

International Engineering Alliance

Glossary of Terms

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Ability: a bodily or mental power to perform an action.

Accreditation of programmes (Programme accreditation): recognition given to a programme as meeting applicable criteria as a result of an evaluation process.

Accredited [engineering] educational qualification: a qualification awarded on successful completion of an accredited programme.

Accredited programme: a programme that has been evaluated and recognised by an accrediting body as meeting stated criteria.

Analyse: Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose - involving differentiating, organizing and attributing. See [Problem analysis](#), [Solution synthesis](#)

Application: the ability to use comprehended knowledge in a new situation involving the use of rules, laws, methods, theories, strategies, heuristics; the production of useful artifacts as a result of using engineering knowledge and skills.

Apply: carrying out or using a procedure in a given situation, executing or implementing. (Anderson-Krathwohl form)

Attributes, graduate: See [Graduate Attributes](#).

Awareness: In general, knowledgeable being conscious; cognizant, informed alert; specifically in engineering context: being alert to identify conditions or situations that require action.

Branch of engineering: a generally-recognised, major subdivision of engineering such as the traditional disciplines of Chemical, Civil, or Electrical Engineering, or a cross-disciplinary field of comparable breadth including combinations of engineering fields, for example Mechatronics, and the application of engineering in other fields, for example Bio-Medical Engineering.

Broadly-defined engineering activities: a class of activities with characteristics defined in section 4.2 of the IEA Graduate Attributes and Professional Competencies v2.

Broadly-defined engineering problems: a class of problem with characteristics defined in section 4.1 of the IEA Graduate Attributes and Professional Competencies v2.

Category of professional [registration]: engineer, engineering technologist and engineering technician or similarly named roles defined by their distinctive competencies and level of responsibility to the public.

Change management: is a structured approach to ensuring a successful transition from a current state to a desired future state by individuals, teams, technologies and organizations

Code of practice: a document, not normally having the force of law, that provide guidance on management or other practices to be adopted in implementing the principles of professional Codes of Conduct and other regulations.

Communication [professional and technical]: is the process of spoken, written and graphical exchange of information, views, opinions between professionals and peers, other professionals, superiors, subordinates, clients, authorities and laypersons.

Competence: The state of having the attributes necessary to perform the activities within the profession or occupation to the standards expected in independent employment or practice.

Competency assessment: is a summative assessment of an individual's competency against a prescribed standard based on evidence from the individual's work, reports by qualified observers, and other tests that may include a professional review.

Competency standard: statement of competence required for a defined purpose.

Competency-based standards [for registration]: statements of the criteria for registration as an engineering professional in the form of outcomes that must be demonstrated and the required level of performance.

Complementary (contextual) knowledge: Disciplines other than engineering, basic and mathematical sciences, that support engineering practice, enable its impacts to be understood and broaden the outlook of the engineering graduate.

Complex engineering activities: a class of activities with characteristics defined in section 4.2 of the IEA Graduate Attributes and Professional Competencies v2.

Complex engineering problems: a class of problem with characteristics defined in section 4.1 of the IEA Graduate Attributes and Professional Competencies v2.

Complex system or situation: has many component parts and their relationships and dependencies are numerous or not simply described.

Comprehend/comprehension: synonymous with understand/understanding. See [Understanding](#)

Computing and information technologies: encompasses the use of computers, networking and software to support engineering activity and as an engineering activity in itself as appropriate to the discipline.

Continuing professional development: the systematic, accountable maintenance, improvement and broadening of knowledge and skills, and the development of personal qualities necessary for the execution of professional and technical duties throughout an engineering practitioner's career.

Continuous quality improvement: a practice, based on the concept that improvement of a process is always possible, involving ongoing assessment of the process and measures to maintain and improve its quality.

Course: a building block of a programme with defined prerequisites, content and learning objectives with assessment that, if completed successfully, provides credit toward a qualification. Often synonymous with Module. Course is also used to mean programme (UK).

Create: putting elements together to form a novel, coherent whole or make an original product: generating, planning or producing. (Anderson-Krathwohl)

Credit: a measure of the volume of learning attached to a course or module calculated according to the procedure defined in the relevant standard for the type of programme; a level may be associated with an assigned number of credits.

Critical: used to describe a factor, component, process, issue or decision in an engineering activity requiring analysis and judgement from which other consequences follow; an entity or operation that must be successfully implemented or completed to ensure that a more complex operation or system can function: failure of the critical entity or operation compromises the whole.

Depth of knowledge: is quantified largely by the specialist engineering sciences in the curriculum.

Design: see [Engineering Design](#)

Educational accord: is an agreement that provides benchmarking of educational standards and mutual recognition benefits to individuals who hold qualifications accredited by signatories. See [Professional Level Agreement](#)

Educational objectives: a statement of the intended achievement that graduates of a programme must be capable of, often with emphasis on the early years after graduation.

Engineer: strict application applies to persons with professional, chartered or similar status or engineer title.

Engineering: (n) an activity that seeks to meet identified needs of people and societies by the purposeful application of engineering sciences, technology and techniques to achieve predicted solutions that use available resources efficiently, are economical, that manage risks; engineering is carried out by practitioners performing roles differentiated by the level of problem analysis and solution, the activity to be managed, risk and responsibility.

Engineering (a): to do with the activity of engineering.

Engineering Activities include but are not limited to: design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; engineering operations and maintenance; project management; research, development and commercialisation.

Engineering application: a situation in which engineering knowledge, skills and methods are brought to bear to provide a beneficial result.

Engineering design: is the systematic process of conceiving and developing materials, components, systems and processes to serve useful purposes. Design may be procedural, creative or open-ended and requires application of engineering sciences, working under constraints, and taking into account economic, health and safety, social and environmental factors, codes of practice and applicable laws.

Engineering design knowledge: Knowledge that supports engineering design in a practice area, including codes, standards, processes, empirical information, and knowledge reused from past designs.

Engineering discipline: synonymous with [branch of engineering](#).

Engineering education programme: an educational programme that aims to provide the educational base toward becoming an engineering professional and satisfies criteria prescribed by an engineering accreditation body.

Engineering fundamentals: a systematic formulation of engineering concepts and principles based on mathematical and basic sciences to support applications.

Engineering graduate: the holder of an engineering qualification.

Engineering knowledge: is based on fundamental engineering sciences, engineering specialist knowledge and engineering contextual knowledge

Engineering management: the generic management functions of planning, organising, leading and controlling, applied together with engineering knowledge in contexts including the management of projects, construction, operations, maintenance, quality, risk, change and business. See [Project Management](#), [Operations Management](#)

Engineering practice area: a generally accepted or legally defined area of engineering work or engineering technology.

Engineering practitioner: a person in an engineering role or category recognized in the context, for example engineers, engineering technologists and engineering technicians.

Engineering problem: is a problem that exists in any domain that can be solved by the application of engineering knowledge and skills and generic competencies.

Engineering qualifications: an award granted at the end of an engineering education programme

Engineering sciences: include engineering fundamentals that have roots in the mathematical and physical sciences, and where applicable, in other natural sciences, but extend knowledge and develop models and methods in order to lead to applications and solve problems, providing the knowledge base for engineering specializations.

Engineering speciality or specialization: a generally-recognised practice area or major subdivision within an engineering discipline, for example Structural and Geotechnical Engineering within Civil Engineering; the extension of engineering fundamentals to create theoretical frameworks and bodies of knowledge for engineering practice areas.

Engineering specialist knowledge: the knowledge associated with an engineering specialization.

Engineering technologist: an engineering practitioner whose competence lies in the application of particular engineering technologies to a class of applications.

Engineer and society: See [Societal Context](#)

Engineering technology: is an established body of knowledge, with associated tools, techniques, materials, components, systems or processes that enable a family of practical applications and that relies for its development and effective application on engineering knowledge and competency.

Engineering technician: and engineering practitioner whose role is to apply established the methods or techniques of an area of practice.

Environmental: Relating to the analysis, design and planning and operation of measures and processes to improve air, water, or land resources, to supply clean water, to improve air quality and to remediate land degradation and pollution.

Engineering ethics: See [Professional Ethics](#)

Evaluate: making judgments based on criteria and standards, including checking and critiquing. (Anderson-Krathwohl form)

Exemplar: a model or pattern for the outcomes of an educational programme available to be copied or imitated in designing national standards by a party seeking to obtain signatory status of an

educational accord.

Exit-level outcome: is a statement of the learning outcomes the student must demonstrate at the exit level to qualify for award of a qualification; these actions indicate the student's capability to fulfill the educational objectives.

Forefront of knowledge in an engineering discipline/speciality: defined by current published research in the discipline or speciality.

Forefront of the professional discipline/branch: defined by the most advanced practice in the specialisations within the discipline.

Formative development: the process that follows the attainment of an accredited education programme that consists of training, experience and expansion of knowledge.

General range statements: Range statements applicable to generic competencies See [Range Indicator/Statement](#)

Generic competence: is a competency that is required within a category of registration irrespective of the industry sector, job function or discipline in which the competency is exercised.

Graduate attributes form a set of individually assessable outcomes that are the components indicative of the graduate's potential to acquire competence to practise at the appropriate level. The graduate attributes are exemplars of the attributes expected of graduate from an accredited programme. Graduate attributes are clear, succinct statements of the expected capability, qualified if necessary by a range indication appropriate to the type of programme.

Impact [of an engineering activity or solution]: an effect that the engineering activity or solution has on a person, community or party; on the environment etc

Independent learning: the ability and process of acquiring knowledge and skills without reliance on formal instruction alone. See [Lifelong learning](#)

In-depth engineering knowledge: knowledge at a specialised level.

Infrequent: applied to engineering problems, situations or tasks means not encountered routinely by a typical practitioner.

Integrated performance: means that demonstration of competence via an activity or set of activities requires several outcomes to be satisfactorily attained.

Investigate: examine an incident or component, system or process with a view to making recommendations to solve a problem or improve performance, by process which may include analysis, modelling or experiment.

Judgement: the ability to think of many matters at once, in their interdependence, their related importance and their consequences to arrive at an opinion, estimate or conclusion.

Know-how: A particular kind of technical knowledge that is needed to accomplish a task.

Knowledge profile: the broad characteristics of the different components of the knowledge embodied in a programme.

Level: a measure of learning demands in terms of types of problems, knowledge required, skills and responsibility, expressed in terms of level descriptors.

Lifelong learning: a process of constant learning with the aim of maintaining and extending competency that has informal, voluntary components and more formalised continuing professional development arrangements, relying on the ability to learn independently.

Local knowledge: knowledge that is specific to a jurisdiction, for example legal requirements, or a practice context, for example the detailed properties of locally available materials. See [Universal knowledge](#)

Manage: means planning, organising, leading and controlling in respect of risk, project, change, financial, compliance, quality, ongoing monitoring, control and evaluation. See [Engineering Management](#)

Mathematical sciences: mathematics, numerical analysis, statistics and aspects of computer science cast in an appropriate mathematical formalism.

Method: a procedure, technique, or way of doing something, especially in accordance with a definite plan; a manner or mode of procedure, especially an orderly, logical, or systematic way of instruction, inquiry, investigation, experiment, presentation; order or system in doing anything

Model: a representation of a system, component or material for that adequately describes the object for a purpose such as analysis or design.

Module: often synonymous with course.

Multidisciplinary: applied to activity that requires the knowledge and skills of persons in different disciplines or specialities, both in and outside engineering.

Natural sciences: Provide, as applicable in each engineering discipline or practice area, an understanding the physical world including physics, mechanics, chemistry, earth sciences and the biological sciences.

Norms of engineering practice: the generally expected or accepted level of performance which may not or may not be enshrined in a standard.

Operations management: the ongoing, repetitive, cyclical semi-permanent activity to deliver services or produce products. See [Project Management](#) [Engineering Management](#)

Outcomes, programme: see [Programme Outcomes](#)

Outcomes-based criteria: criteria for accrediting a programme that are stated in terms of the outcomes that graduating students must have demonstrated.

Performance indicators: are assessable actions that a person must demonstrate in order to satisfy an outcome (indicators may be prescribed or typifying)

Practice area: *in the educational context:* synonymous with generally-recognised engineering speciality; *at the professional level:* a generally recognised or distinctive area of knowledge and expertise developed by an engineering practitioner by virtue of the path of education, training and experience followed.

Principles (of engineering): general laws of the natural and engineering sciences and good practice.

Principles-based: An approach to an action that uses the relevant concepts and principles to guide and support the work.

Problem analysis: a systematic analysis of a problem to ensure proper identification of the problem, full

understanding of the situation and the criteria for an acceptable solution, generally as a prelude to solution synthesis. See [solution synthesis](#)

Problem solving: the combination of problem analysis and solution synthesis; is the ability to get answers to questions through a conscious, organised process.

Professional level agreement: are agreements that provide benchmarking professional standards and aim to provide mobility at professional level. See [Educational Accord](#)

Professional category [of registration]: a mode of registering a person who is competent to perform a particular professional role, for example, engineer, engineering technologist or engineering technician.

Professional competency profiles: for each professional category record the elements of competency necessary for competent performance that the professional is expected to be able to demonstrate in a holistic way at the stage of attaining registration. See [Profile](#)

Professional ethics: the accepted norms of conduct recognized in respect to a practice within a profession.

Professional responsibilities [of an engineering professional]: See [Responsibilities of Engineering Practice](#).

Professionally [or occupationally] competent person: is a person who has the baseline competencies for the professional role and has specific competencies for the actual work undertaken.

Profile: applied to a professional category, is a set of attributes that a person in the category would display and typical functions that these attributes would enable.

Programme: a structured, integrated teaching and learning arrangement with a defined purpose, usually leading to a qualification.

Programme outcomes: learning outcomes that must be fulfilled at the exit level of a programme that are consistent with the educational objectives. Synonymous with [Exit-level Outcomes](#), See [Educational Objectives](#).

Project management is the application of planning, organizing, and managing resources to achieve predetermined objectives of a project: scope, quality, time and cost, to the equal satisfaction of the parties. See [Operations Management](#), [Engineering Management](#)

Qualification: the formal recognition of a specified learning achievement, usually awarded on successful completion of a programme.

Range indication/statement: Required extent or limitations on expected performance stated in terms of situations and circumstances in which outcomes are to be demonstrated.

Remember: retrieving relevant knowledge from long term memory: recognizing, recalling. (Lowest level Anderson-Krathwohl action)

Regulatory body: is responsible for certifying competence through registration and regulating the practice of registered persons.

Research-based knowledge: a systematic understanding of knowledge and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of the academic discipline, field of study or area of professional practice.

Responsibilities of engineering practice: include: social responsibilities, ethics, health and safety and other legislation; cultural; environmental responsibilities, including sustainable development and design and legislative responsibilities.

Societal context [of engineering]: the aspects of society that are potentially or actually affected by any stage of the lifecycle of an engineering activity, both in a positive and negative way that must therefore be taken into account.

Solution synthesis: the process that is based on a problem analysis that develops alternative solutions to the problem, selects a preferred solution, develops it and evaluates it against stated criteria and other impacts. See [Analysis](#), [Problem Analysis](#), [Problem solving](#)

Solution: an effective proposal for resolving a problem, taking into account all relevant technical, legal, social, cultural, economic and environmental issues and having regard to the need for sustainability.

Specialisation: synonymous with specialty. Also Speciality

Standard: in the *educational context*, a statement of outcomes to be demonstrated, the level of performance required and the knowledge profile; in the *registration context*, see [Competency Standard](#)

Subdiscipline: Synonymous with *engineering speciality*.

Sub-problem: a lesser or constituent problem that results from the decomposition of a problem.

Substantial equivalence: applied to educational programmes means that two programmes, while not meeting a single set of criteria, are both acceptable as preparing their respective graduates to enter formative development toward registration.

Sustainable development: Development which seeks to produce sustainable economic growth while ensuring future generations' ability to do the same by not exceeding the regenerative capacity of the nature.

Sustainability: the condition sought by application of the principles of sustainable development.

Synthesis: the process of building a new concept, solution, design for a purpose by putting parts together in a logical way.

Teamwork: a mode of working in which a number of individuals having the range of competencies required to complete the work in an organised way to contribute to the achievement of the overall purpose.

Technical: 1: belonging to, peculiar to or characteristic of an art or science; 2: treating subject matter in a manner peculiar to an art or science; 3: requiring skilled application of established techniques.

Technology: is the process of applying an established body of knowledge to meet identified market and social needs. See [Engineering technology](#)

Tool: an aid to accomplishing an engineering task or assignment, including but not restricted to computing packages.

Transfer: the application of knowledge, ability and skill to perform actions in a context other than that in which formal learning took place.

Transferable skills: Skills acquired in one context that, with adaptation may be applied in another

context.

Understand: determining the meaning of instructional messages: Interpreting, exemplifying, classifying, summarizing, inferring, comparing or explaining. (Anderson-Krathwohl form)

Understanding: is the possession of knowledge coupled with the capability of reasoning and making judgements relating to the applicability of the knowledge. Synonymous with Comprehension.

Universal [engineering] knowledge: knowledge that is invariant of the context, for example the laws of physics.

Well-defined engineering activities: a class of activities with characteristics defined in section 4.2 of the IEA Graduate Attributes and Professional Competencies.

Well-defined engineering problems: a class of problem with characteristics defined in section 4.1 of the IEA Graduate Attributes and Professional Competencies.

Wider context of engineering: the economic, social, regulatory, environmental context in which a particular engineering activity is performed.

Wide-ranging: describes a set of considerations with different characteristics.