

Module Code	ME5MM7
Module Name	SAFETY MANAGEMENT SYSTEMS AND RISK ASSESSMENT
ECTS Weighting¹	5 ECTS
Semester taught	Semester 1
Module Coordinator/s	Professor Garret O'Donnell (Garret.ODonnell@tcd.ie), Professor Kevin O'Kelly, Dr. Chiara Leva (Levac@tcd.ie)
<u>Module Learning Outcomes</u> with reference to the <u>Graduate Attributes</u> and how they are developed in discipline	<ol style="list-style-type: none"> 1. Understanding the role of risk in decision making in major projects 2. Develop a conceptualization of System Safety Engineering considering an historical perspective 3. Know the main references in relation to legislative framework requiring Risk Assessment and Safety Management System in industry 4. Be able to use the main engineering methods for Risk Assessment (e.g. HAZID, HAZOP, FAULT TREES, EVENT TREES, BOW TIES etc.) 5. Be informed on the main principle for Safety Management Systems according to SEVESO directive, OSHA 18001, Safety Health and Welfare at work act in Ireland. 6. Understand the need for Accident reporting, analysis and investigations, and the monitoring of safety performance 7. Understand the role of human performance in connection with system performance and the impact of human and organisational error and the conditions for it 8. Be able to apply basic human reliability analysis methods to key industrial tasks.
Module Content	<p>The aim of the module is to provide expose the students to the issue of risk and the impact of risk in two main aspects of engineering. First the fundamental criteria and the methodological approaches for the design and management of system safety approaches for industrial operations, for production and service, in the view of minimization of operational risks.</p> <ul style="list-style-type: none"> • Operational Risk Management from an historical and legislative perspective (Fundamentals and Principles of Industrial Safety and Health Occupational, Compliance and laws on prevention of occupational risks) • System Safety Engineering in Industrial applications examples (types of risks workers are exposed to) • Hazard identification, according to the activity and the workplace • CE marking on machines and associated compliance issues • Engineering methods for risk assessments (HAZID, HAZOP, FT,

¹ [TEP Glossary](#)

ET, BOWTIE)

- Human and Organisational risk factors analysis
- Human Reliability Assessment
- Occupational Safety Management (methods for reducing the incidence of accidents, occupational hazards and diseases of the worker, in and out of their work environment)
- Hierarchy of controls. Fundamentals of industrial hygiene (Selection, use and maintenance of Personal Protective Equipment)
- Monitoring safety Performance (Accident reporting and analysis)
- Seminar: safety management in two industrial examples (inviting the safety managers or equivalent domain specialists)
- Project Risk Management
- Group work on a real world scenario, report preparation and review

Due to Covid-19, the following changes to the normal teaching methods apply, and the same will apply in case of a new possible lockdown scenario during teaching term:

- All lectures and tutorials will be delivered online using Blackboard Collaborate Ultra or Microsoft Teams. These sessions will be recorded and available for viewing at a later time.
- The end of semester exam modalities will be online/remote, although this is subject to change and will follow College guidelines (60% of the module mark)

Graduate Attributes: levels of attainment

To act responsibly - Attained

To think independently - Enhanced

To develop continuously - Enhanced

To communicate effectively - Attained

Teaching and Learning Methods

This module is typically a modest group size environment and sub divided as necessary for group project activity. Hence the class forms the basis for discussion on topics, as well as more formal podium style lectures.

Examples related in the class are often research led through discussion on leading research projects. Visiting/guest lectures include industry domain specialists e.g safety managers as well as visiting researchers specialising in risk in industrial systems. This model will be used as much as possible using online tools such as Blackboard/Teams with mix of larger group online lectures and smaller team group meetings.

For semester 1, all lectures and tutorials/project sessions will be delivered online using Blackboard Collaborate Ultra. These sessions will be recorded and available for viewing via Blackboard at a later time.

Continuous assessment will be used.

Assessment Details² Please include the following: <ul style="list-style-type: none"> • Assessment Component • Assessment description • Learning Outcome(s) addressed • % of total • Assessment due date 	Assessment Component	Assessment Description	LO Addressed	% of total	Week due			
	Assignments	Individual	1-7	60%	Wk12			
	Assignments	Group Assignments	2,6,7	40%	Wk12			
Reassessment Requirements	See lecturers							
Contact Hours and Indicative Student Workload²	<table border="1"> <tr> <td>Contact hours: 33 Hours</td> </tr> <tr> <td>Independent Study (preparation for course and review of materials):33</td> </tr> <tr> <td>Independent Study (preparation for assessment, incl. completion of assessment):33</td> </tr> </table>					Contact hours: 33 Hours	Independent Study (preparation for course and review of materials):33	Independent Study (preparation for assessment, incl. completion of assessment):33
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Recommended Reading List	<ul style="list-style-type: none"> • Roland, H. E. & Moriarty, B. (1990). System Safety Engineering and Management (2nd ed.). New York, NY: John Wiley & Sons. • Bedford, T. & Cooke, R. M. (2001). Probabilistic Risk Analysis: Foundations and Methods. Cambridge: Cambridge University Press. • Reason, J. (1997). Managing the risks of organisational accidents. Aldershot, United Kingdom: Ashgate • Reason J Human Error Cambridge University Press 1990. • Trevor Kletz Critical Aspects of Safety and Loss Prevention (1990) Butterworths • Trevor Kletz Lessons from Disaster - How Organisations Have No Memory and Accidents Recur(1993) IChemE • Trevor Kletz Hazop and Hazan 4th ed (1999) Taylor & Francis 							
Module Pre-requisite	Recommended: Advanced Manufacturing modules, Supply Chain Management or equivalent from visiting institutions							
Module Co-requisite	Na							

² [TEP Guidelines on Workload and Assessment](#)

Module Website	Blackboard TCD
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	No
Module Approval Date	02-09-2020
Approved by	G. O'Donnell
Academic Start Year	2020
Academic Year of Date	2020-2021