



EASTERN MEDITERRANEAN UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING

Course Code: MENG424
Course Name: RELIABILITY ENGINEERING
Semester/ Year: Fall 2026-27
Instructor: Prof. Dr. Qasim Zeeshan
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Assessment: Project
Submission Date:

PROJECT: RELIABILITY ANALYSIS OF A SYSTEM

GROUP NO. :

STUDENT NO: NAME, SURNAME:

STUDENT NO: NAME, SURNAME:

STUDENT NO: NAME, SURNAME:

SECTIONS:

No.	STUDENT OUTCOMES	COURSE LEARNING OUTCOMES	WEIGHT OF SECTION /100	MARKS OBTAINED	REMARKS
S-0	1, 5, 7	5	10		
S-1	1, 5, 7	5	10		
S-2	1, 5, 7	5	50		
S-3	1, 5, 7	5	10		
S-4	1, 5, 7	5	10		
S-6	1, 5, 7	5	10		
TOTAL:(Out of 100)					

Course Learning Outcomes		Student Outcomes						
		1	2	3	4	5	6	7
1	Understand the fundamental concepts of reliability engineering	X						
2	Compute measures of reliability of products and systems	X						
3	Construct and analyze Reliability Block Diagrams	X						
4	Conduct Fault Tree Analysis	X						
5	Perform Failure Modes and Effects Analysis	X						
6	Probable causes and types of failure	X					X	
7	Recognition of the relevant standards, codes and regulations	X						X
8	Use the techniques and tools learned to solve practical engineering problems. Design	X	X				X	X
Weight of Student Outcomes		H	H				L	M

Instructions:

- Late submissions will be penalized with 10 marks/ day.
- Draw neat, labeled diagrams where necessary.
- Write relevant equations and write your Assumptions where necessary.
- Be clear and specific and include units. Give explanatory notes where necessary. Please carry out each step explicitly.
- Please provide the references using APA Style of Referencing.
- References should be from the Textbook or from an authentic source.
- Please include the equations, diagrams, plots and figures in the report.
- All figures and Tables must be numbered and captioned.
- Please submit the pdf Soft copy of the report via the MOODLE LMS/ Microsoft Assignment along with the MATLAB codes, Simulink. AVI File. Code/ Simulation etc.
- The file/ folder uploaded should be named as [MENG424-PROJECT-GROUP NO]. Files with any other name or format will be disregarded. Do not forget the cover page Files with any other name or format will be disregarded. Do not forget the cover page.

PROJECT: RELIABILITY ANALYSIS OF A SYSTEM

Abstract

SECTION.1 System Description

- **System Hierarchy.** Parts and components for each assembly and sub assembly
- **Classification of System into Mechanical, Electrical, and Software subsystems**
- **Product Life Cycle**
- **Quality function deployment (QFD) to identify and prioritize key design and process requirements.**
- **Normal Operation conditions**
 - Design loads (weight, voltage, pressure, etc.)
 - Environment (fatigue, creep, wear, corrosion, temp., humidity, vibration and shock, contaminants, etc.)
 - Operating (usage, storage, maintenance, shipment, etc.)
- **Probable Causes and Types of Failure during the Product Life Cycle**
- **Failure Data/ Failure Rate of Components and Systems**
- **Reliability Measures like MTTF/MTBF each component and Sub System**

SECTION.2 Reliability Analysis

- **Reliability Block Diagram (RBD)**
- **Fault Tree Analysis (FTA)/ Event Tree Analysis (ETA)**
- **Failure Mode and Effect Analysis (FMEA):**
Design FMEA/ System FMEA/ Process FMEA
Failure Mode(s) Identification, Failure Effect(s), Risk Quantification, and Risk Mitigation Approach(s)
- **Cause and Effect Diagram**
- **HAZOP, PoF, SWOT, SWIFT, Markov Analysis (if applicable)**
- **Reliability Testing Plan**
- **RAMS**
- **Design for Reliability**
Discussion on how to improve the reliability of the system?
Improved design, improved manufacturing processes, operations, maintenance & inspection plan

SECTION.3 Conclusion and Recommendations

- **Justification of selected Reliability Analysis approach**
- **Discussion on the Overall System Reliability Performance**

REFERENCES

- All references on APA Style Format and must also be cited in text in Author (Year) format.

APPENDICES

- A. Failure Data and Sources
- B. Product Catalogue Information of each component/ sub system
- C. List of Applicable Standards, Codes and Regulations (with Cost)
- D. List of Applied Standards, Codes and Regulations
- E. Simulation or Test Results

USE OF ARTIFICIAL INTELLIGENCE

Students are required to explicitly state the use of AI-generated text, data analysis, visuals, or other content in their report under the heading "Use of Artificial Intelligence", which should be placed immediately after the "References" section. This statement must clearly specify the AI tools used (e.g., ChatGPT, Midjourney, Gemini) and the purpose for which they were employed (e.g., generating preliminary text for a literature review, data analysis).

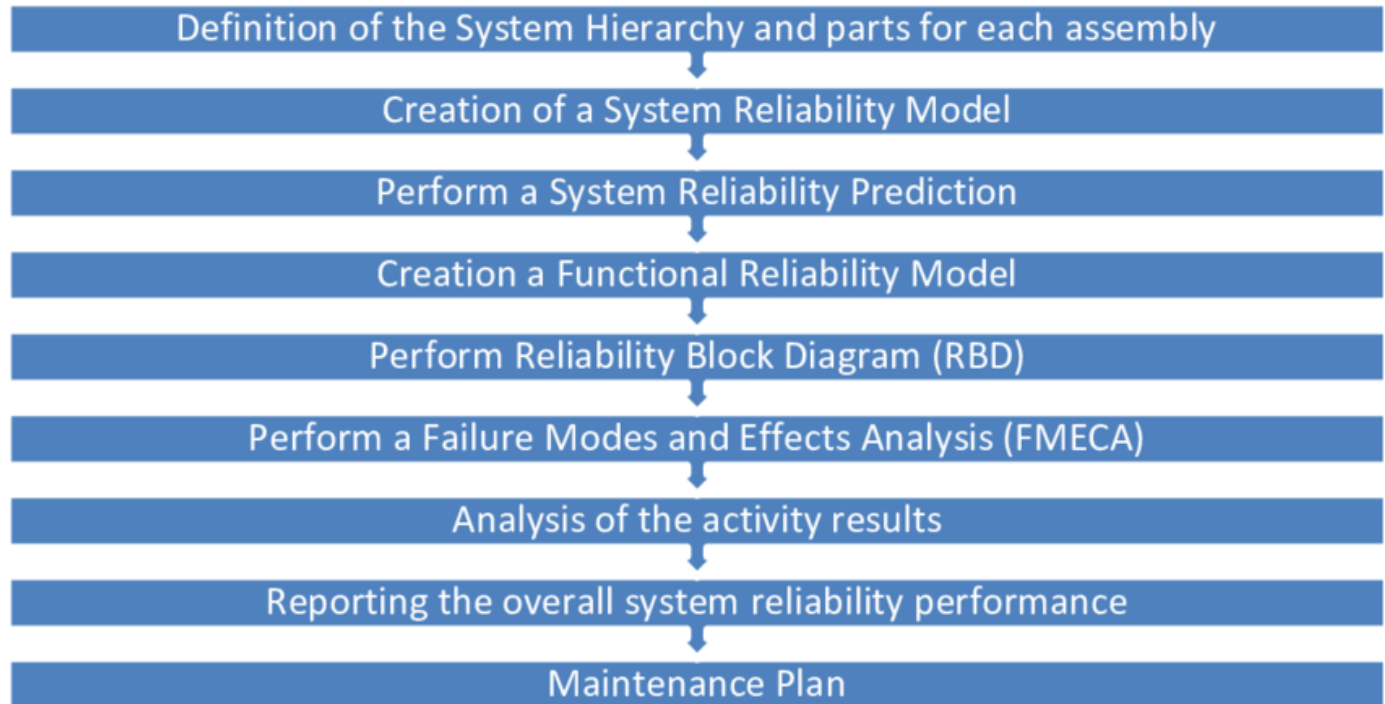
Example Statement: "In this study, [XYZ AI tool] was used for [purpose, e.g., generating preliminary text for a literature review]."

AI-generated content must not exceed 20% of the total word count of the report.

Log every meaningful AI interaction as you go, right after you have it — not at submission time. The seven rows below show a realistic example spanning the whole report; add your own rows as you work. With Section 2 worth half your grade, this is the log worth being most careful and specific in.

S. No.	AI Tool Used	Section	Section No.	Page No.	4D Competency	Purpose of Use
1	ChatGPT	Abstract / S-0	S-0	1	Delegation	Drafted an early abstract structure; final wording and all results are our own
2	Gemini	Sec. 1: System Description	1	3	Discernment	Verified an AI-suggested failure rate for a COTS component against the actual manufacturer datasheet
3	Claude	Sec. 2.1: RBD	2.1	9	Description	Asked AI to check our series/parallel RBD logic against our own system architecture, not generate it from scratch
4	ChatGPT	Sec. 2.2: FTA / FMEA	2.2	13	Discernment	Verified an AI-suggested failure mode in the FMEA actually applies to our specific component before including it
5	DeepSeek	Sec. 2.3: RAMS / DfR	2.3	17	Discernment	Checked that an AI-suggested reliability improvement recommendation was actually feasible within our constraints
6	ChatGPT	Sec. 3: Conclusion	3	20	Delegation	Drafted an initial structure for the conclusion; final judgments are our own
7	Gemini	Appendix C: Standards	—	23	Discernment	Verified an AI-suggested standard actually applied to our specific component before listing it as applicable
8						
9						
10						

Project Guidelines



Reliability analysis procedure

- Quality function deployment (QFD) to identify and prioritize key design and process requirements.
- Reliability modelling of the system and sub-systems using reliability block diagrams.
- Reliability predictions and apportionment for sub-systems and components, as appropriate.
- Failure analysis by failure mode, effect and criticality analysis (FMECA) and fault tree analysis (FTA).
- Testing, with the emphasis on HALT.
- Failure reporting, analysis and corrective action (FRACAS).
- Maintainability analysis and demonstration.
- System safety analysis by the application of hazard identification and hazard analysis techniques.
- RAMS reviews, in which compliance with RAMS tasks will be audited.
- Production quality assurance and improvement methods.