

The Skills, Attributes and Qualities of an Engineer

From: Maddocks AP, Dickens JG, Crawford AR, 2002, "Encouraging Lifelong Learning by means of a Web-based Personal and Professional Development Tool", ICEE 2002, UMIST, Manchester, 18-22 Aug, 8pp.

The Subject Benchmark statement for engineering details skills, attributes and qualities that are thought necessary to enable the engineer to practice effectively in a professional manner. It is expected that an engineering degree programme will foster, develop and inculcate such attributes, skills and qualities. These attributes, skills and qualities are listed in the Subject Benchmark Statement under five headings:

- Knowledge and Understanding
- Intellectual Abilities
- Practical Skills
- General Transferable Skills
- Qualities.

The full Benchmark Statement is available at...

<http://www.qaa.ac.uk/crntwork/benchmark/engineering.pdf>

The attributes are summarised in the table below:

Heading	Demonstration of Skills / Attributes / Qualities
Knowledge & Understanding	A Graduating Engineer should be able to demonstrate: <ul style="list-style-type: none">• Specialist (Discipline) knowledge• Understanding of external constraints• Business and Management techniques• Understanding of professional and ethical responsibilities• Understanding of the impact of engineering solutions on society• Awareness of relevant contemporary issues

Heading	Demonstration of Skills / Attributes / Qualities
Intellectual Abilities	<p>A Graduating Engineer should be able to demonstrate:</p> <ul style="list-style-type: none"> • The ability to solve engineering problems, design systems etc. through creative and innovative thinking • The ability to apply mathematical, scientific and technological tools • The ability to analyse and interpret data and, when necessary, design experiments to gain new data • The ability to maintain a sound theoretical approach in enabling the introduction of new technology • The ability to apply professional judgement, balancing issues of costs, benefits, safety, quality etc. • The ability to assess and manage risks
Practical Skills	<p>A Graduating Engineer should be able to:</p> <ul style="list-style-type: none"> • Use a wide range of tools, techniques, and equipment (including software) appropriate to their specific discipline • Use laboratory and workshop equipment to generate valuable data • Develop, promote and apply safe systems of work
General Transferable Skills	<p>A Graduating Engineer should be able to:</p> <ul style="list-style-type: none"> • Communicate effectively, using both written and oral methods • Use Information Technology effectively • Manage resources and time • Work in a multi-disciplinary team • Undertake lifelong learning for continuing professional development
Qualities	<p>A Graduating Engineer should be:</p> <ul style="list-style-type: none"> • Creative, particularly in the design process • Analytical in the formulation and solutions of problems • Innovative, in the solution of engineering problems • Self-motivated, • Independent of mind, with intellectual integrity, particularly in respect of ethical issues • Enthusiastic, in the application of their knowledge, understanding and skills in pursuit of the practice of engineering