SYE6043: QUALITY AND RELIABILITY ENGINEERING

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Quality and Reliability Engineering

Subject Code
SYE - Systems Engineering
Course Number
6043

Academic Unit
Systems Engineering (SYE)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
P5, P6 - Postgraduate Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
SEEM6043 Quality and Reliability Engineering (offered until 2021/22) / ADSE6043 Quality and Reliability Engineering (offered until 2023/24)

Exclusive Courses
Nil

Part II Course Details

Abstract

The aim of this course is to provide students with a basic understanding of the approaches and techniques to assess and improve process and/or product quality and reliability. The objectives are to introduce the principles and techniques of Statistical Quality Control and their practical uses in product and/or process design and monitoring; and the basic concepts and techniques of modern reliability engineering tools.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Beware of some basic techniques for quality improvement, and fundamental knowledge of statistics and probability.	10	x	x	
2	Apply control charts to analyze and improve the process quality.	30	x	x	x
3	Design a simple sampling plan and its OC curve for effectiveness analysis.	20	x	x	
4	Acquire basic knowledge of reliability for the system reliability calculation and the model calculation.	20	x	x	
5	Acquire basic knowledge of the experimental design with emphasis to factorial design matrix and Taguchi loss function	20	x	x	

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Large Class Activities (Lecture / tutorial) Small Class Activities	To explain fundamentals of the course, and to present basic skill to solve example problems. To demonstrate advance skill for solving problems.	1, 2, 3, 4, 5	39 hours/ sem

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Course work	1, 2, 3, 4, 5	50	-	No

Continuous Assessment (%)
50

Examination (%)
50

Examination Duration (Hours)
2

Minimum Continuous Assessment Passing Requirement (%)
30

Minimum Examination Passing Requirement (%)
30

Assessment Rubrics (AR)

Assessment Task
Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
>=30%

Excellent
(A+, A, A-) High

Good
(B+, B, B-) Significant

Fair
(C+, C, C-) Moderate

Marginal
(D) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Course work (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
>=30%

Excellent
(A+, A, A-) High

Good
(B+, B, B-) Significant

Fair
(C+, C, C-) Moderate

Marginal

(D) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
>=30%

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Moderate/Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Course work (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
>=30%

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Moderate/Basic

Failure
(F) Not even reaching marginal levels

Additional Information for AR
Examination and course work will be numerically marked and grades awarded accordingly. Overall, the course work weights about 50% and examination weights about 50% of the total mark. The course work includes two assignments.

Part III Other Information

Keyword Syllabus
- Quality concepts and basic techniques for quality improvement;
- Basic statistics and probabilities for quality and reliability;

- Variable control chart;
- Process capability analysis;
- Attribute control chart;
- Acceptance sampling;
- System reliability and reliability model;
- Experimental design and analysis;
- Taguchi loss function and design

Reading List

Compulsory Readings

	Title
1	NIL

Additional Readings

	Title
1	Dale H. Besterfield, Quality Control, 8th edition, Prentice Hall, 2009
2	Lecture notes