D2Q7-SRE Master of Science in Safety, Risk and Reliability Engineering

PROGRAMME DETAILS
Programme Code: D2Q7-SRE
Department: Civil Engineering
Main Award: MSC - Master of Science
Full Award Title: Master of Science in Safety, Risk and Reliability Engineering
Level: Postgraduate Taught

LOCATION OF STUDY
<table>
<thead>
<tr>
<th></th>
<th>Edinburgh</th>
<th>Scottish Borders</th>
<th>Orkney</th>
<th>Dubai</th>
<th>Malaysia</th>
<th>Approved Learning Partner</th>
<th>Dubai</th>
<th>Malaysia</th>
<th>Approved Learning Partner</th>
<th>Independent Distance Learners</th>
<th>Collaborative Learning Partner</th>
<th>Other</th>
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ASSOCIATED AWARDS

<table>
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<tr>
<th>Programme Code</th>
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<tr>
<td>D200-ZZZ</td>
<td>PGCERT</td>
<td>Postgraduate Certificate in Infrastructure and Environment</td>
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<tr>
<td>D2Q5-SRE</td>
<td>PGDIP</td>
<td>Postgraduate Diploma in Safety, Risk and Reliability Engineering</td>
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<tr>
<td>D2Q7-SRE</td>
<td>MSC</td>
<td>Master of Science in Safety, Risk and Reliability Engineering</td>
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ACCREDITATION

JBM - MSc only

IOSH - PGDip and MSc

LEARNING OUTCOMES – SUBJECT MASTERY

Understanding, Knowledge and Cognitive Skills

Demonstrate understanding of:

1. fundamentals of probability and statistics as applied to risk assessment in engineering
2. qualitative risk assessment procedures that are currently widely used in safety management and in the writing of safety cases
3. why engineering systems fail, how to predict failures, and how decisions are taken based on those predictions
4. how safety systems can be applied across different industries
5. how safety management links to other management systems such as environmental management
6. the ability to anticipate failures of systems or in human behaviour, and how decisions are taken based on those predictions
7. the scientific principles that underlie many hazardous situations
8. the professional responsibilities of a safety engineer

Scholarship, Enquiry and Research (Research Informed Learning)

Be able to:

1. demonstrate an understanding of technical advances in safety engineering
2. show familiarity with a broad range of technical literature;
3. plan, conduct and report a self-directed research project;
4. use problem-solving skills in a variety of contexts;
5. apply numerical and analytical skills and engineering knowledge in the analysis of safety related problems

LEARNING OUTCOMES – PERSONAL ABILITIES

Industrial, Commercial and Professional Practice

Demonstrate an ability to:

1. appreciate the professional responsibilities of safety engineers
2. link solutions across a diverse range of industries
3. relate their work to international standards and legislation
4. appreciate ethics in relation to safety engineering
5. develop international links with industry through worldwide collaboration and industrial support for our courses
6. undertake an industrially relevant project leading to the dissertation – some students will have the opportunity to do this based in an industrial company or consultancy.

Autonomy, Accountability and Working With Others

Be able to:

1. work effectively remotely, plan and execute their learning programme, and decide when to take modules and examinations.
2. interact with staff and other students in a variety of industries through discussion boards, email etc.
3. set objectives and plan and manage the project in conjunction with a supervisor for the MSc dissertation
4. demonstrate an understanding of the impact of safety engineering

Communication, Numeracy & Information and Communications Technology

Be able to:

1. solve mathematical problems relating to safety engineering - half the taught modules require a high level of numeracy to complete them successfully.
2. critically analyse more qualitative problems
3. use IT skills effectively for completion of coursework.
4. develop written reporting skills in a technical environment
5. present and defend outcomes from a self-directed research project

APPROACHES TO TEACHING AND LEARNING

The programme is based on eight fully written courses, which are either self-contained, or are based on structured study from a text book (a required text for the module). All students on this programme are studying primarily by distance learning. At masters level students are expected to take a large degree of responsibility for their own studies. Students rely on a practical study guide, detailed course texts (or a required text book), fully worked solutions, email, discussion groups, as well as discussion with staff, other students and more experienced work colleagues in most cases. Courses usually include objectives, theory, applications in the real world, worked examples, exercises, and review questions that usually form part of the formative assessment and feedback for the course. Some courses have a coursework component to address a deeper level of understanding of more complex and lengthy problems or where practical software applications are required.
Approaches to teaching and learning are continually reviewed and developed with the aim of matching them to the abilities and experiences of students, with regard also for the subject area. Industry feedback on course content is also used in the updating and improvement of all courses. Specific details about teaching and learning methods are provided in the appropriate course descriptors.

EDUCATIONAL AIMS OF THE PROGRAMME

Overview

The overall aim of the programme is to provide the necessary academic training for a professional safety and reliability engineer able to work in a wide range of high hazard industries either directly or through a consultancy. The programme gives engineering graduates the knowledge necessary to undertake reliability engineering and quantified safety assessments in either an engineering company (e.g. the oil industry) or a safety and reliability consultancy. Such skills are typically applied to the design of engineering systems/structures to achieve specified reliability targets, as part of the preparation of a safety case for approval by a safety regulator, the development of a safety management system, or can be used to develop a reliability centred maintenance of existing systems. The techniques have wider applications, for example to the assessment of business or financial risk in the insurance industry.

The broad educational aims of the civil and structural engineering programmes may be defined within the context of the educational requirements of UKSPEC (2013 ed.) as detailed below.

Knowledge & Understanding

1. Ensure students have a sound understanding and experience of both quantitative and qualitative risk assessment procedures
2. Apply the fundamentals of probability to solving reliability centred problems
3. How to predict failures and how decisions can be made on the basis of these predictions
4. Enable students to write or contribute to an effective safety management system
5. Equip students with a foundation of human factors principles to enable decision making
6. Provide a scientific understanding of the causes and effects of hazardous scenarios
7. Appreciate the context of safety engineering in relation other disciplines and industrial constraints

Intellectual Abilities
1. Ensure students have the creative and innovative skills to synthesise theory when formulating solutions.
2. Critical awareness of the current practices within the safety industries and how practice is evolving.
3. Develop problem-solving and conceptual skills and the ability to apply such skills to solve realistic challenges.
4. Equip students to be able to apply knowledge and understanding over a range of scales to an appropriate level of detail.

**Practical Skills**

1. Develop an awareness of the safety industries and the development of professional competencies.
2. Develop experience of using a set of tools that can be used in safety engineering.
3. Ensure all students demonstrate the ability to undertake a major individual project.

**General Transferrable Skills**

1. Match a professional and technical education to the needs and aspirations of individuals.
2. Equip students with the opportunity to apply and improve problem solving as well as the effective use of general IT, communication and information retrieval skills.
3. Give students experience of data collection and analysis, use of tools to support analysis and consideration of uncertainty.
4. Ensure all students demonstrate the ability to reflect on their performance and understand their weaknesses.

**ASSESSMENT POLICIES**

The programme uses a range of assessment types.

Coursework is used to develop problem solving skills, to demonstrate mastery of techniques taught as part of the course that would be too lengthy to undertake as exam questions or where software applications are required. Coursework also helps develop professional report writing skills with emphasis on correct report structure, writing style, resume, and referencing. All courses have some form of formative assessment that provide self, peer or staff feedback as required.

Examinations make up the majority of summative assessment as these are the best way to be certain of testing the capabilities of the individual student against the course aims.
The final MSc dissertation allows students to demonstrate good research skills and a deeper level of critical thinking and analysis than can be assessed by exam.

Approaches to assessment are continually reviewed. Specific details about methods of assessment are provided in the appropriate course descriptors.

### PROGRAMME STRUCTURE

#### Mandatory Courses

<table>
<thead>
<tr>
<th>Edinburgh</th>
<th>SBC</th>
<th>Orkney</th>
<th>Dubai</th>
<th>HWUM</th>
<th>IDL</th>
<th>Coll. Partner</th>
<th>ALP</th>
<th>Other</th>
<th>Stage</th>
<th>Semester</th>
<th>Phase</th>
<th>Course Code</th>
<th>Course Title</th>
<th>SCQF Cr</th>
<th>SCQF Lvl</th>
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<td>A</td>
<td>D21DA</td>
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<td>Data Analysis and Simulation</td>
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<td>11</td>
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| X       | 1   | 1      | D11ST|     | Sustainability for Construction Professionals | 15  | 11    |       |           |       |             |              |         |          |

#### Optional Courses

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<th>Course Title</th>
<th>SCQF Cr</th>
<th>SCQF Lvl</th>
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### COMPOSITION NOTES(PG)

8 taught courses - 8 mandatory - (plus research dissertation for MSc)

<table>
<thead>
<tr>
<th>Mandatory Credits</th>
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AWARDS, CREDITS AND CRITERIA (PG)

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<th>Overall Credits</th>
<th>Specific Requirements</th>
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<td>180 SCQF credits including a minimum of 150 credit at Level 11</td>
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**Award Requirements**

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<th>Total Course Passes</th>
<th>Overall Mark</th>
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<th>Basis of Overall Mark/Grade</th>
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<tbody>
<tr>
<td>Master (Distinction)</td>
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<tr>
<td>Master</td>
<td>8 + Research</td>
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**DURATION OF STUDY**

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<tr>
<td>Certificate</td>
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**RE-ASSESSMENT (PG)**

1. A student who has been awarded a Grade E or F in a course may be re-assessed in that course. A student who has been awarded a Grade D in a course may be re-assessed in that course in order to proceed to or be eligible to receive the award of Masters.
2. A student shall be permitted only one re-assessment opportunity in a maximum of three taught courses. The opportunity for re-assessment in four or more taught courses shall be at the discretion of the Progression Board.
3. Any further re-assessment opportunities in a course will require the approval of the Postgraduate Studies Committee.
4. A student may be permitted, at the discretion of the Progression Board, to be re-assessed in the dissertation, project or other supervised research component of the course of study.

**PROGRESSION TO DISSERTATION/PROJECT**

Average $\geq$50% over 8 courses at grades A - D