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Subject: BACKGROUND TO ACCREDITATION OF ENGINEERING DEGREE PROGRAMMES			
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BACKGROUND TO ACCREDITATION OF ENGINEERING DEGREE PROGRAMMES

Document Reference: EAB-A01-P

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Purpose of this Document

This document introduces readers to engineering degree programme accreditation and explains the engineering programme accreditation environment in Mauritius. It also provides background information on EAB's quality assurance and accreditation system.

This document also lists out in the Appendices the commonly used expressions, as well as Knowledge Areas definitions mostly reproduced from the Rules and Procedures of the International Engineering Alliance. The Appendices include a set of Abbreviations.

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CONTENTS

1. INTRODUCTION TO ACCREDITATION

1.1 Accreditation is defined in this document **EAB-A01-P** as the formal recognition awarded to an education or training programme through a quality assurance procedure that ensured it met the criteria laid down for the type of programme. In an environment where an engineering degree programme is accredited by recognised professional engineering institutions or regulatory bodies against accreditation standards and criteria set by the engineering profession, the accreditation carries an assurance that the programmes meet the reference standard.

1.2 The Institution of Engineers Mauritius, IEM, through the Engineering Accreditation Board (EAB), operates a quality assurance system that leads to the accreditation of engineering education programmes offered by the Higher Educational Institutions (HEIs) of Mauritius to an academic standard substantially equivalent to that advocated within the jurisdictions of the Washington Accord signatory institutions.

1.3 EAB has resolved, for the near and medium term, to limit its programme evaluation activities towards the accreditation of only those engineering degree programmes that are compliant with the National Qualifications Framework (NQF) Level 8 and which purport to satisfy the educational standard prescribed by the Council of Registered Professional Engineers of Mauritius (CRPE) for registration as a Professional Engineer, a status that permits the practice of professional engineering under the Laws of Mauritius. The set of documents that define the standards, criteria, policies and procedures is described in Section 1.3 of document **EAB-A10-P: *Accreditation Policy on Engineering Degree Programmes.*** The structure of the documentation is briefly described herein in section 5.

1.4 The International Engineering Alliance defines "engineering" as "an activity that is essential to meeting the needs of people, economic development and the provision of services to society". A Higher Educational Institution providing engineering education must therefore impart to its engineering graduates the essential attributes, viz. the knowledge and understanding, skills, abilities and attitude that the graduate would need, and depend and build on to acquire expertise and develop the professional competence that would subsequently be expected and required of him to engage in the activities within his discipline of engineering.

1.5 It must, therefore, be appreciated that the process of professional development in engineering is continuous but has important stages. Typically, the first stage is to meet the educational requirements that may be prescribed for entry into the engineering practice; thereafter, the graduate may benefit from a placement/enrolment on an approved State or Industry-sponsored training programme intended for engineering graduates who may be in search of opportunities towards acquiring industrial or other engineering experience necessary for registration with the Regulatory body; this being frequently a mandatory requisite for engaging in the practice of professional engineering. Graduates who desire professional registration, but who miss out on the sponsored training programmes, would necessarily need to seek employment opportunities from employers prepared to employ them.

1.6 The graduates achieving professional registration then gradually evolve from a phase where they performed engineering tasks under limited supervision to one where they have acquired such knowledge and expertise as would enable them to perform without the need for supervision as regards their engineering output. Their commitment to life-long learning and to professional ethics and values would have motivated them to keep abreast of technological advances in their field of practice and preparing them to face challenges ahead while making an effective contribution to the economy.

1.7 Holding an engineering degree accredited by EAB, or by any other Washington Accord signatory, is one way of meeting CRPE's requirements for Stage 1 (i.e., approval of educational qualifications), being the academic standard requirement for entry into engineering practice at professional level.

Section 2 of this document describes the purpose of accreditation and the guiding principles for the system.

Section 3 identifies EAB authority and obligation to accredit educational programmes.

Section 4 sets out the objectives of accreditation.

Section 5 describes the structure of the documentation system for the accreditation process.

Section 6 defines the method of calculating credits for courses and modules and sub-allocating these credits to knowledge areas.

Definitions of terms used in the system and abbreviations commonly used are presented in **Appendix A.1, A.2 and A.3.**

2. PURPOSE OF ACCREDITATION AND PRINCIPLES UNDERLYING THE EAB ACCREDITATION SYSTEM

2.1 The key purpose of accreditation, given the rigorous nature of the quality assurance system put in place by EAB, is to assure the public, students and their parents and advisers, employers, funding agencies and other stakeholders that

(i) the accredited programme fulfils its key purpose of providing the graduate with the educational foundation for engineering in a stated role at the professional level; and that

(ii) the teaching, learning and assessment processes are effective.

2.2 Fulfilment of the key purpose is confirmed by the programme's compliance with Criterion-1 [*Programme Educational Objectives and Programme Structure*] and Criterion-2 [*Assessment of Graduate Attributes and Assessment System*], defined in document **EAB-A03-P: *Criteria for Accreditation of Engineering Degree Programmes***. Criterion-1 ensures that the programme provides a coherent body of knowledge that is consistent with the purpose. Criterion-2 ensures that each graduate demonstrates key outcomes that are consistent with the purpose of the programme.

2.3 Providers of programmes (the HEIs) have the freedom to design and execute programmes that prepare students to meet the outcomes defined in Criteria 1 and 2. Providers are also responsible for assessing these outcomes.

2.4 Providers are expected to apply best practices in programme implementation as defined in Criterion-3 [*Teaching and Learning and Quality Assurance Processes*] and Criterion-4 [*Resourcing and Sustainability*] of the document **EAB-A03-P**. These criteria support the achievement of Criterion-1 and Criterion-2 and their effective delivery. Satisfying Criterion-4 also instils confidence that the programme is sustainable over the accreditation period and that capacity for necessary improvements exists.

2.5 Considering that with globalisation, local standards and practices converge to international norms, graduates of accredited programmes will practise in a globalised environment, even if they work locally. The accreditation system is, therefore, committed to international benchmarking of its standards and accreditation processes, and to be more specific, it is developed to satisfy the Requirements of the International Engineering Alliance (IEA) and conform to the IEA best practice. Criteria 1 and 2 are designed to be substantially equivalent to the Washington Accord's Graduate Attributes while Criteria 3 and 4 and the accreditation process follow IEA best practice.

2.6 It is reiterated here that the EAB accreditation standards and process relate to the Washington Accord for providing the educational foundation for Engineering Practice at the professional level. EAB is aware that there are corresponding standards and processes developed by the IEA within the Sydney Accord and Dublin Accord which respectively concern the educational foundation for Engineering Technologist and Engineering Technician practices respectively. Since the latter practices are not currently subject to any regulatory framework in Mauritius, EAB will defer consideration of accreditation framework to handle them.

2.7 Additional objectives of accreditation are set out in Section 4.

3. OBLIGATION AND AUTHORITY TO ACCREDIT ENGINEERING PROGRAMMES

3.1 IEM is a body registered with the Registrar of Associations, under the Registration of Associations Act (RL 4/465 – 24 April 1982), with objectives, inter-alia, to foster engineering science and its application in all engineering disciplines, and to ensure the highest standard of service in engineering, and additionally to promote excellence in engineering education through establishment of appropriate framework for setting and implementing standards and procedures for accreditation of engineering degree programmes to internationally recognised standards for entry into practice of engineering. IEM's initiatives must be viewed against the requirements of the Higher Education Act (No 17 of 2017) that any HEI offering programmes of studies in a discipline that leads to engagement in a professional practice regulated under a statute must be "approved by the relevant recognised regulatory body for that practice" prior to the HEI seeking "accreditation" from the Higher Education Commission established under the Act. Notwithstanding this development, the Engineering Accreditation Board (EAB) set up by IEM, is

required under the Constitution of IEM to consider any request for accreditation from any HEI offering engineering degree programmes and to take such steps as may be necessary to conduct the desired accreditation against Accreditation Standards, Criteria and Procedures approved by EAB.

3.2 Under a Memorandum of Understanding (MoU) signed with the Council of Registered Professional Engineers Mauritius (CRPE), which will be valid so long as IEM remains a member of the Washington Accord, the latter has therein,

(a) welcomed the setting up of the **Engineering Accreditation Board** and the governance structure put in place for IEM to deliver, through the EAB, on its eventual objectives to seek admission as a provisional member of the Washington Accord and eventually seek upgrading to signatory status, and

(b) undertaken to support and collaborate with IEM, both at the level of the Engineering Accreditation Board and the Engineering Accreditation Steering Committee.

(c) agreed to support EAB's system and process put in place for conducting programme accreditation to the standard anticipated by Washington Accord

(d) agreed and declared that any programme of studies in engineering that EAB may approve, or that it may accredit, subsequent to an evaluation of the programme against the Washington Accord accreditation standards, criteria and procedures, shall be deemed to satisfy the educational requirements for registration as a Registered Professional Engineer Mauritius under the Registered Professional Engineers Act, 1966, or as may be amended.

(e) additionally agreed and declared that any programme in engineering accredited by EAB as being substantially equivalent to and meeting the Washington Accord standard, shall also be deemed to fully satisfy the educational requirements for registration under the Act referred to in (d) above.

(f) duly recognised that EAB has established itself as the sole and uncontested organization within the Republic of Mauritius for the accreditation of programmes of studies in engineering benchmarked on the academic standards, criteria, and recommended

procedures set within the Washington Accord community of professional engineering bodies.

3.3 The provisions of the MoU may be considered in the context of the Higher Education Act (2017) which, after promulgation in January 2020, requires every HEI providing education programmes for a profession regulated under the Laws of Mauritius to be approved by the relevant regulatory body prior to the HEI seeking accreditation from the Higher Education Commission.

3.4 In accordance with the Accreditation Policy of EAB, the latter's accreditation intervention will focus on programmes and not on a department, school, and faculty or education institution.

4. OBJECTIVES OF ACCREDITATION OF ENGINEERING PROGRAMMES

4.1 Over and above the key purpose of accreditation mentioned in paragraph 2, accreditation serves several functions:

(i) It determines whether the graduate meets the educational requirement towards registration as a Registered Professional Engineer in Mauritius and, therefore, the graduate's readiness to enter engineering employment and is equipped to continue learning throughout his/her career.

(ii) It establishes the international comparability of engineering educational programmes under agreements to which IEM is a signatory, especially as accreditation also evidences a substantial equivalence of an EAB accredited programme with similar programmes accredited by other Washington Accord signatories.

(iii) The accreditation process provides the HEIs with the tools and mechanisms to monitor, assess, evaluate and improve the quality of their programmes.

(iv) It encourages improvement and innovation in engineering education in response to national and global needs.

(v) The accreditation label associated with a degree assures students of the recognition status of the programme within the engineering profession, hence guides them on their choice.

(vi) It is a pointer to discerning employers as to the higher inherent potential of graduates from accredited programmes.

4.2 Other aims of EAB in instituting an engineering accreditation regime are:

(i) to provide guidance to programme providers on requirements and criteria that their programmes will need to satisfy for eventual accreditation,

(ii) to contribute to the improvement and development of engineering degree programmes through feedback from its members and the industry,

(iii) to contribute towards producing better performing engineers for both research and the industry, especially to meet the global challenges ahead.

Documents Defining the EAB Accreditation System

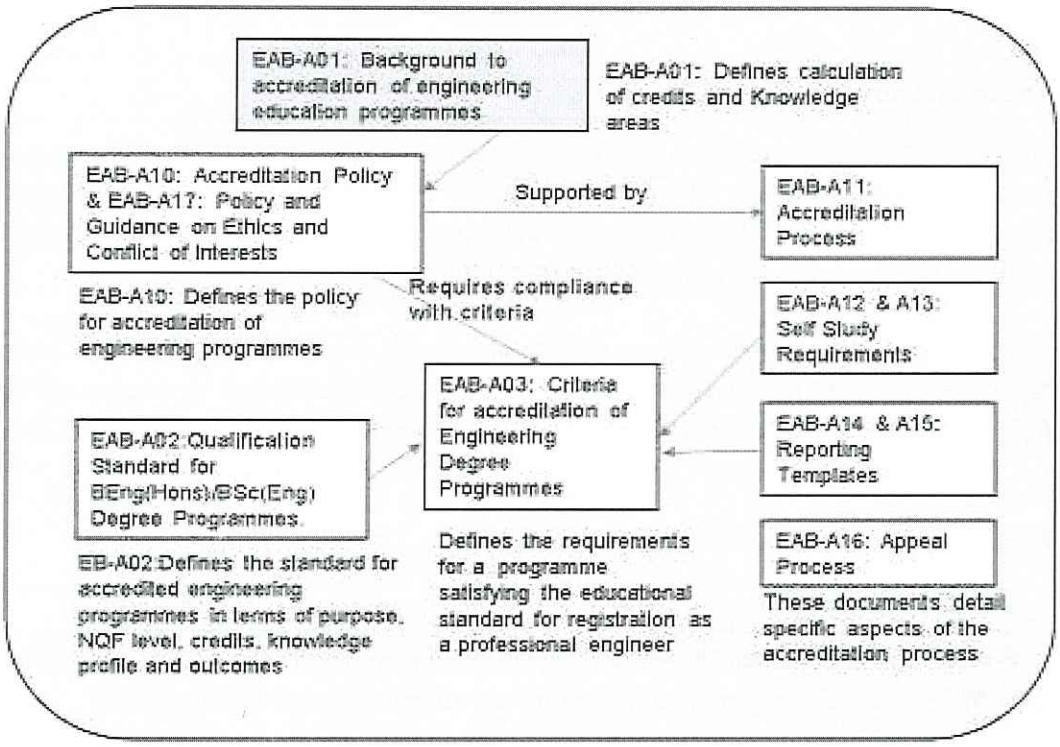

Chart EAB-A01

5. STRUCTURE OF THE EAB ACCREDITATION DOCUMENTATION

The structure of the accreditation documentation and the relationships among individual documents are shown hereafter in Chart EAB-A01. The documentation system is modular and has a number of elements, which are described in section 5.1 to section 5.4. The present standards are identified only for practice of engineering at the professional level, which is presently regulated in Mauritius. The current document is shown highlighted in Chart EAB-A 01

5.1 Standards

The document **EAB-A02-P:** ***Qualification Standard for Bachelor of Engineering (Hons)/ Bachelor of Science (Hons) in Engineering Programmes*** specify the permitted qualification designations, knowledge profile and graduate attributes that are incorporated into the accreditation criteria for the accredited programmes.

5.2 Accreditation Criteria

5.2.1 The accreditation criteria are the set of requirements, which if met by the programme, indicate that a programme is of adequate quality and include the programme educational objectives, structure, learning outcomes achieved, educational process, resourcing and sustainability. The accreditation criteria are defined in document **EAB-A03-P**.

5.2.2 The standards supplement the accreditation criteria. For instance, Criterion-2 (*Assessment of Graduate Attributes and Assessment System*), which is detailed in document **EAB-A03-P** requires that defined Graduate Attributes for the programme type are assessed by the provider.

5.3 Policies and Procedures

The accreditation policies and process are defined in a set of modular documents:

EAB-A10-P: ***Accreditation Policy on Engineering Degree Programmes.***
EAB-A11-P: ***Procedure for Arranging and Conducting Accreditation Visits.***
EAB-A12-P: ***Self-Study Documentation Requirements for Accreditation of Engineering Degree Programmes.***
EAB-A13-P: ***Tables and Forms for Use with Self-Study Documentation.***
EAB-A14-P: ***Format for Accreditation Visit Team Report and Recommendations.***

EAB-A15-P: ***Format for Accreditation Visit Leader's Report.***
EAB-A16-P: ***Procedure for Appeal/Review against Accreditation Decisions.***
EAB-A17-P: ***Policy and Guidance on Ethics and Conflicts of Interest.***

5.4 Listings of accredited programmes.

EAB-A20-P: ***Accredited Programmes Meeting the CRPE Stage-1 Requirements***
Note: No engineering degree programme has been accredited as at the date of this document.

5.5 Best Practice and Training Manual

EAB may develop and issue guidance on best practice in accreditation and training material from time to time. This material is informative. The normative documents listed in sections 5.1 to 5.4 take precedence in all cases.

6. Calculation of Credits (Accreditation Credit Units)

6.1. All reference to credits or Accreditation Credit Units (ACU) within the standards, policies and procedures means credits calculated according to the procedure presented in this document. The method for calculation of credits is presented below. The method of calculation assumes that certain activities are scheduled on a regular basis while others can only be quantified as a total activity over the duration of a course or module. This calculation uses the following estimates:

6.1.1 Classroom or other scheduled contact activity generates notional hours which include contact time in addition to student preparation time. The total is given by a multiplier applied to the contact time. The maximum notional hours for assessment in a semester, including student preparation time, is given by a multiplier applied to the actual hours of assessment.

6.1.2 All multipliers used need to be determined by the education provider and must be justified.

6.1.3 Assigned work generates only the notional hours judged to be necessary for completion of the work and is not multiplied. The education provider must assign the values indicated in Table 1 for each course or module identified in the rules for the degree.

TABLE 1

Values for each Course or module Type of Activity	Time Unit (Hours or Fraction of Hour)	Contact Time Multiplier
Total Lectures: L	T_L [=duration of a Lecture period]	M_L [Total work per Lecture period]
Total Tutorial: T	T_T [= duration of a Tutorial period]	M_T [=Total work per Tutorial period]
Total Practical: P	T_P [=duration of a Practical period]	M_P [=Total work per Practical period]
Total Other Contact periods: X	T_X [=duration of other contact period]	M_X [=Total work per other contact period]
Total Non-Contact Assignment Hours: A	T_A [=1 hour]	
Assessment Hours (outside time accounted for under L, T, P, X and A): E	Hours	M_E [=Total such work per assessment hour]

The Total Credit is the sum of each of the number of in column (1) multiplied by the Time Unit multiplied by the Multiplier for that activity

The EAB credit for the course is:
$ACU = \{L(T_L)(M_L) + T(T_T)(M_T) + P(T_P)(M_P) + X(T_X)(M_X) + A(T_A) + E(M_E)\}/10$

Note: 1 credit (or ACU) = 10 notional hours

Credits for ***Work-Integrated Learning*** are accrued at a rate of ***one credit per 30 hours of work*** or an equivalent activity.

The education providers must be able to justify all values used. In allocating the credit for a course to multiple knowledge areas, only new knowledge or skills that are explicitly assessed may be

counted towards a particular area. Knowledge and skills developed in other courses and used in the course in question shall not be counted. Such knowledge is classified by the nature of the area in which it is applied. In summary, no knowledge is counted more than once as being new.

7. REVISION HISTORY

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APPENDICES

Appendix A.1: General definitions

Source: International Engineering Alliance (Extended Glossary) & Engineering Council of South Africa

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

Academic support: A process that provides additional learning support to students who are not prepared for the normal curriculum; also means academic support that may be provided prior to or in addition to the normal curriculum.

Accreditation (of programmes): Formal recognition awarded to an education or training programme through a quality assurance procedure that ensured it met the criteria laid down for the type of programme.

Accreditation criteria: Statements of requirements that must be satisfied by a programme in order to receive accreditation.

Accreditation visit: An evaluation of an engineering education programme based on examination of documentation and an on-site inspection to determine the programme's conformance with accreditation criteria.

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 Taxonomy)

Assessment: The process of determining the capability or competence of an individual by evaluating performances against standards.

Assessment criteria (also referred to as Accreditation Criteria): A set of measurable performance requirements, which indicate that a person meets a specified outcome at the required level.

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 problems: A class of problems with characteristics as defined in document **EAB-A02-P.**

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: 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]: Process of spoken, written and graphical exchange of information, views, and 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: 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 problems with characteristics as defined in document **EAB-A02-P.**

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 the assessment that, if completed successfully, provides credit toward a qualification. Often synonymous with *Module*. The 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

ECTS Credit: (if and when referred to) Unit defined by the European Credit Transfer System to measure the volume of learning, and includes learning done outside classroom and laboratories.

Education provider: A public or private higher education institution or body legally established to offer education programmes to the public. (synonymous with *Higher Educational Institution*)

Educational accord: 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 objective: A statement of the intended achievement that graduates of a programme must be capable of accomplishing, especially a few 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: 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: A problem that exists in any domain that can be solved by the application of engineering knowledge and skills and generic competencies.

Engineering problem-solving: The process of finding solutions through a conscious, organised approach that relies on the application of engineering knowledge and skills and generic competencies.

Engineering Programme Accreditation Committee (or Accreditation Committee): The committee established by EAB in accordance with the Policy of EAB as provided for in document **EAB-A10-P** to receive Accreditation Visit Reports and to take decision thereon.

Engineering qualification: 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: A*n 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: 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: Engineering practitioner whose role is to apply established the methods or techniques of an area of practice.

Environmental: Relates 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.

*Engin*eering *ethics*: See Professional Ethics

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

Evaluation: Determination of the compliance of a result with prescribed criteria based on documentation, inspection and the application of judgement supported by reasoning.

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 (synonymous with Graduate Attribute): A statement of the learning outcomes that a student must demonstrate at exit level to qualify for an award of a qualification; these actions indicate the student's capability to fulfil the educational objectives; also referred to as and used synonymously with Graduate Attributes.

External moderation: A moderation process in which the moderator(s) are not in the employ of the provider and neither make any input into the programme nor have they any prior contact with the students.

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: A person successfully completing an engineering degree programme

Graduate attributes: 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 area: A classification of curriculum content into defined types.

Knowledge profile: the broad characteristics of the different components of the knowledge embodied in a programme. A description of the knowledge of a graduate in terms of the type and balance of knowledge in defined areas.

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.

Moderation: The process of ensuring that assessment of an individual meets the required standard and is consistent, objective and fair.

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.

Notional hours: The estimated learning time taken by the 'average' student to achieve the specified learning outcomes of the course-unit or programme.

Operations management: The ongoing, repetitive, cyclical semi-permanent activity to deliver services or produce products. See Project 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.

Pathway: Defined arrangement of teaching, learning and assessment within a programme that is one-way of gaining the award of a qualification.

Performance indicators: 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;

Practice area–at the professional level: A generally recognised or distinctive area of knowledge and expertise developed by an engineering practitioner through the path of education, training and experience.

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: Agreement that provides 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: 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 Graduate Attributes. [See Educational Objectives].

Project management: 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

Provider: Means a higher education provider except if the context indicates otherwise

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.

Self-study report: A provider's account of how a programme meets each accreditation criterion and all applicable policy requirements while covering all methods of programme delivery and all possible pathways for completion of the degree.

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: 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.

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.

Specialisation: Synonymous with specialty. Also, Speciality

*Stage 1: depending on context, designates t*he first stage (Eligibility: Approval of qualifications) in the process of registration as a Registered Professional Engineer with the Council of Registered Professional Engineers Mauritius (CRPE) at which an applicant fulfils the educational requirements prescribed for registration.

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: Depending on context, may mean 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 problems with characteristics defined in document EAB-A02-P.

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.

Appendix A.2: Knowledge area definitions

Complementary studies: Studies that cover disciplines other than engineering sciences, natural sciences and mathematics, which are relevant to the practice of engineering and include engineering economics, management, the impact of technology on society, effective communication, the humanities, social sciences and other areas that support an understanding of the world in which engineering is practised.

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

Engineering design and synthesis: 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 applying engineering sciences and working under constraints while taking into account economic, social, environmental and health and safety factors in addition to codes of practice and applicable laws.

Engineering sciences: Have roots in the mathematical and physical sciences and where applicable, in other natural sciences; extend knowledge and develop models and methods in order to lead to engineering applications and to solve engineering problems.

Mathematical sciences: An umbrella term embracing the techniques of mathematics, numerical analysis, statistics and aspects of computer science cast in an appropriate mathematical formalism.

Natural sciences (also referred to as basic sciences): Comprise physics (including mechanics), chemistry, Earth sciences and the biological sciences that focus on understanding the physical world as applicable in each engineering disciplinary context.

Appendix A.3: Abbreviations

Abbreviations used in the EAB -A series of documents include the following:

AC: Accreditation Committee
BEng: Bachelor of Engineering
BEng (Hons): Bachelor of Engineering with honours
BSc(Eng.): Bachelor of Science in Engineering
CRPE: Council for Registered Professional Engineers
EAB: Engineering Accreditation Board
ELO: Exit-level outcome, also Programme Outcome or Graduate Attribute
GA: Graduate Attribute; also see ELO
HEA: Higher Education Act (2017)
HEA/HEC: Higher Education Authority /Higher Education Commission.
HEI: Higher Education Institution
HEQC: Higher Education Quality Committee
HEQSF: Higher Education Qualifications Sub-Framework
NQF: National Qualifications Framework
OBE: Outcome Based Education
PEO: Programme Educational Objectives
PO: Programme Outcome (synonymous with Graduate Attribute)
QAA: Quality Assurance Authority.
TEC: Tertiary Education Commission

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