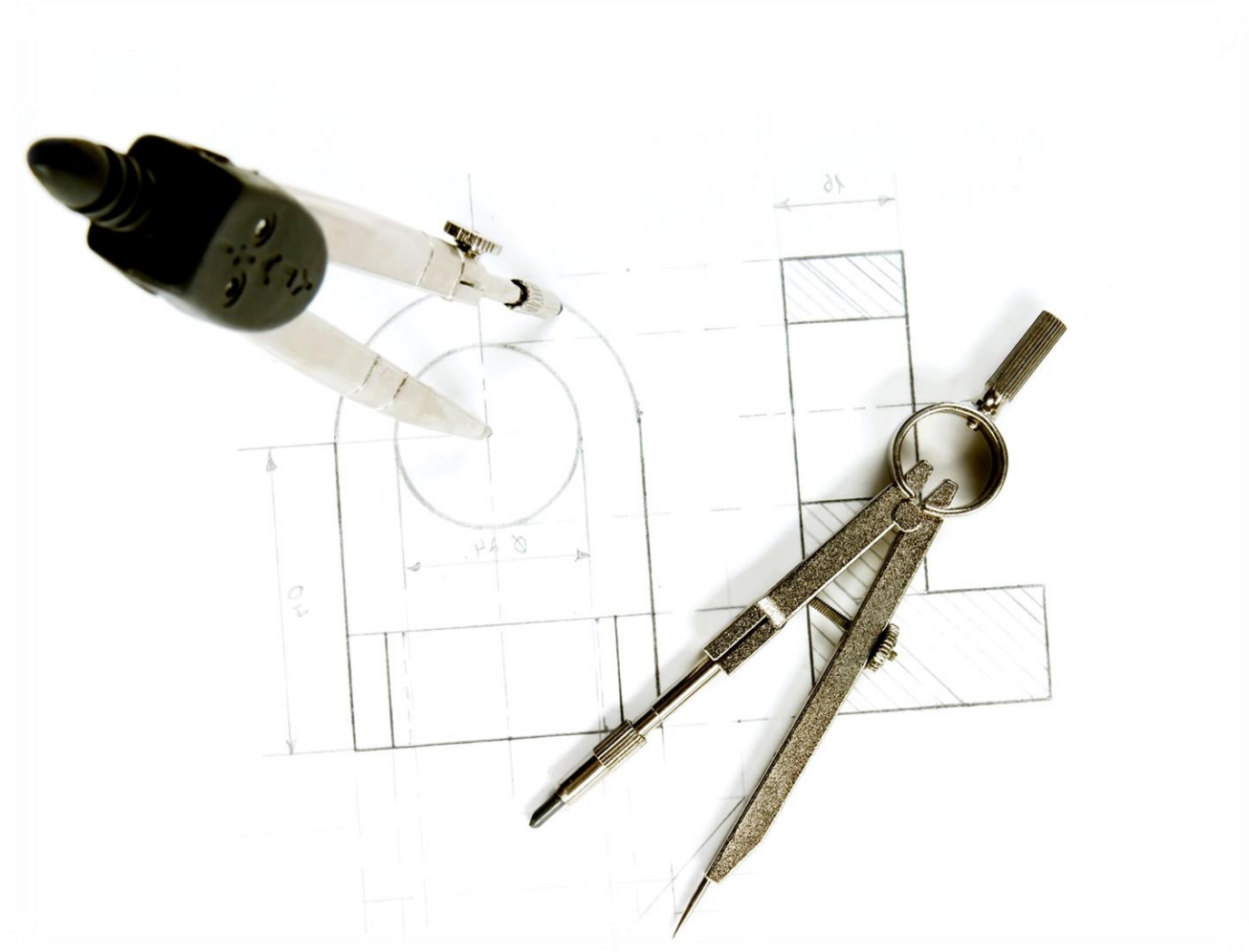

BEng (Hons) Mechanical Engineering

Programme Specification

Valid from September 2020

Contents

Programme Information

BEng (Honours) in Mechanical Engineering

Teaching Institution	Furness College
Location	Furness College Channelside Barrow in Furness Cumbria LA14 2PJ
Mode of Attendance	Full Time or Part Time
Date of Revalidation	Effective from September 2020
Accrediting Body	The Institute of Engineering and Technology (IET)
Final Award and FHEQ Level	BEng (Honours) in Mechanical Engineering FHEQ Level Six
Exit Award and FHEQ Level	BEng (Ordinary) in Mechanical Engineering FHEQ Level Five
QAA Subject Benchmarks	QAA Subject Benchmark Statement for Engineering 2019
Other External and Internal Reference Points	UK Standard for Professional Engineering Competence – Third Edition Accreditation of Higher Education Programmes: UKSPEC **(AHEP:UKSPEC)** Engineering Employer Forums Student Consultation Lancaster University Regulations and Guidelines

Educational Purpose and Aims of the Programme

The specific aim of the programme is to provide learners with an undergraduate education in the discipline of mechanical engineering, providing them with the knowledge, skills, understanding, and competencies that they will require to develop as a professional engineer. Successful completion of this programme will be an important step in achieving CEng status.

The broader aims of the programme are to provide learners with an enjoyable, intellectually demanding and stimulating experience that allows them the opportunity to develop the characteristics expected of mechanical engineering graduates, as described in the QAA benchmark for engineering (QAA 2019). These are stated below

- be pragmatic, taking a systematic approach and the logical and practical steps necessary for, often complex, concepts to become reality
- seek to achieve sustainable solutions to problems and have strategies for being creative, innovative and overcoming difficulties by employing their skills, knowledge and understanding in a flexible manner
- be skilled at solving problems by applying their numerical, computational, analytical and technical skills, using appropriate tools
- be risk, cost and value-conscious, and aware of their ethical, social, cultural, environmental, health and safety, and wider professional responsibilities
- be familiar with the nature of business and enterprise in the creation of economic and social value appreciate the global dimensions of engineering, commerce and communication
- be able to formulate and operate within appropriate codes of conduct, when faced with an ethical issue
- Be professional in their outlook, be capable of team working, be effective communicators, and be able to exercise responsibility and sound management approaches

Admissions Criteria

Candidates wishing to enter the programme at level five will usually have completed 120 credits from a pre-requisite Level 4 HNC in an engineering programme.

- Candidates with an average of a merit or higher at HNC/D in Engineering will be allowed to enter onto Level 5.
- Students wishing to enter the programme with a HNC/D will be required to have a level 4 in mathematics.
- Applicants without the formal qualifications described above, but with relevant work experience will be considered for entry to the Level 5 programme, following successful completion of an HNC/D or Accredited Prior Learning (APL)
- Applicants should hold a GCSE English qualification or equivalent. Applicants without this will be offered an English course of study at Furness College which must be successfully completed before they commence studies on the BEng programme.

All applicants are expected to demonstrate a high level of commitment and motivation for the programme, and are expected to manage their own time in order to meet the total learning hours required.

Candidates who wish to enter the programme with qualifications from other higher education institutions in the UK may be eligible to have their prior learning considered, resulting in some of their previous credits being transferred onto this programme. Candidates who fall into this category are required to provide a transcript from their previous higher education institution showing evidence of credits that have already been awarded, and descriptors of the modules they have already successfully completed detailing the content, learning outcomes, and FHEQ level of those modules. For further guidance on this, candidates are referred to the Lancaster University Manual of Academic Regulations and Procedures: Recognition of Prior Learning (2019)

Programme Learning Outcomes

The learning outcomes for programmes accredited for partial CEng are stated in the AHEP:UKSPEC. These are described across the following six dimensions

- Science and Mathematics (SM)
- Engineering Analysis (EA)
- Design (D)
- Economic, Legal, Social, Ethical and Environmental Context (ET)
- Engineering Practice (EP)
- Additional General Skills (G)

The AHEP learning outcomes are each divided further into more specific learning outcomes. These can be found in Appendix One. The learning outcomes for this programme are defined across the same dimensions in order to clearly demonstrate alignment with the QAA engineering subject benchmarks and the AHEP:UKSPEC. The tables below show how the learning outcomes are broken up, and how they are linked to the AHEP learning outcomes where applicable.

Evidence for the learning outcomes below will be generated using a variety of assessment methods within the modules that form this programme.

LO1 Science and Maths		
Learning Outcome	**Learning Outcome Description**	**AHEP Equivalent Where Applicable**
LO1a	Knowledge and understanding of the scientific principles and methodology underpinning mechanical engineering to solve engineering problems	SM1p
LO1b	Ability to apply knowledge and understanding of mathematical and statistical methods to analyse and solve engineering problems	SM2p
LO1c	Ability to incorporate knowledge and understanding of other engineering disciplines to support study of mechanical engineering	SM3p

LO2 Engineering Analysis		
Learning Outcome	**Learning Outcome Description**	**AHEP Equivalent Where Applicable**
LO2a	Apply understanding of engineering principles in order to analyse engineering processes	EA1p
LO2b	Analyse the performance of electrical and mechanical systems and components through the use of analytical methods and modelling techniques	EA2p
LO2c	Apply quantitative and computational methods in order to solve engineering problems and implement appropriate action	EA3p
LO2d	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems	EA4p

LO3 Design		
Learning Outcome	Learning Outcome Description	AHEP Equivalent Where Applicable
LO3a	Understand and evaluate business, consumer, and user needs	D1p
LO3b	Investigate and define engineering problems and their constraints	D2p
LO3c	Work with information that may be incomplete or uncertain	D3p
LO3d	Apply advanced problem-solving skills, technical knowledge and understanding to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem	D4p
LO3e	Plan and manage the engineering design process, including cost, and evaluate outcomes	D5p
LO3f	Communicate work to technical and non-technical audiences	D6p
LO3g	Apply appropriate practical methods to manufacture and construct engineering products	
LO3h	Employ appropriate computer software to assist in the design process	
LO3i	Analyse the life cycle of engineering products	

LO4 Economic, Legal, Social, Ethical and Environmental Context		
Learning Outcome	Learning Outcome Description	AHEP Equivalent Where Applicable
LO4a	Knowledge and understanding of the need for ethical conduct in engineering	ET1p
LO4b	Knowledge of the codes of conduct for engineering professionals and the need for a high level of professionalism	ET1p
LO4c	Knowledge and understanding of the commercial, economic, and social context of engineering	ET2p
LO4d	Knowledge and understanding of management techniques, including project management techniques, that can be used to meet engineering objectives	ET3p
LO4e	Knowledge and understanding of the environmental context of engineering and the need to promote sustainable development, and the ability to apply quantitative techniques where appropriate	ET4p
LO4f	Awareness of relevant legal requirements covering engineering practices	ET5p
LO4g	Awareness of health and safety, contractual, intellectual property rights, product safety and liability issues	ET5p
LO4h	Knowledge and understanding of risk issues and management techniques associated with engineering projects and practices	ET6p
LO4i	Understanding of innovation, commercial risk, and customer satisfaction as drivers for business success	
LO4j	Knowledge and understanding of leadership strategies in the engineering profession	

LO5 Engineering Practice		
Learning Outcome	Learning Outcome Description	AHEP Equivalent Where Applicable
LO5a	Understand the context in which engineering knowledge can be applied	EP1p
LO5b	Knowledge of characteristics of particular materials, equipment, processes, or products	EP2p
LO5c	Apply appropriate practical and laboratory skills	EP3p
LO5d	Understand the importance of, and apply information from technical literature and other sources	EP4p
LO5e	Knowledge of relevant legal and contractual issues	EP5p
LO5f	Understanding of appropriate codes of practice and industry standards	EP6p
LO5g	Awareness of quality issues and their application to continuous improvement	EP7p
LO5h	Ability to work with technical uncertainty	EP8p
LO5i	Understanding of, and the ability to work in, different roles within an engineering team	EP9p
LO5j	Ability to develop and implement computer programs	
LO5k	Ability to employ computer software packages to assist in data acquisition and the analysis of engineering systems/processes	

Programme Mapping

The tables below show how each module develops the learning outcomes listed in the previous section, and where they are assessed

Programme Map for Learning Outcomes One and Two

Module			LO1 Science and Maths			LO2 Engineering Analysis			
Module Code	Module Name	FHEQ Level	LO1a	LO1b	LO1c	LO2a	LO2b	LO2c	LO2d
TE510	Engineering Mathematics	5	X	X	X	X	X	X	X
TE511	Principles of Research	5							
TE522	Applied Mechanics	5	X	X		X	X		
TE515	Applied Thermodynamics	5	X	X	X	X	X	X	X
TE521	Group Project	5			X	X		X	X
TE523	Mechanical Computer Aided Engineering	5				X	X	X	X
TE520	Dynamics and Control	5	X	X	X	X	X	X	X
TE514	Advanced Manufacturing	5	X		X	X			X
TE610	Principles of Leadership and Management	6							
TE611	Sustainability in Engineering	6				X			
TE613	Fluid Dynamics and Heat Transfer	6	X	X	X	X	X	X	
TE614	Mechanical Systems	6	X	X	X	X	X		
TE615	Advanced Dynamics and Numerical Techniques	6	X	X	X	X	X	X	X
TE612	Engineering Measurement Systems	6	X		X				X
TE620	Advanced Level Project	6							

Programme Map for Learning Outcome Three

Module			LO3 Design								
Module Code	Module Name	FHEQ Level	LO3a	LO3b	LO3c	LO3d	LO3e	LO3f	LO3g	LO3h	LO3i
TE510	Engineering Mathematics	5									
TE511	Principles of Research	5									
TE522	Applied Mechanics	5									
TE515	Applied Thermodynamics	5									
TE521	Group Project	5	X	X	X	X	X	X	X		
TE523	Mechanical Computer Aided Engineering	5			X	X				X	
TE520	Dynamics and Control	5									
TE514	Advanced Manufacturing	5							X	X	X
TE610	Principles of Leadership and Management	6	X	X			X	X			
TE611	Sustainability in Engineering	6	X	X							X
TE613	Fluid Dynamics and Heat Transfer	6									
TE614	Mechanical Systems	6			X						
TE615	Advanced Dynamics and Numerical Techniques	6									
TE612	Engineering Measurement Systems	6									
TE620	Advanced Level Project	6									

Programme Map for Learning Outcome Four

Module			LO4 Economic, Legal, Social, Ethical and Environmental Context									
Module Code	Module Name	FHEQ Level	LO4a	LO4b	LO4c	LO4d	LO4e	LO4f	LO4g	LO4h	LO4i	LO4j
TE510	Engineering Mathematics	5										
TE511	Principles of Research	5	X				X	X	X			
TE522	Applied Mechanics	5										
TE515	Applied Thermodynamics	5										
TE521	Group Project	5		X	X	X				X	X	
TE523	Mechanical Computer Aided Engineering	5										
TE520	Dynamics and Control	5										
TE514	Advanced Manufacturing	5		X	X	X						
TE610	Principles of Leadership and Management	6	X	X	X	X	X	X	X	X	X	X
TE611	Sustainability in Engineering	6	X	X	X		X	X	X	X	X	
TE613	Fluid Dynamics and Heat Transfer	6										
TE614	Mechanical Systems	6										
TE615	Advanced Dynamics and Numerical Techniques	6										
TE612	Engineering Measurement Systems	6										
TE620	Advanced Level Project	6										

Programme Map for Learning Outcome Five

Module			LO5 Engineering Practice										
Module Code	Module Name	FHEQ Level	LO5a	LO5b	LO5c	LO5d	LO5e	LO5f	LO5g	LO5h	LO5i	LO5j	LO5k
TE510	Engineering Mathematics	5											
TE511	Principles of Research	5	X			X				X			
TE522	Applied Mechanics	5		X	X	X							
TE515	Applied Thermodynamics	5	X	X		X				X			
TE521	Group Project	5	X	X	X	X		X		X	X		
TE523	Mechanical Computer Aided Engineering	5	X		X	X		X		X			
TE520	Dynamics and Control	5	X		X								X
TE514	Advanced Manufacturing	5	X	X	X			X	X				
TE610	Principles of Leadership and Management	6	X			X	X	X	X	X	X		
TE611	Sustainability in Engineering	6		X		X	X	X					
TE613	Fluid Dynamics and Heat Transfer	6	X	X		X				X			
TE614	Mechanical Systems	6	X	X						X			
TE615	Advanced Dynamics and Numerical Techniques	6										X	X
TE612	Engineering Measurement Systems	6		X	X	X							
TE620	Advanced Level Project	6											

Programme Structure

Learners who meet the appropriate entry requirements will enter the programme at FHEQ level five, and complete a total of 120 credits at level five, and 120 credits at level six. For part time students, this will typically require four years of study in total, with two years being spent at level five, and two years at level six. For students wishing to study full time, then they would require one year to complete all of the level five modules, and one year to complete the level six modules. The table below shows how the programme is structured at the modular level, and the level and credit value of each module.

Students should expect to complete ten hours of learning for each credit earned, with the learning hours being a mixture of contact time and independent study. Detailed information about the learning hours and assessment requirements can be found on the module descriptors.

There are no optional modules offered on this programme, therefore all of the modules listed below are mandatory.

BEng in Mechanical Engineering Level Five (Part Time Years One and Two)			
Module Code	Module Name	Level	Credit Value
TE510	Engineering Mathematics	5	15
TE511	Principles of Research	5	15
TE522	Applied Mechanics	5	15
TE515	Applied Thermodynamics	5	15
TE521	Group Project	5	15
TE523	Mechanical Computer Aided Engineering	5	15
TE520	Dynamics and Control	5	15
TE514	Advanced Manufacturing	5	15
BEng in Mechanical Engineering Level Six (Part Time Years Three and Four)			
Module Code	Module Name	Level	Credit Value
TE610	Principles of Leadership and Management	6	15
TE611	Sustainability in Engineering	6	15
TE613	Fluid Dynamics and Heat Transfer	6	15
TE614	Mechanical Systems	6	15
TE615	Advanced Dynamics and Numerical Techniques	6	15
TE612	Engineering Measurement Systems	6	15
TE620	Advanced Level Project	6	30

Teaching, Learning and Assessment

The content, teaching, learning, and assessment strategies used on this programme are informed by the QAA Quality Code for Higher Education, the QAA Framework for Higher Education (2014), and the AHEP: UKSPEC Third Edition, and the QAA Subject Benchmark for Engineering (2019). The college also holds ongoing consultations and forums with students and local and national employers to seek advice on programme pathways, modules, content, and gaps in transferable skills.

Teaching and Learning

Teaching and learning will be delivered using a variety of means on this programme. The specific activities that can be expected are stated in the table below. More detail about the indicative hours of study required for contact and non-contact activities can be found in the module descriptors for each module. Contact time will be supplemented by timetabled tutorial sessions, where students will be able to direct their own learning, and support can be offered where appropriate.

These methods stated in the table below have been identified in order to allow the learners to benefit from the skills, knowledge, and experience of the colleges academic staff, to develop broad theoretical knowledge and understanding of mechanical engineering, to apply their knowledge and understanding in solving engineering problems, and to develop as active and independent learners who take responsibility for their own learning.

Typical Contact Activities	Non-Contact Activities
• Lectures • Tutorials • Practical demonstrations • Practical classes and workshops • Project work • Guest lectures	• e-Learning • Independent study • Reading course texts • Reviewing academic literature and articles • Assessment preparation • Tutorial problems

Student Support

The college has a fully staffed Student Services Department where students' needs that have been clearly identified at enrolment and induction are fully supported. This support can take various forms, such as individual or group tutorials on specific areas needing support (e.g. academic writing), individual support for dyslexia, special equipment loaned out to students to enable their studies. Referrals can be made to the support unit via the Programme Leader.

Summary of Student Support

- An induction programme welcoming students and introducing them to the programme of study and study skills.
- Student Handbook including a comprehensive description of the modules, information on course administration and other key information.
- Learning resources centre, Learning hubs, IEEE Xplore Digital Library.
- Project Room, Labs, Computer rooms and general HE resource information available.
- Teaching/Learning materials available on the VLE.
- Timetabled Tutorials with a focus on pastoral and PDP issues at least once per semester.
- HE Learning Support tutor and access to Teaching and Learning Support Services organised centrally.
- Student Services and Career tutors.
- An identified Programme Leader and Personal Tutor allocated at the beginning of the academic year. Monitoring of students' progress takes place via these two key members of staff and are reported to the Curriculum Manager on a regular basis and at course team meetings.
- Student feedback via Module Evaluation Questionnaires, Student Liaison Meetings, NSS

Assessment

BEng modules are assessed in various ways depending upon content. The following summarizes the forms of assessment that can be expected on the programme

- Written Coursework
- Closed Book Examinations (2 Hours)
- Project Output
- Dissertation
- Lab Reports
- Presentations

The weightings of each individual piece of assessment may vary from module to module, but will typically be as follows

- The majority of theoretical modules will be assessed by 30% coursework and 70% exam
- Project modules and practical skill based subjects will be assessed 100% by coursework

The module descriptor for each module of the scheme will indicate which strategy is to be used, and the assessment weightings and timings.

Assessment Regulations

Clear and detailed guidance on the assessment regulations are provided to students in the course handbook. Students are referred to this document for information regarding the following

- Extenuating Circumstance and Extension Requests
- Electronic Assignment Submission using Turnitin
- Exam Timetables
- Broad Grade Descriptors

For additional information regarding assessment and assessment regulations, students are referred to the Lancaster University Regional Teaching Partner Regulations (2019)

Appendix One – AHEP:UKSPEC Learning Outcomes

Science and Mathematics (SM) Learning Outcomes for Partial CEng

SM1p

"Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current, and future developments and technologies"

SM2p

"Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems"

SM3p

"Ability to apply and integrate knowledge and understanding from other engineering disciplines to support study of their own engineering discipline")

Engineering Analysis (EA) Learning Outcomes for Partial CEng

EA1p

"Understanding of engineering principles and the ability to apply them to analyse key engineering processes"

EA2p

"Ability to identify, classify, and describe the performance of systems and components through the use of analytical methods and modelling techniques"

EA3p

"Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action"

EA4p

"Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems"

Engineering Practices (EP) Learning Outcomes for Partial CEng

EP1p

"Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc)"

EP2p

"Knowledge of characteristics of particular materials, equipment, processes, or products"

EP3p

"Ability to apply relevant practical and laboratory skills"

EP4p

"Understanding of the use of technical literature and other information sources"

EP5p

"Knowledge of relevant legal and contractual issues"

EP6p

"Understanding of appropriate codes of practice and industry standards"

EP7p

"Awareness of quality issues and their application to continuous improvement"

EP8p

"Ability to work with technical uncertainty"

EP9p

"Understanding of, and the ability to work in, different roles within an engineering team"

Economic, legal, social, ethical and environmental context (ET) Learning Outcomes for Partial CEng

ET1p

"Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct"

ET2p

"Knowledge and understanding of the commercial, economic and social context of engineering processes"

ET3p

"Knowledge and understanding of management techniques, including project management that may be used to achieve engineering objectives"

ET4p

"Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate"

ET5p

"Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues"

ET6p

"Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, and of risk assessment and risk management techniques"

Engineering Design (D) Learning Outcomes for Partial CEng

D1p

"Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and Aesthetics"

D2p

"Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards"

D3p

"Work with information that may be incomplete or uncertain and quantify the effect of this on the design"

D4p

"Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal"

D5p

"Plan and manage the design process, including cost drivers, and evaluate Outcomes"

D6p

"Communicate their work to technical and non-technical audiences"