# **Further Learning Report - Introduction**

If you are advised that the Further Learning Report (FLR) option for IEng is available to you, you may use this to demonstrate further learning to an accredited Bachelor’s level in order to satisfy the IEng academic benchmark and progress to Professional Review.

# **What is an accredited qualification?**

Accredited engineering and technology programmes provide the exemplifying levels of understanding, knowledge and skills for professional competence.

The six key areas of learning within accredited degree programmes are:

* Science and mathematics
* Engineering analysis
* Design
* Economic, legal, social, ethical and environmental context
* Engineering practice
* Additional general skills

In general, accredited BEng programmes are characterised by

* Technical proficiency of a high level in a major field of engineering, including the ability to tackle a wide variety of practical problems, however specialised.
* A professional attitude towards matters such as the design reliability and maintenance, sustainability, product quality and value, marketing and safety.
* Oral and written communication skills.
* A professional approach to relationships with clients, customers and colleagues, including supervision of staff, and the ability to work as a member of an engineering team within an ethical framework.
* An appropriate exposure to environmental, health and safety considerations for staff and the general public.

# **How to demonstrate that your learning meets the academic benchmark for IEng**

You should complete the table below which lists the BEng learning outcomes of accredited courses and identify, with supporting evidence as an Appendix, how your learning meets each of the criteria.

As the comparison is an academic one, the evidence supplied by you in the FLR must exhibit suitable rigour and measurability through recognised assessment processes. The requirement can be met either through conventional qualifications or examinations, or through work-based assessment based on verifiable and certified achievements.

# **Interpretation**

Within the below table, the following terms are used with the meanings stated:

* **Understanding** is the capacity to use concepts creatively, for example, in problem solving, design, explanations and diagnosis
* **Knowledge** is information that can be recalled
* **Know-how** is the ability to apply learned knowledge and skills to perform operations intuitively, efficiently and correctly
* **Skills** are acquired and learned attributes that can be applied almost automatically
* **Awareness** is general familiarity, albeit bounded by the needs of the specific discipline
* **Complex** implies engineering problems, artefacts or systems that involve dealing simultaneously with a sizeable number of factors that interact and require deep understanding, including knowledge at the forefront of the discipline, to analyse or deal with

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| **Science and Mathematics**Engineering is underpinned by science and mathematics, and other associated disciplines, as defined by the relevant professional engineering institution(s). Graduates will need the following knowledge, understanding and abilities: |
| **BEng Learning Outcomes** | **Formal Learning** | **Learning in the workplace** |
| Knowledge and understanding of scientific principles and methodology 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 |  |  |
| 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 |  |  |
| Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline |  |  |

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| **Engineering Analysis**Engineering analysis involves the application of engineering concepts and tools to the solution of engineering problems. Graduates will need:  |
| **BEng Learning Outcomes** | **Formal Learning** | **Learning in the workplace** |
|  Understanding of engineering principles and the ability to apply them to analyse key engineering processes |  |  |
| Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques |  |  |
| Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action  |  |  |
| Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems |  |  |

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| **Design**Design at this level 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 and complex problems. Graduates will therefore need the knowledge, understanding and skills to: |
| **BEng Learning Outcomes** | **Formal Learning** | **Learning in the workplace** |
|  Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics |  |  |
| 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  |  |  |
| Work with information that may be incomplete or uncertain and quantify the effect of this on the design  |  |  |
| 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  |  |  |
| Plan and manage the design process, including cost drivers, and evaluate outcomes |  |  |
| **Economic, Legal, Social, Ethical and Environmental Context** Engineering activity can have impacts on the environment, on commerce, on society and on individuals. Graduates therefore need the skills to manage their activities and to be aware of the various legal and ethical constraints under which they are expected to operate, including:  |
| **BEng Learning Outcomes** | **Formal Learning** | **Learning in the workplace** |
|  Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct |  |  |
| Knowledge and understanding of the commercial, economic and social context of engineering processes |  |  |
| Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives |  |  |
| Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate |  |  |
| Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues |  |  |
| Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, and of risk assessment and risk management techniques |  |  |
| **Engineering Practice**This is the practical application of engineering skills, combining theory and experience, and use of other relevant knowledge and skills. This can include: |
| **BEng Learning Outcomes** | **Formal Learning** | **Learning in the workplace** |
|  Understanding of contexts in which engineering knowledge can be applied (for example operations and management, application and development of technology, etc.) |  |  |
| Knowledge of characteristics of particular materials, equipment, processes or products |  |  |
| Ability to apply relevant practical and laboratory skills |  |  |
| Understanding of the use of technical literature and other information sources |  |  |
| Knowledge of relevant legal and contractual issues |  |  |
| Understanding of appropriate codes of practice and industry standards |  |  |
| Awareness of quality issues and their application to continuous improvement |  |  |
| Ability to work with technical uncertainty |  |  |
| Understanding of, and the ability to work in, different roles within an engineering team |  |  |
| **Additional General Skills**Graduates must have developed transferable skills, additional to those set out in the other learning outcomes, that will be of value in a wide range of situations, including the ability to:  |
| **BEng Learning Outcomes** | **Formal Learning** | **Learning in the workplace** |
|  Apply their skills in problem solving, communication, information retrieval, working with others and the effective use of general IT facilities |  |  |
| Plan self-learning and improve performance, as the foundation for lifelong learning/CPD |  |  |
| Plan and carry out a personal programme of work, adjusting where appropriate |  |  |
| Exercise initiative and personal responsibility, which may be as a team member or leader |  |  |