SEEM3101: BASIC METHODOLOGIES AND TOOLS FOR RISK ENGINEERING

Effective Term
Summer Term 2023

Part I Course Overview

Course Title
Basic Methodologies and Tools for Risk Engineering

Subject Code
SEEM - Systems Engineering and Engineering Management
Course Number
3101

Academic Unit
Systems Engineering (SYE)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
MA2172 Applied Statistics for Sciences and Engineering or MA2177 Engineering Mathematics and Statistics

Precursors
Nil

Equivalent Courses
ADSE3101 Basic Methodologies and Tools for Risk Engineering

Exclusive Courses
Nil

Part II Course Details

Abstract

This course aims to introduce the basic principles, practices, methodologies and tools for analysing risk in a formal and scientific manner required for engineering applications.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the basic principles, methodologies and tools in risk engineering	20		x	
2	Select appropriate tools and methodologies for identifying and measuring risks in engineering problems	40			x
3	Apply quantitative methods for risk assessment of engineering problems	20		x	
4	Demonstrate reflective practice in an engineering context	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.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Large Class Activities	Delivery of the course will be achieved through a series of formal lectures supported by practical case studies. A series of lectures will introduce basic elements and importance of risk analysis.	1, 2, 3, 4	26 hours/semester
2	Laboratory activities	Mainly teach the students use of software tools for risk analysis.	1, 2, 3, 4	14 hours/semester

3	Mini-Project	A typical risk analysis task for engineering problem will be given to students to solve. The students are expected to work in teams to tackle the given problems. This learning activity will be mainly student-led but with some structural guidance from the teacher.	1, 2, 3, 4	10 hours/semester

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Mini-Project	1, 2, 3, 4	25	

Continuous Assessment (%)

25

Examination (%)

75

Examination Duration (Hours)

2

Assessment Rubrics (AR)

Assessment Task

Laboratory Reports

Criterion

-

Excellent (A+, A, A-)

-

Good (B+, B, B-)

-

Fair (C+, C, C-)

-

Marginal (D)

-

Failure (F)

-

Assessment Task

Mini-Project

Criterion

Project is completed in groups and is graded by the course leader.

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

Criterion
2-hour examination

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

Part III Other Information

Keyword Syllabus
Definition of risk and uncertainty; measures of risk
Steps in managing risk in engineering applications
Methods for risk identification and measurement: Failure mode, effects, and criticality analysis (FMECA), Hazard and operability study (HAZOP)
Quantitative methods for Risk Assessment: Event tree, Fault Tree Analysis (FTA), Probabilistic Risk Assessment

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Paul R. Garvey, Analytical Methods for Risk Management: A Systems Engineering Perspective, CRC Press, 978-1-58488-637-2.
2	Enrico Zio, An Introduction to the Basics of Reliability and Risk Analysis, World Scientific Publishing Co., ISBN978-981-270-639-3.
3	Terje Aven, Foundations of Risk Analysis: A Knowledge and Decision-oriented Perspective, John Wiley and Sons, ISBN 978-0-4714-9548-2.
4	Paul Hopkin, Fundamentals of Risk Management: Understanding, Evaluating and Implementing Effective Risk Management, Kogan Page Publishers, 978-0-7494-5942-0.
5	David Vose, Risk Analysis: A Quantitative Guide, John Wiley, 978-0-470-51284-5.