

| Module Details |                                                         |
|----------------|---------------------------------------------------------|
| Module Title   | Risk Assessment and Management                          |
| Module Code    | ENB7007-B                                               |
| Academic Year  | 2022/3                                                  |
| Credits        | 20                                                      |
| School         | Department of Mechanical and Energy Systems Engineering |
| FHEQ Level     | FHEQ Level 7                                            |

| Contact Hours  |       |
|----------------|-------|
| Type           | Hours |
| Lectures       | 20    |
| Seminars       | 10    |
| Tutorials      | 10    |
| Directed Study | 160   |

| Availability |                                     |
|--------------|-------------------------------------|
| Occurrence   | Location / Period                   |
| BDA          | University of Bradford / Semester 2 |

| Module Aims                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Acquire a deep understanding of the concepts, principles and tools of Risk Assessment and Management (RAM) and apply them in a range of engineering applications. |

## Outline Syllabus

Risk, Uncertainty and Opportunity.

Risk Analysis: Qualitative, Quantitative, Quasi-probabilistic.

Risk Assessment Attributes and Models.

Risk Assessment Tools: Delphi, Checklists, PHA, HAZOP, HACCP, What-If, Scenario Analysis,

BIA, RCA, RCM, FMECA, FTA, ETA, CCA, LOPA, Decision Tree Analysis, Analytic Hierarchy Process (AHP), Human Reliability Analysis. Risk/Deviation Assessment and Control: Lambda-Tau methodology. Risk Control: Protective Systems and devices. Risk strategies with online and offline repair. Risk Prediction and Total Productive Maintenance (TPM). Corporate Risk Management: Governance, Ethical Leadership, Integrity, Risk Appetite, Risk Portfolios, Risk Tolerances. Turnbull. COSO: Enterprise Risk Management. Risk Analysis and Management for Projects (RAMP). Project Portfolio Risk Management. Construction Design Management (CDM) and Risk Management. Asset Risk Management. Risk Communication. Business Continuity Management (BCM). Disaster Management. Contractual Risk Management (indemnification, limitation of liability and subrogation). RAM Standards: Management Principles (ISO-31000), Information Security Management (ISO-27001) and Sarbanes-Oxley compliance.

## Learning Outcomes

| Outcome Number | Description                                                                                                                                                                                                                                        |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01             | Critically evaluate and apply the tools and methodologies of Risk Assessment and Management respectively and appraise the conditions for their successful implementation for managing complex situations in a variety of engineering applications. |
| 02             | Apply Risk Assessment and Management Tools in complex engineering environments to manage Corporate, Project, Information and Asset Risk, and Business Continuity Management.                                                                       |
| 03             | Demonstrate ability to manage, present and analyse data using scientific methods as well as interpret data. Demonstrate leadership and work as part of a team to solve problems systematically and creatively demonstrate leadership.              |

## Learning, Teaching and Assessment Strategy

Lectures deliver core content in RAM concepts, principles and associated international standards providing students with the opportunity to acquire the information to enhance their knowledge and understanding of the subject (LO 1&2). This will be complemented by tutorials, seminars and video presentations of case studies to deepen understanding in line with the requirements of the profession and bring to life practical issues relating to RAM in a holistic way. Tutorials will consist of questions requiring quantitative analyses including past examination papers.

Industrial speakers will be invited to enhance experiential learning. All lectures, seminars and tutorials will be delivered online. Face to face meetings with individual groups will be set up to provide further support and guidance, as appropriate.

Practical, cognitive, personal and discipline skills will be developed in open-ended problem-solving seminars consisting of case studies discussed in small groups supported by the tutor, allowing students to apply learning to specific issues (LO 2&3). Students will be using technology systems to enhance their learning; PollEverywhere (for discussion) and TeamMates (for peer review).

Directed study (case studies on RAM applications) provides students with the opportunity to undertake guided reading and develop their own portfolio of learning to enhance transferable skills and knowledge and will enhance their critical thinking and collaborative learning. Whereas independent study (wider reading on the subject areas also required for the coursework) enables students to pursue and research the subjects in more depth and in an independent way. Both directed and independent studies achieve LO 1&2&3.

Oral feedback is given during tutorials and seminars and in a dedicated formative assessment session. The directed study required for the coursework and associated group work will provide further opportunities for critical thinking and collaborative learning. Students will be encouraged to explore online resources and software suites available. The examination part of the assessment will be on the quantitative part of RAM (LO 2&3). Past exam papers will be practiced in tutorial sessions (LO 2&3). The coursework part of the assessment will be on the qualitative part of RAM (LO 1&3). It will consist of a case study and the formulation of detailed lessons learned from it, which includes group work assessed by peers (via TeamMates) and the tutor. The coursework will enhance experiential learning, critical thinking and enquiry-based learning.

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Fourth Edition (AHEP4) as published by the Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify five key areas of learning which partially (C) or fully (M) meet the academic requirement for CEng registration: Science and Mathematics (1), Engineering Analysis (2-4), Design and Innovation (5-6), The Engineer and Society (7-11), and Engineering Practice (12-18). Further details of these learning outcomes can be found at <https://www.engc.org.uk/ahep/>

M1, M2, M4, M6, M7, M8, M9, M10, M11, M14, M15, M16, M17, M18,

### Mode of Assessment

| Type      | Method                    | Description                                                                                 | Weighting |
|-----------|---------------------------|---------------------------------------------------------------------------------------------|-----------|
| Summative | Examination - Closed Book | Closed book examination focussing on Risk (2 Hrs) Assessment                                | 50%       |
| Summative | Coursework - Written      | Coursework on Risk Management. Group work assessed by peers and academic staff (5000 words) | 50%       |
| Formative | Coursework - Written      | Coursework on Risk Assessment and Management (2000 words)                                   | N/A       |

### Reading List

To access the reading list for this module, please visit <https://bradford.rl.talis.com/index.html>

*Please note:*

*This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.*

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