. In alignment with the Assessment Rules of the Faculty of Engineering, for avoiding the requirement to submit medical certificates or proof of leave by the Registrar, the following apply to this module:

   i. A mark of 0 will be awarded in the cases when a student does not do a quiz or an tutorial and no excuses (whether for medical, sport or any other reason) will be considered.
   ii. Each student's lowest mark, for only the tutorials, will be omitted from the calculation of the semester mark.
   iii. All quizzes and tutorials will contribute to the semester mark (unless otherwise specified). Sufficient timeframes for completing the quizzes will be provided to allow for cases of medical, sport or any other leave of absence.

8.4 Plagiarism

"Plagiarism is the theft and use of the ideas, material and other intellectual property of others that are passed as one's own" is the formal definition of plagiarism at Stellenbosch University as published by the senate in 2010 in the formal policy document: "SUN policy on academic integrity: the prevention and handling of plagiarism". There will be a zero-tolerance policy on plagiarism of any kind in this course and suspicions of plagiarism will be dealt with strictly in accordance with the formal policy.

Students are reminded that plagiarism is considered to be a serious offense, which can have dire consequences for the person concerned, including suspension or expulsion from the University, besides possible criminal or civil action.

8.5 Use of AI-related Technologies

For this module:

- The responsible use of AI technologies is allowed with appropriate declarations*.

*Specific AI rules, where applicable, will be clearly communicated.

According to the draft interim SU guidelines on allowable AI use and academic integrity in assessment the following table can be used as guideline and to assess the impact of various forms of AI use on student learning.

AI use for	**This use is similar to**	**Be aware of**
Ideation phase of an assignment		
brainstorming ideas, i.e., a topic or approach.	Discussing the idea with a friend, tutor or lecturer	It might be a good idea to keep a record of the prompts you used and the outputs you received.
creating an outline or a plan	Google search or checking Wikipedia	It is your responsibility to critically engage with the output of the AI tool and check the accuracy of the output.
Drafting phase		
learning about a particular topic	Google search or checking Wikipedia	You need to (1) find the original owner of the idea and (2) ensure that all content is factually correct and not likely to harm anyone through spreading untruths or sharing personal information.
searching for literature on a topic	SU Library and database or a google scholar search.	Always check that references are real, suitably academic and include the key works. Include URLs of all references. Also check for similarity; some research tools offer near direct quotes without indicating it as such.
generating or drafting a coherent output, i.e. using AI to complete the assessment on your behalf	enlisting someone else to write your paper or complete your project for you.	Indicate how you interacted, i.e. improved the output. It should still be you own work. You should be able to answer detailed questions, i.e. why you chose a certain direction, referred to a certain author, drew a specific conclusion during an oral or interview? Using paraphrasing or translation software tools on texts you did not personally write or make a substantial input to, and did not reference, cover up plagiarism is deemed as academic misconduct.
Revising phase		
language editing	similar to using a spelling checker	Language enhancement tools are increasingly available in word processing software (such as MS Word) and tools such as Grammarly are also increasingly popular. Always save a draft of your original text as backup and remember to check the accuracy of the suggestions made by language editing software. Make sure that the authenticity of your text is not compromised.

AI use for	This use is similar to	Be aware of
Soliciting feedback	asking a friend or tutor or lecturer to read you work and offer you feedback.	You may be asked to provide evidence of your learning process, i.e. a copy of the feedback on how you responded to it. Remember that you are ultimately accountable for your work and that you should feel comfortable with the improvements you ultimately incorporate.
revising a piece of work	asking someone else to improve your work.	Ensure that the work is still your own, captures your voice and that you can defend it. Also check the accuracy of the output; AI revisions can introduce factual errors during paraphrasing.