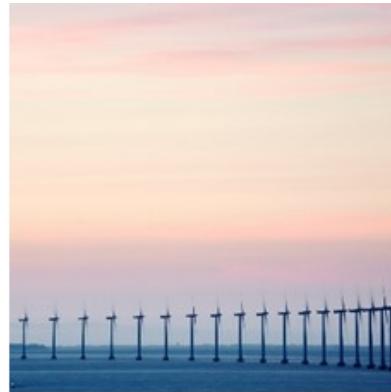


Postgraduate Programme Catalogue



Helping to develop competent risk and safety management professionals for industry



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dream plan achieve

Postgraduate Certificate (PgCert)

The PgCert requires participants to gain 60 credits from six modules. Each module involves up to 100 hours of part-time study, which includes submission of a formal written assessment. Each module should be completed within 8 weeks. The programme takes one year to complete.

The six PgCert distance learning modules are as follows:

- Principles of Risk Management
- Hazard Identification
- Risk Analysis
- Health, Safety & Environment (HSE) Management Systems
- Risk Reduction & ALARP
- Research Methods in Risk & Safety Management

Postgraduate Diploma (PgDip)

The PgDip requires participants to gain 120 credits from twelve modules. The programme takes two years.

The twelve PgDip distance learning modules are the six PgCert modules plus the following:

- Culture, Behaviour and Competency
- Human Factors in Design and Operations
- Emergency Response & Crisis Management
- Bowtie Risk Management
- HAZOP Study or Physical Effects Modelling*
- Incident Investigation & Analysis or Safety/HSE Cases*

* Students wishing to apply for registration as a Professional Process Safety Engineer with IChemE must select Incident Investigation & Analysis and Physical Effects Modelling for the second and final modules respectively.

Master of Science (MSc)

The MSc requires participants to gain 180 credits from twelve modules plus an academic project (dissertation) of 60 credits. This programme takes three years, with the project needing to be finished within the third year.

The MSc programme comprises the twelve PgDip modules plus a dissertation of approximately 15,000 words.



The MSc in Risk and Safety Management (IChemE Process Safety Pathway) is approved by IChemE as meeting the knowledge and understanding requirements for IChemE's Professional Process Safety Engineer qualification.



PgCert Modules

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Principles of Risk Management

Purpose

The course provides an overview of risk management in the high hazard industries. It discusses the drivers, defines some of the fundamental terminology and introduces major risk management concepts, such as risk tolerability criteria and As Low As Reasonably Practicable (ALARP). It also illustrates how risk assessment provides an input into decision making. The module briefly introduces some key risk assessment techniques and the situations in which they may be used. It considers the purpose and structure of a HSE/safety case and significance of an HSE management system. The module includes case studies of some significant historical accidents and their root causes, and evaluates the importance of safety leadership and organisational culture in preventing accidents.

At the end of the course you will be able to

1. Deconstruct the risk management process into its constituent components
2. Contrast key risk management terms such as "hazard", "consequence" and "risk"
3. Evaluate the various drivers which cause organisations to manage risk
4. Demonstrate expertise in academic referencing

Outline content

- Drivers for risk management
- Definitions and terminology
- Elements of risk management process
- Demonstration of ALARP
- Example tools, techniques and studies
- The HSE case (or safety case) and HSE management system
- Leadership, culture and behaviours
- Causes of major accidents

Recommended prior study

Education, skills or experience equivalent to undergraduate level

Hazard Identification

Purpose

This course provides an understanding and awareness of the tools and techniques available for hazard identification, where they can be applied and what limitations may exist. Students will be introduced to the concept of HAZID, including the HAZID team and process. A range of other hazard identification techniques will also be introduced.

At the end of the course you will be able to

1. Assess the role of hazard identification in the risk management process
2. Critically review the tools and techniques available to carry out effective hazard identification at each lifecycle stage
3. Design a fit-for-purpose hazard identification study

Outline content

- Basic concepts
- Overview of hazard identification techniques:
- Hazard identification through the project lifecycle
- Failure Modes and Effects Analysis (FMEA)
- Hazard and Operability (HAZOP) studies
- HAZID/checklist approach
- HAZID versus HAZOP
- Making recommendations

Recommended prior study

Education, skills or experience equivalent to undergraduate level
Risktec module: *Principles of Risk Management*

Risk Analysis

Purpose

To provide a solid foundation of knowledge of risk assessment tools, with an emphasis on the concept of risk and qualitative risk assessment techniques.

At the end of the course you will be able to

1. Logically deduce the most appropriate risk assessment tool/ technique to be used, depending on circumstances
2. Apply certain risk assessment techniques
3. Critically review example risk assessments, illustrating strengths and weaknesses

Outline content

- Introduction to risk assessment
- Identifying and recording hazards – registers, schedules, inventories
- The risk assessment matrix
- Risk analysis and risk reduction through project / facility lifecycle
- Qualitative hazard assessment techniques
- Significance of environmental aspects – environmental hazard assessment
- Health risk assessment (HRA)
- Security risk assessment
- Business / commercial risk assessment
- Quantitative risk assessment (QRA) techniques
- Safety Integrity Level (SIL) assessment
- Layers of Protection Analysis (LOPA)
- External hazards
- Good practice in risk analysis

Recommended prior study

Education, skills or experience equivalent to undergraduate level
Risktec modules: *Principles of Risk Management; Hazard Identification*

Health, Safety and Environment (HSE) Management Systems

Purpose

A formal management system or framework can help an organisation manage Health, Safety and the Environment (HSE). The aim of this module is to deliver an understanding of what constitutes an HSE Management System (HSE MS), and how these systems are applied in different hazardous industries. Legislative requirements and international standards for an HSE MS are also discussed. The module examines issues associated with the documentation and the human elements for the successful implementation of an HSE MS.

At the end of the course you will be able to

1. Discuss the key factors to be considered when developing an HSE MS
2. Assess the role of HSE MSs in reducing the probability and consequences of major accidents
3. Examine issues associated with the implementation of HSE MSs

Outline content

- Definition of an HSE MS
- Elements of an HSE MS
- Guidance and legislation
- Implementation aspects
- Documenting and implementing the HSE MS

Recommended prior study

Education, skills or experience equivalent to undergraduate level
Risktec module: *Principles of Risk Management*

Risk Reduction and ALARP

Purpose

ALARP (As Low As Reasonably Practicable) is a commonly used but often misunderstood concept. The purpose of this module is to enable students to understand the hierarchy of risk reduction measures and the options for risk reduction in the project lifecycle. Students will be introduced to the concept of ALARP and how to demonstrate that risk has been reduced to ALARP levels.

At the end of the course you will be able to

1. Identify different options available for risk reduction (control hierarchy)
2. Decide when risk reduction measures can best be used
3. Describe the concepts of "tolerability of risk" and "As Low As Reasonably Practicable (ALARP)"
4. Apply the ALARP concept and conduct an ALARP assessment to an appropriate level of detail

Outline content

- Risk management summary
- Hierarchy of risk reduction measures
- Risk reduction through the project lifecycle
- The ALARP concept
- Demonstrating ALARP
- Qualitative and semi-quantitative approaches
- Cost Benefit Analysis (CBA)
- Societal risk

Recommended prior study

Education, skills or experience equivalent to undergraduate level
Risktec module: *Principles of Risk Management*

Research Methods in Risk & Safety Management

Purpose

To provide the theoretical background for conducting postgraduate project work. The module provides a valuable opportunity for graduates to acquire necessary skills and training to conduct research at postgraduate level. This includes giving the student an opportunity to develop ideas for a project/dissertation in risk and safety management and to engage with potential supervisors.

At the end of the course you will be able to

1. Communicate findings in an accepted format
2. Assess previous research completed in a subject area
3. Critically appraise research data and assimilate, integrate and discuss in a logical way
4. Demonstrate compliance with appropriate ethical standards related to any research undertaken
5. Produce an appropriate project description and specification

Outline content

- Study skills review
- Introduction – why do research?
- Defining the research problem
- Literature search and review techniques
- Research methodologies including statistical techniques, questionnaires and interviewing
- Project analysis and design
- Ethics in research
- Project planning
- Time management, Gantt charts
- Presentation skills

Recommended prior study

Education, skills or experience equivalent to undergraduate level





PgDip Modules

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Culture, Behaviour and Competency

Purpose

The purpose of this module is to provide the theory and practice that underpins safety culture and related workplace behaviour, as well as managing competency. It aims to promote consideration, discussion and evaluation of the inter-connection between culture, behaviour and competency and their relative importance within the workplace. The module promotes the application of this knowledge in workplace situations and highlights the importance of the topic in the field of risk and safety management.

At the end of the course you will be able to

1. Determine and justify the elements of, and requirements for, competency management and evaluate the relationship between competency, training and resourcing
2. Critically review the importance of culture and behaviour in the workplace
3. Demonstrate how culture, behaviour and competency can be successfully managed in the workplace

Outline content

- Competency Management
- Training and resourcing
- Organisational Culture
- Human Behaviour
- Organisational change management
- Examples of major accidents / accident causes

Recommended prior study

Education, skills or experience equivalent to undergraduate level

Risktec modules: *Principles of Risk Management; HSE Management Systems*

Incident Investigation & Analysis*

Purpose

This module provides an awareness and understanding of incident investigation and analysis, including why we need to investigate incidents. The stages of incident investigation are discussed: immediate actions in the event of an incident; initiating the investigation; collecting, organising and analysing data; identifying corrective and preventive actions; reporting the incident and learning from it. The module involves a significant amount of practical exercises.

At the end of the course you will be able to

1. Demonstrate a thorough grounding in the underlying theories behind accident cause analysis
2. Apply the investigation and analysis process to determine the sequence of events and the causes of an incident
3. Critically analyse published incident and accident reports including the recommendations.

Outline content

- Why we investigate accidents
- The incident investigation process
- Collecting data
- Data organisation/analysis
- Corrective actions
- Concluding the analysis

Recommended prior study

Education, skills or experience equivalent to undergraduate level

Risktec module: *Principles of Risk Management*

Safety/HSE Cases*

Purpose

The aim of this module is to explain the purpose, content and uses of a Safety/HSE Case. Particular attention is focused on the best practical approaches to address legal, industry and company requirements. The differing types of Safety/HSE case during the project lifecycle are discussed, as well as differences in approaches between industries. Links between the case, supporting studies and the management system are studied.

At the end of the course you will be able to

1. Critically review the reasons for having Safety/HSE Cases and the role of the Safety/HSE Case
2. Justify the contents of a Safety case
3. Discuss the key factors to be considered when planning a safety case

Outline content

- Historical drivers
- Legal Requirements - UK, Europe, worldwide
- Company and industry body requirements
- Differing types of case by project phase (e.g. PSR, PCSR, design, operational, decommissioning)
- Safety/HSE Case structure and approach by industry (nuclear, offshore oil and gas, onshore process, transport, others)
- Bridging documents
- Links between the case and supporting studies
- Links between the case and the management system
- Documentation and management / maintenance of the Safety/HSE Case
- Roll-out and implementation - keeping the case as a working document
- Features of a fit-for-purpose safety case

Recommended prior study

Education, skills or experience equivalent to undergraduate level

Human Factors in Design & Operations

Purpose

The purpose of this module is to explain how an understanding of human abilities, limitations and needs can be applied to the design and assessment of tasks, equipment, systems and processes, in order to reduce human error, improve safety and increase efficiency. It also highlights how and why human errors occur, and describes the methods, tools and techniques that can be used to identify, analyse and reduce them.

At the end of the course you will be able to

1. Analyse the part played by individual, task and organisational factors in achieving safe and effective designs, systems and processes
2. Demonstrate how Human Factors should be integrated within a project/ design lifecycle process for high hazard industries and discuss the key Human Factors inputs and activities that are typically required
3. Analyse the potential causes of human errors and violations and discuss the measures that can be taken to reduce them
4. Evaluate the different techniques and approaches available for qualitative and quantitative human error identification, assessment and error reduction

Outline content

- Introduction to Human Factors
- Human Factors integration (HFI)
- Human Factors support to the design lifecycle for high hazard industries
- Defining human error
- Human Reliability Analysis (HRA)

Recommended prior study

Education, skills or experience equivalent to undergraduate level

Risktec module: *Principles of Risk Management*

Emergency Response & Crisis Management

Purpose

The purpose of this module is to enable students to understand and apply the principles of emergency response planning and crisis management. It considers the need for emergency and crisis response planning and an integrated approach to emergency management. Emergency organisation and procedures are also studied.

At the end of the course you will be able to

1. Define the requirements and importance of Emergency and Crisis Response Management
2. Discuss aspects of integrated emergency management
3. Generate appropriate emergency and crisis response documentation

Outline content

- Emergency management basics
- Emergency anticipation and assessment
- Emergency prevention and mitigation
- Emergency preparations - planning, organisation, training, documentation, mutual aid, drills & exercises, etc.
- Emergency response and recovery
- Crisis management overview

Recommended prior study

Education, skills or experience equivalent to undergraduate level

Risktec module: *Principles of Risk Management*

Bowtie Risk Management

Purpose

Bowtie analysis is an increasingly popular approach to help manage risk. This module introduces the bowtie methodology (also known as barrier diagrams) and examines in detail the various bowtie analysis components. The module also provides a critical review of the method's benefits, limitations and practical uses, with hands-on practice at applying the technique.

At the end of the course you will be able to

1. Analyse hazard scenarios by applying the bowtie method and designing a bowtie diagram
2. Develop integrity assurance for bowtie barriers e.g. in terms of HSE critical tasks and/or HSE critical systems
3. Devise risk acceptance criteria for hazards in bowties

Outline content

- Introduction to risk assessment and bowties
- The bowtie method – what is a bowtie and how to build one
- Assuring barrier integrity
- Effectiveness and ALARP for bowties
- Benefits and practical uses of bowties
- Facilitating bowtie workshops
- Bowtie software tools

Recommended prior study

Education, skills or experience equivalent to undergraduate level

Risktec module: *Principles of Risk Management*

Hazard and Operability (HAZOP) Study*

Purpose

To gain an understanding of the technique, application and limitations of the HAZOP study methodology, one of the most commonly used hazard identification methods. This module does not provide detailed HAZOP facilitator training but does cover the skills needed and the work that the facilitator must do as part of the HAZOP Study.

At the end of the course you will be able to

1. Critically review the HAZOP technique and examples of output
2. Analyse how the HAZOP technique can be applied at the different stages of a project's lifecycle such as FEED, detailed design, revalidation and decommissioning
3. Prepare for a HAZOP workshop, determine the skills and actions necessary to lead a HAZOP and how to generate a HAZOP report

Outline content

- Introduction to risk assessment
- Basic engineering terminology
- Process safety incidents – lessons learned
- HAZOP – what, when, how
- HAZOP – guidewords and parameters
- HAZOP – noding
- HAZOP – teams, roles and responsibilities
- Recording methods, software, reporting and close-out
- Overview of the LOPA technique
- Major HAZOP studies, minor modification studies
- Common failings in HAZOPs
- Limitations of HAZOPs
- Leading HAZOP teams
- Other forms of HAZOP – procedures, batch operations

Recommended prior study

Education, skills or experience equivalent to undergraduate level
Risktec modules: *Principles of Risk Management; Hazard Identification*

Physical Effects Modelling*

Purpose

To enable an understanding of the range of hazardous physical effects that can occur, an overview of human and equipment vulnerability to physical effects, and the uses and limitations of physical effect modelling. This includes an introduction to physical effects modelling and the opportunity for some hands-on practice of physical effects calculations.

At the end of the course you will be able to

1. Analyse an industrial plant/installation to determine expected physical effects in the event of an incident
2. Evaluate, by applying physical effects modelling techniques, how these physical effects affect people and plant
3. Justify which of the available modelling techniques/software is appropriate to analyse physical effects in different circumstances, whilst understanding the limitations of these techniques

Outline content

- What are physical effects and why model them?
- Source term release and discharge calculation
- Dispersion analysis
- Fire modelling
- Explosion modelling
- Subsea releases/dispersion
- Human and plant vulnerability to physical effects
- Commercial and public domain software tools

Recommended prior study

Education, skills or experience equivalent to undergraduate level
Risktec module: *Principles of Risk Management*

