

EAB

Engineering Accreditation Board

Appendix B: Specified Learning Outcomes

Summary of Engineering Council Output Statements

Specific Learning Outcomes

Knowledge is information that can be recalled.

Understanding is the capacity to use concepts creatively, for example in problem solving, in design, in explanations and in diagnosis.

Know-how is the ability to apply learned knowledge and skills to perform operations intuitively, efficiently and correctly.

Skills are acquired and learned attributes which can be applied almost automatically.

Awareness is general familiarity, albeit bounded by the needs of the specific discipline.

In the tables below, the central column related to the BEng(Hons) for CEng, is the reference column and the ones to the left and right show enhancements or limitations to it. Where no enhancement or limitation is shown the statement in the central column applies.

UK-SPEC
Specific Learning Outcomes

IEng degree as an enhancement or limitation to BEng(Hons) for CEng		BEng(Hons) for CEng		Integrated MEng degree as enhancement of BEng(Hons)	
<i>The weighting given to these different broad areas of learning will vary according to the nature and aims</i>					
Underpinning Science and Mathematics and associated engineering disciplines (US)					
US1i	<ul style="list-style-type: none"> Knowledge and understanding of the scientific principles underpinning relevant technologies, and their evolution 	US1	<ul style="list-style-type: none"> 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 future developments and technologies. 	US1m	<ul style="list-style-type: none"> A comprehensive understanding of the scientific principles of own specialisation and related disciplines.
US2i	<ul style="list-style-type: none"> Knowledge and understanding of mathematics necessary to support application of key engineering principles 	US2	<ul style="list-style-type: none"> Knowledge and understanding of mathematical principles necessary to underpin their education in their engineering discipline and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems. 	US2m	<ul style="list-style-type: none"> A comprehensive knowledge and understanding of mathematical and computer models relevant to the engineering discipline, and an appreciation of their limitations.
US3		US3	<ul style="list-style-type: none"> Ability to apply and integrate knowledge and understanding of other engineering disciplines to support the study of their own engineering discipline 	US3m	<ul style="list-style-type: none"> An understanding of concepts from a range of areas including some outside engineering, and the ability to apply them effectively in engineering projects.
				US4m	<ul style="list-style-type: none"> An awareness of developing technologies related to own specialisation.

IEng degree		BEng(Hons) for CEng		Integrated MEng degree	
Engineering Analysis (E)					
E1i	<ul style="list-style-type: none"> Ability to monitor, interpret and apply the results of analyses and modelling in order to bring about continuous improvement 	E1	<ul style="list-style-type: none"> Understanding of engineering principles and the ability to apply them to analyse key engineering processes. 	E1m	<ul style="list-style-type: none"> Ability to use fundamental knowledge to investigate new and emerging technologies.
E2i	<ul style="list-style-type: none"> Ability to use the results of analysis to solve engineering problems, apply technology and implement engineering processes. 	E2	<ul style="list-style-type: none"> Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques 	E2m	<ul style="list-style-type: none"> Ability to extract data pertinent to an unfamiliar problem, and apply its solution using computer based engineering tools when appropriate
E3i	<ul style="list-style-type: none"> Ability to apply quantitative methods and computer software relevant to their engineering technology discipline(s), frequently within a multidisciplinary context. 	E3	<ul style="list-style-type: none"> Ability to apply quantitative methods and computer software relevant to their engineering discipline, to solve engineering problems 	E3m	<ul style="list-style-type: none"> Ability to apply mathematical and computer based models for solving problems in engineering, and the ability to assess the limitations of particular cases.
E4i	<ul style="list-style-type: none"> Ability to apply a systems approach to engineering problems through know-how of the application of the relevant technologies 	E4	<ul style="list-style-type: none"> Understanding of and ability to apply a systems approach to engineering problems 	E4	

IEng degree		BEng(Hons) for CEng		Integrated MEng degree	
<p><i>Design is the creation and development of an economically viable product, process or system to meet a defined need. It involves significant technical and intellectual challenges and can be used to integrate all engineering understanding, knowledge and skills to the solution of real problems. Graduates need the knowledge understanding and skills to:</i></p>					
<i>Design (D)</i>					
D1i	<ul style="list-style-type: none"> Define a problem and identify constraints. 	D1	<ul style="list-style-type: none"> Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues 	D1m	<ul style="list-style-type: none"> Wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.
D2i	<ul style="list-style-type: none"> Design solutions according to customer and user needs 	D2	<ul style="list-style-type: none"> Understand customer and user needs and the importance of considerations such as aesthetics 	D2	
D3		D3	<ul style="list-style-type: none"> Identify and manage cost drivers 	D3	
D4i	<ul style="list-style-type: none"> Use creativity and innovation in a practical context 	D4	<ul style="list-style-type: none"> Use creativity to establish innovative solutions 	D4m	<ul style="list-style-type: none"> Ability to generate an innovative design for products, systems, components or processes to fulfil new needs.
D5i	<ul style="list-style-type: none"> Ensure fitness for purpose (including operation, maintenance, reliability etc) 	D5	<ul style="list-style-type: none"> Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal 	D5m	
D6i	<ul style="list-style-type: none"> Adapt designs to meet their new purposes or applications 	D6	<ul style="list-style-type: none"> Manage the design process and evaluate outcomes 	D6	

IEng degree		BEng(Hons) for CEng		Integrated MEng degree	
<i>Economic, social and environmental context (S)</i>					
S1		S1	<ul style="list-style-type: none"> Knowledge and understanding of commercial and economic context of engineering processes 	S1m	<ul style="list-style-type: none"> The ability to make general evaluations of commercial risks through some understanding of the basis of such risks
S2		S2	<ul style="list-style-type: none"> Knowledge of management techniques which may be used to achieve engineering objectives within that context 	S2m	<ul style="list-style-type: none"> Extensive knowledge and understanding of management and business practices, and their limitations, and how these may be applied appropriately <i>to strategic and tactical issues</i>.
S3		S3	<ul style="list-style-type: none"> Understanding of the requirement for engineering activities to promote sustainable development 	S3	
S4		S4	<ul style="list-style-type: none"> Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk) issues. 	S4	
S5		S5	<ul style="list-style-type: none"> Understanding of the need for a high level of professional and ethical conduct in engineering 	S5	

IEng degree		BEng(Hons) for CEng		Integrated MEng degree	
Practical application of engineering skills, combining theory and experience, and use of other relevant knowledge and skills. This must include an appropriate combination of the majority of these outcomes					
Engineering Practice (P)					
P1i	<ul style="list-style-type: none"> Understanding of and ability to use relevant equipment, tools, processes, or products 	P1	<ul style="list-style-type: none"> Knowledge of characteristics of particular equipment, processes or products 	P1m	<ul style="list-style-type: none"> A thorough understanding of current practice and its limitations and some appreciation of likely new developments
P2i	<ul style="list-style-type: none"> Knowledge and understanding of workshop and laboratory practice 	P2	<ul style="list-style-type: none"> Workshop and laboratory skills 	P2m	<ul style="list-style-type: none"> Extensive knowledge and understanding of a wide range of engineering materials and components
P3i	<ul style="list-style-type: none"> Knowledge of contexts in which engineering knowledge can be applied (e.g. operations and management, application and development of technology, etc) 	P3	<ul style="list-style-type: none"> Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, technology, development, etc) 	P3	
P4i	<ul style="list-style-type: none"> Ability to use and apply information from technical literature 	P4	<ul style="list-style-type: none"> Understanding use of technical literature and other information sources 	P4	
P5		P5	<ul style="list-style-type: none"> Awareness of nature of intellectual property and contractual issues 	P5	
P6i	<ul style="list-style-type: none"> Ability to use appropriate codes of practice and industry standards 	P6	<ul style="list-style-type: none"> Understanding of appropriate codes of practice and industry standards 	P6	
P7i	<ul style="list-style-type: none"> Awareness of quality issues and their application to continuous improvement 	P7	<ul style="list-style-type: none"> Awareness of quality issues 	P7	
P8i	<ul style="list-style-type: none"> Understanding of the principles of managing engineering processes 	P8	<ul style="list-style-type: none"> Ability to work with technical uncertainty 	P8m	<ul style="list-style-type: none"> Ability to apply engineering techniques taking account of a range of commercial and industrial constraints