

Module Details	
Module Title	Reliability and Safety Engineering
Module Code	ENB6009-B
Academic Year	2024/5
Credits	20
School	School of Engineering
FHEQ Level	FHEQ Level 6

Contact Hours	
Type	Hours
Lectures	20
Tutorials	20
Directed Study	160

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

Module Aims
The students will be able to develop a detailed knowledge of the theories, principles and practices of reliability and safety engineering and apply these principles in the design, operation and maintenance of complex systems.

Outline Syllabus
<p>Reliability Engineering: Introduction and fundamental concepts of reliability engineering. Reliability Basics. Reliability functions and constant failure models. The Weibull distribution and its applications. Reliability block diagrams. Reliability data analysis. Use of life distributions (Weibull, Normal, Lognormal) and discrete distributions (Poisson, Binomial). Estimation of reliability parameters using graphical methods. Reliability standards. Advanced topics in reliability engineering.</p> <p>Safety Engineering: Introduction to Safety Engineering and hazard & risk Management. System Safety Process & Process Safety Management. Hazard and operability studies (HAZOP). Failure modes effects and criticality analysis (FMECA). Hazard Analysis. Critical Point Technique (HACCPT). Bow-Tie Analysis and Layers of Protection Analysis. Major safety accidents' case studies. Fire safety management. Hazardous Classification and FF equipment. Human Factor and Safety Management.</p>

Learning Outcomes	
Outcome Number	Description
01	1.1 Critically appraise the use and review of complex reliability and safety engineering tools and their practical application in complex systems.
02	2.1 Apply reliability and safety tools and techniques to real-world examples in a wide spectrum of industries. 2.2 Estimate reliability parameters of simple and complex systems. 2.3 Calculate the system reliability. 2.4 Perform Reliability Block Diagrams calculations, use discrete and continuous statistical distributions in Reliability Analysis, and perform HAZOP and Fault Tree Analysis. 2.5 Carry out a quantitative Safety Engineering study. 2.6 Apply System Safety Standards. 2.7 Include Human Factors in engineering safety applications.
03	3.1 Enhance your skills in data management; data presentation and interpretation; IT skills; systematic problem-solving; and creative problem-solving.

Learning, Teaching and Assessment Strategy
<p>Concepts, theories and principles explored in formal lectures and practical tutorials. The students' cognitive, practical and personal skills are developed in problem-solving exercises, achieved by working in small groups supported by members of academic staff. Video presentations, where appropriate, are used to enhance learning. Oral feedback is given during tutorials. Face-to-face meetings with individual groups will be set up to provide further support and guidance, as appropriate. Guest speakers enhance learning and provide practical experience related to selected topics in reliability and safety engineering. The assessment will consist of a closed book examination and group coursework. The latter will include peer review to assess the individual student contribution to the group work. Both components of assessment will examine the wider learning outcomes expressed in the descriptor. Supplementary assessment is to repair deficiency in the original assessment for the examination. The group coursework re-assessment will be individual coursework for supplementary assessment.</p>

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Examination - Closed Book	Closed Book Examination (120 minutes)	50%
Summative	Coursework - Written	Group Coursework (2000 words per Student) Supplementary: Individual Coursework	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.

