Module Code	ME5MM7
Module Name	**SAFETY MANAGEMENT SYSTEMS AND RISK ASSESSMENT**
ECTS Weighting[1]	5 ECTS
Semester taught	Semester 1
Module Coordinator/s	Dr. Chiara Leva (Levac@tcd.ie), Professor Garret O'Donnell (Garret.Odonnell@tcd.ie)
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	1. Develop a conceptualization of System Safety Engineering considering an historical perspective 2. Know the main references in relation to legislative framework requiring Risk Assessment and Safety Management System in industry 3. Be able to use the main engineering methods for Risk Assessment (HAZID, HAZOP, FAULT TREES, EVENT TREEs, BOW TIES etc.) 4. Be informed on the main principle for Safety Management Systems according to SEVESO directive, OHSA 18001, Safety Health and Welfare at work act in Ireland. 5. Understand the need for Accident reporting, analysis and investigations, and the monitoring of safety performance 6. Understand the role of human performance in connection with system performance and the impact of human and organisational error and the conditions for it 7. Be able to apply basic human reliability analysis methods to key industrial tasks.
Module Content	The aim of the module is to provide 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. • 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 • Engineering methods for risk assessments (HAZID, HAZOP, FT, ET, BOWTIE) • Human and Organisational risk factors analysis • Human Reliability Assessment

[1] TEP Glossary

	• 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 **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.

Assessment Details[2]
Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Exam	Written Exam	1-7	60%	Wk12
Assignments	Group Assignments	2,6,7	40%	Wk12

Reassessment Requirements

Contact Hours and Indicative Student Workload[2]

Contact hours: 33 Hours
Independent Study (preparation for course and review of materials):33
Independent Study (preparation for assessment, incl. completion of assessment):33

Recommended Reading List

- 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	08-08-2019
Approved by	G. O'Donnell
Academic Start Year	2019
Academic Year of Date	2019-2020