UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Risk Assessment and Management
Module Code	ENB6011-B
Academic Year	2024/5
Credits	20
School	School of Engineering
FHEQ Level	FHEQ Level 6

Contact Hours	
Type	Hours
Directed Study	160
Seminars	10
Lectures	20
Tutorials	10
Tutorials	Every organisation faces the risk of unexpected, harmful events that can readily result in catastrophic failures, including financial, legal, societal and reputational losses. Risk management is the identification, evaluation, and prioritisation of risks followed by a coordinated sequence of preventive and remedial actions to minimise, monitor, and control the probability or impact of such events or to maximize the realisation of opportunities. Threats can stem from a wide variety of sources, including financial uncertainty, legal liabilities, strategic management errors, human error, accidents and natural disasters, IT security threats and data-related risks. Risk management enables a company establish procedures to avoid such potential threats, and minimise their impact should they occur. This module will enable students to 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.
Tutorials	Risk, Uncertainty and Opportunity. Risk Analysis: Qualitative, Quantitative, Quasi-probabilistic. Risk Assessment Attributes and Models. Risk Assessment Tools: Delphi, Checklists, PHA, HAZOP, HACCPT, 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.
Tutorials	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 also 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 face to face. Special individual or group meetings 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). Throughout the module, students will be set formative assessment activities that will help develop confidence in assessing and managing risks in a variety of different environments. The timely constructive feedback from formative assessment will support students develop the skills and knowledge required for the summative assessment. 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. This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Third Edition (AHEP3) as published by The Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-

Type	Hours
	SPEC). These outcomes specify six key areas of learning: Science and Mathematics (SM), Engineering Analysis (EA), Design (D), Economic, Legal, Social, Ethical and Environmental Context (EL), Engineering Practice (P) and Additional General Skills (G). SM2m, EA1m, D1, D2, EL1m, EL2, EL3m, EL5m, EL6m, EL7m, P1, P4, P5, P6, P8, P9m, P10m, P11m, G1, G2, G4, SM8M, EL8M, EL9M, EL10M, EL11M, EL12M, EL13M. Further details of these learning outcomes can be found at https://www.engc.org.uk/. 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 1&2). The coursework part of the assessment will be on the qualitative part of RAM (LO 2&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. Throughout the tutorial and the coursework, lots of opportunities are provided for students to design their own solutions and express their own ideas, choosing from a variety of tools and methodologies in Risk Assessment and Management.

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

Module Aims

Every organisation faces the risk of unexpected, harmful events that can readily result in catastrophic failures, including financial, legal, societal and reputational losses. Risk management is the identification, evaluation, and prioritisation of risks followed by a coordinated sequence of preventive and remedial actions to minimise, monitor, and control the probability or impact of such events or to maximize the realisation of opportunities. Threats can stem from a wide variety of sources, including financial uncertainty, legal liabilities, strategic management errors, human error, accidents and natural disasters, IT security threats and data-related risks. Risk management enables a company establish procedures to avoid such potential threats, and minimise their impact should they occur.

This module will enable students to 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, HACCPT, 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	Evaluate and apply the tools and methodologies of Risk Assessment and Management 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. Work as part of a team to solve problems systematically and creatively, and 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 also 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 face to face. Special individual or group meetings 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).

Throughout the module, students will be set formative assessment activities that will help develop confidence in assessing and managing risks in a variety of different environments. The timely constructive feedback from formative assessment will support students develop the skills and knowledge required for the summative assessment.

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. This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Third Edition (AHEP3) as published by The Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify six key areas of learning: Science and Mathematics (SM), Engineering Analysis (EA), Design (D), Economic, Legal, Social, Ethical and Environmental Context (EL), Engineering Practice (P) and Additional General Skills (G). SM2m, EA1m, D1, D2, EL1m, EL2, EL3m, EL5m, EL6m, EL7m, P1, P4, P5, P6, P8, P9m, P10m, P11m, G1, G2, G4, SM8M, EL8M, EL9M, EL10M, EL11M, EL12M, EL13M. Further details of these learning outcomes can be found at https://www.engc.org.uk/.

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 1&2). The coursework part of the assessment will be on the qualitative part of RAM (LO 2&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.

Throughout the tutorial and the coursework, lots of opportunities are provided for students to design their own solutions and express their own ideas, choosing from a variety of tools and methodologies in Risk Assessment and Management.

Mode of Assessment

Type	Method	Description	Weighting
Summative	Examination - Closed Book	Closed Book Examination	50%
Summative	Coursework - Written	Group project with peer review	50%

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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https://bradford.ac.uk