

Liverpool John Moores University

Title: PROBABILISTIC SAFETY ASSESSMENT (PSA) IN NUCLEAR INDUSTRIES
Status: Definitive
Code: **7507RSKDL** (118768)
Version Start Date: 01-08-2019

Owning School/Faculty: Maritime and Mechanical Engineering
Teaching School/Faculty: Maritime and Mechanical Engineering

Team	Leader
Zaili Yang	Y

Academic Level: FHEQ7
Credit Value: 10
Total Delivered Hours: 16.5
Total Learning Hours: 100
Private Study: 83.5

Delivery Options

Course typically offered: Runs Twice - S1 & S2

Component	Contact Hours
Lecture	8
Online	.5
Tutorial	8

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Essay	Essay		55	
Technology	Tech		40	
Reflection	test&refl		5	

Aims

To enable students to understand and apply PSA techniques with particular relevance to the nuclear industry.

Learning Outcomes

After completing the module the student should be able to:

- 1 Critically review the legal and regulatory obligations placed on the owners of a nuclear plant to demonstrate that the risks posed to people and the environment by operation of their plant are both tolerable and "as low as reasonably practicable".
- 2 Demonstrate a thorough grounding in the theory and concepts that are embedded within PSA.
- 3 Deduce the PSA techniques appropriate to a real-life nuclear plant and hence evaluate the risks associated with the operation and design of that plant. The student should identify and critically examine any additional measures that may be required to ensure that the risks are both tolerable and ALARP.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Essay	2
Technological Task	3
Online test and Reflection	1

Outline Syllabus

Introduction to safety assessment in the nuclear industry

Safety Assessment, Guidelines and Principles

Reliability Theory and Concepts

System Reliability and Modelling (more detail in Availability, Reliability, Maintainability (ARM) Analysis module)

Fault and hazard identification, including:

- *Failure Modes and Effects Analysis*
- *Hazard and Operability Studies (HAZOP) (more detail in HAZOP module)*

Frequency analysis

- *Event Tree Analysis (more detail in Fault and Event Tree module)*
- *Fault Tree Analysis (more detail in Fault and Tree Event module)*

Supporting data, including:

- *Reliability data*
- *Dependent failures*
- *Human Factors*

Consequence analysis in the nuclear industry

Hazards PSA

Application of results, including ALARP demonstration

Learning Activities

A combination of slides and notes, exercises, discussions, interactive web activities and supported self study.

Notes

The purpose of this module is to enable students to understand and apply PSA techniques with particular relevance to the nuclear industry. The module will give an overview of the nuclear industry safety assessment guidelines and principles. Reliability theory and concepts and system reliability and modelling will be covered, including event tree and fault tree analysis (although more detail on this is in a separate module). Consequence modelling in the nuclear industry and typical hazard scenarios such as fire, aircraft crash, natural hazards, etc. will also be discussed. The module includes application of PSA results and demonstration of ALARP. The assessment for this module is a combination of essay, technological task and online activities (e.g. tests, discussions, etc.).