

SYE8011: STATISTICAL MODELING AND DESIGN OF EXPERIMENTS

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Statistical Modeling and Design of Experiments

Subject Code

SYE - Systems Engineering

Course Number

8011

Academic Unit

Systems Engineering (SYE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

R8 - Research Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Knowledge in Basic Probability and Statistics

Equivalent Courses

SEEM8011 Statistical Modeling and Design of Experiments (offered until 2021/22)/ ADSE8011 Statistical Modeling and Design of Experiments (offered until 2023/24)

Exclusive Courses

Nil

Part II Course Details

Abstract

This course aims to develop students' abilities to understand the theory and application methods on statistical modeling of observational data and design of experiment data, including linear models, regression models, and analysis of variance models.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Develop a familiarity with basic statistical estimation and hypothesis testing ideas and methods	10	x	x	
2	Understand simple and multiple linear regression models and corresponding inference methods for process characterization and prediction.	30	x		
3	Understand motivations and needs for design of experiments in manufacturing and other applications.	10	x		
4	Understand design and analysis of experiments methods to characterize and improve systems and processes.	30	x		
5	Understand and apply regression methods and design of experiment methods to analyze and solve real life problems and applications.	20	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	Lecture	- large class activity - questions and discussion	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	Group Work	2, 3, 4, 5	40	-	No
2	Individual Coursework	1, 2, 4	25	-	No
3	Test	2, 3, 4	35	-	No

Continuous Assessment (%)

100

Examination (%)

0

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

0

Assessment Rubrics (AR)**Assessment Task**

Group Work (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Application of class materials and teamwork

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

Individual Coursework (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Application of class materials

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

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

Criterion

Understanding of class materials

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

Group Work (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Application of class materials and teamwork

Excellent

(A+, A, A-) Excellent

Good

(B+, B) Good

Marginal

(B-, C+, C) Marginal

Failure

(F) Failure

Assessment Task

Individual Coursework (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Application of class materials

Excellent

(A+, A, A-) Excellent

Good

(B+, B) Good

Marginal

(B-, C+, C) Marginal

Failure

(F) Failure

Assessment Task

Test (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Understanding of class materials

Excellent

(A+, A, A-) Excellent

Good

(B+, B) Good

Marginal

(B-, C+, C) Marginal

Failure

(F) Failure

Part III Other Information

Keyword Syllabus

- Statistical estimation and hypothesis testing
- Data collection, data analysis, and model prediction
- Regression modeling and analysis
- Design and analysis of Experiments
- Analysis of Variance modeling
- Process estimation and prediction
- Process characterization and improvement
- Robust design and parameter design

Reading List

Compulsory Readings

Title	
1	Applied Linear Statistical Models by Kutner, Nachtsheim, Neter, and Li, 5th edition, McGraw Hill
2	Lecture notes

Additional Readings

Title	
1	NIL