

SYE8202: SYSTEMS MODELLING AND ANALYSIS

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Systems Modelling and Analysis

Subject Code

SYE - Systems Engineering

Course Number

8202

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

Nil

Equivalent Courses

SEEM8202 Systems Modeling and Management (offered until 2021/22)

ADSE8202 Systems Modeling and Management (offered until 2023/24)

Exclusive Courses

Nil

Part II Course Details

Abstract

This course includes the introduction of: 1) simulation models and simulation studies; 2) simulation language (Arena); 3) statistical aspects including input analysis, random variate generation, output analysis, and variance reduction techniques; and 4) simulation optimization techniques.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Introduce the fundamental concepts and principles in system modelling and simulation.	20	x	x	
2	Introduce appropriate simulation language for modelling systems	30		x	x
3	Understand basic statistical aspects related to simulation modelling	30		x	x
4	Apply methodologies for improving the performance of stochastic systems	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	Learning through teaching is primarily based on lectures. Mini-lectures and tutorials will be used to facilitate understanding and applications of various concepts and methods.	1, 2, 3, 4	26 hrs/ semester
2	Tutorial Exercises	The homework exercises provide students with the opportunities to familiarize themselves with the methods learnt during the lectures.	1, 2, 3, 4	21 hrs/ semester

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Assignments Students are required to effectively apply knowledge and skills learned from the course in solving some simple practical problems.	1, 2, 3, 4	40	-	No

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Additional Information for ATsExam

Students will be assessed via the examination their understanding of concepts and mastering in skills of modelling and problems solving learned in class, textbooks and reading materials and their ability to apply subject-related knowledge.

Assessment Rubrics (AR)**Assessment Task**

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

Criterion

Students' ability to model the systems and systematically analyse them.

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

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

Criterion

It assesses students' ability to solve different types of simulation problems.

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

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

Criterion

Students' ability to model the systems and systematically analyse them.

Excellent

(A+, A, A-) Excellent

Good

(B+, B) Good

Marginal

(B-, C+, C) Marginal

Failure

(F) Failure

Assessment Task

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

Criterion

It assesses students' ability to solve different types of simulation problems.

Excellent

(A+, A, A-) Excellent

Good

(B+, B) Good

Marginal

(B-, C+, C) Marginal

Failure

(F) Failure

Part III Other Information

Keyword Syllabus

- Probability and Statistics
- Arena
- Random Number Generation
- Input Analysis
- Output Analysis
- Comparing Systems
- Variance Reduction

Reading List**Compulsory Readings**

Title	
1	Law, A. M., Simulation Modeling and Analysis, 5th edition, McGraw-Hill Education, New York, 2015.
2	Kelton, W. D., Sadowski, R. P., and Zupick, N. B., Simulation with Arena, 6th edition, McGraw-Hill, New York, 2015.

Additional Readings

Title	
1	NIL