



<b>Course Code</b> OGEE-542	<b>Course Title</b> Health, Safety and Risk Management	<b>ECTS Credits</b> 7.5
<b>Prerequisites</b> None	<b>Department</b> Engineering	<b>Semester</b> Fall, Spring
<b>Type of Course</b> Required	<b>Field</b> Oil, Gas and Energy Engineering	<b>Language of Instruction</b> English
<b>Level of Course</b> 2 <sup>nd</sup> Cycle	<b>Lecturer(s)</b> Dr Theodoros Tsakiris	<b>Year of Study</b> 1 <sup>st</sup> /2 <sup>nd</sup>
<b>Mode of Delivery</b> Face-to-face	<b>Work Placement</b> N/A	<b>Co-requisites</b> None

### Objectives of the Course:

The main objectives of the course are to:

- Help attendees recognize the importance of health and safety in the petroleum domain;
- Introduce students to hazards as well as risk management;
- Cover the principles and methods of risk management;
- Explain the attributes of process safety management and failure modes;
- Present pressure and control system designs in the process industries;
- Overview health and safety related regulations and standards;
- Teach attendees the main lessons learnt from incidents;
- Provide solid knowledge on the fundamentals and principles of systems reliability and life cycle aspects of process plants in the petroleum industry;
- Analyse the aspects and risk mitigation strategies;
- Develop the tools for quantitative and qualitative performance analysis of risk management.

### Learning Outcomes:

After completion of the course students are expected to be able to:

1. Appreciate the role of health and safety matters in the oil & gas industry;
2. Explain the main characteristics of energy safety and environmental hazards and risk management;
3. Gain an understanding of risk related decision-making under uncertainty;
4. Use engineering tools and practices in order to analyse and evaluate the performance of risk management;
5. Recognise different pressure and control system designs and the risk they may pose;
6. Identify the causes of major incidents;
7. Appraise aspects and the reduction of risk of engineering components and equipment;
8. Describe various types of systems reliability, failure and life cycle aspects in the petroleum industry;

9. Become accustomed to the elements of safety and environmental management systems.

**Course Contents:**

- Hazard identification (HAZID) and hazard identification during operation (HAZOP);
- Risk acceptance, decision making under uncertainty, concept of “as low as reasonably practicable (ALARP);
- Elements of health and safety, scope of guidelines, acceptable level of risk;
- Personal Protection Equipment (PPE);
- Process functions and reliability metrics;
- Pressure vessels, pipeworks and valves, heat exchangers, pressure relief, flare systems, instrument failure, fault-tolerance, automation;
- Failure of systems and components, importance of maintenance;
- Life-cycle aspects of process plants, start-up and shutdowns, pollution containment;
- Accident modelling and risk simulation.
- Lessons learnt from major incidents: Piper Alpha, Exxon Valdez, Gullfaks C, Deepwell Horizon, Montara, Bhopal.
- Fire, explosion characteristics, blowouts, gas leakage, chemical and gaseous explosions, induced earthquakes;
- Organisational health, safety and risk culture, contingency planning and emergency response;
- Types of regulations, enforcement, regulation agencies, industry organisations and engineering standards;
- Elements of, design and implementation of safety and environmental management systems.

**Learning Activities and Teaching Methods:**

Lectures, Projects, Discussion.

**Assessment Methods:**

Homework, Project assignments, exams, final exam.

**Required Textbooks / Reading:**

Title	Author(s)	Publisher	Year	ISBN
Health, Safety and Environmental Management in Offshore and Petroleum Engineering	Chandrasekaran S.	Wiley	2016	978-1-119-22142-5

**Recommended Textbooks / Reading:**

<b>Title</b>	<b>Author(s)</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>
Offshore Safety Management Implementing a SEMS Program	Sutton I.	Elsevier	2014	978-0-323-26206-4
Introduction to Oil and Gas Operational Safety	Wise Global Training	Routledge	2015	978-1-315-84992-8
Effective Maintenance: Risk & Reliability Strategies of Optimizing Performance, 2 <sup>nd</sup> edition	Narayan V.	Industrial Press	2012	978-0-8311-3444-0