MNE3110: SAFETY ENGINEERING DESIGN

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Safety Engineering Design

Subject Code
MNE - Mechanical Engineering
Course Number
3110

Academic Unit
Mechanical Engineering (MNE)

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
MA2177 Engineering Mathematics and Statistics

Precursors
Nil

Equivalent Courses
MBE3110 Safety Engineering Design

Exclusive Courses
Nil

Additional Information
#Prerequisites which are not part of the Major Requirement are waived for students admitted with Advanced Standing.

Part II Course Details

Abstract

This course aims to provide an understanding and practical experience in applying the principles and concept of safety engineering to an engineering design. Students will choose a complex engineering system design, and apply the tools and techniques learnt from the various courses to evaluate the safety risk of the complex engineering system. Finally, the results obtained from the safety evaluation will be used to reduce the safety risk in the engineering system design.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the essential principles and concept of safety engineering.			x	
2	Apply the appropriate tools and techniques to analyse the safety risk of a complex engineering system.			x	
3	Modify a given design based on safety risk evaluation results.			x	x
4	Extend the knowledge and analytical skill to conduct level 1, 2 and 3 risk assessments for nuclear power systems.			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.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Delivery of the course will be achieved through a series of formal lectures supported by practical case studies.	1, 2, 3, 4	3hrs/week

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quizzes	1, 2, 3, 4	10	
2	Mini-project and Presentations	1, 2, 3, 4	30	A risk assessment task for a complex engineering system will be given to students as a mini-project. Students need to submit a report and 2-3 presentation files.

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

2

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

Assessment Rubrics (AR)

Assessment Task

1. Quizzes

Criterion

1.1 Ability to Apply the appropriate tools and techniques to analyse the safety risk of a complex engineering system.
1.2 Ability to Modify a given design based on safety risk evaluation results.
1.3 Ability to Extend the knowledge and analytical skill to conduct level 1, 2 and 3 risk assessments for nuclear power systems.

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

2. Mini-project and Presentations

Criterion

2.1 Ability to Apply the appropriate tools and techniques to analyse the safety risk of a complex engineering system.
2.2 Ability to Modify a given design based on safety risk evaluation results.
2.3 Ability to Extend the knowledge and analytical skill to conduct level 1, 2 and 3 risk assessments for nuclear power systems.

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

3. Examination

Criterion

3.1 Ability to Describe the essential principles and concept of safety engineering.
3.2 Ability to Apply the appropriate tools and techniques to analyse the safety risk of a complex engineering system.
3.3 Ability to Modify a given design based on safety risk evaluation results.
3.4 Ability to Extend the knowledge and analytical skill to conduct level 1, 2 and 3 risk assessments for nuclear power systems.

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

Additional Information for AR

Note: For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

Part III Other Information

Keyword Syllabus

- Understanding design diagrams, process flow.
- Based on engineering information, identify hazard and risks.
- Develop event sequence diagram.
- Identify initiating events postulate accident scenarios.
- Conduct level 1, 2 and 3 risk assessments to identify the individual risk of acute and latent fatality to public from releases of radionuclides.

Reading List

Compulsory Readings

	Title
1	Dan Petersen, Techniques of Safety Management: A Systems Approach, American Society of Safety Engineers, ISBN-10: 1885581203.

Additional Readings

	Title
1	Enrico Zio, An Introduction to the Basics of Reliability and Risk Analysis, World Scientific, ISBN-10: 9812706399.